

on lost time accidents, doctor's care injuries, or minor injuries. Conclusions drawn from any one of these areas applies to the other areas because there is a high correlation between the various types of accidents. For example, in one study made by the author it was found that lost-time-accident employees averaged 6.3 minor injuries during the one year period involved, whereas other employees had an average of only 3.1 minor injuries.

Similarly, employees having doctor's-care-injuries averaged 5.5 minor injuries whereas others had only 3.0 minor injuries per employee. It has long been recognized that a definite relationship exists between lost time accidents, doctor's-care-accidents, minor injuries, and no-injury accidents. What is equally important, although usually not realized, is that this relationship extends to the specific individuals involved. Further, there is a high degree of relationship between one period and another. The individuals who have most accidents during one period are the same individuals who have the most accidents during another period. These relations facilitate behavioral research on accident prone employees. After all, you cannot expect to have an employee who is so accident prone that he breaks his leg four times in one year. Accident prone research can thus be based on minor injuries which are quite frequent, and conclusions will be found to hold for the more important lost time accidents which are relatively small in number and consequently difficult to analyze mathematically.

The procedure for detecting accident prone employees is relatively simple. All employees who have worked during all of the selected period are listed together with the number of injuries they sustained. A frequency table showing the number of employees having each number of accidents is constructed, and the average of accidents per employee is computed. The actual average number of accidents sustained is then used as a basis for computing how these accidents would be distributed if no accident prone employees were contained in the group being studied, these computations being made from figures obtained from appropriate tables of Poisson's exponential binomial expansion.<sup>1</sup> A comparison

of actual and expected frequencies readily shows the presence or absence of accident prone employees.

Figure 3 given the results of an accident prone investigation in a paper mill. The period covered was one calendar year during which time a total of 946 employees sustained 3074 minor injuries. The figure shows that 309 employees sustained no injuries during the year, whereas a chance distribution would lead one to expect only 37 employees having no accidents. On the other hand the number of persons sustaining 4, 5, 4, 5, or 6 injuries was less than would theoretically be expected.

This would indicate that the safety work done within the mill was not only highly effective, but the point of diminishing returns had been reached, and little further improvement could be expected by an expansion of the type of safety work being done. A slightly larger number than expected sustained one minor injury. Inasmuch as those having from two to six injuries was smaller than expected, we can conclude that accident investigations and subsequent action on persons having a single injury were effective in preventing further accidents. So far, the picture is highly favorable. When we compare the actual and expected frequencies of those having seven or more injuries we see that many more employees were included than could be expected. In fact, 79 persons had ten or more injuries (maximum of 53) whereas we would expect only two persons in this group. These are the employees who are accident prone and whose behavior must be studied intensively on an individual basis. They are the persons who, for one reason or another, are not being reached effectively by the type of safety work currently being done. They are also the persons who are affecting the accident rate to the greatest degree. In fact, the elimination of accident proneness of these 79 employees (8%) would result in a 45% decrease in total minor injuries. A reduction of this size should be welcomed by any safety director.

Figure 4 gives the same type of data for the Minneapolis Gas Light Company. The data are based on all injuries (minor and major) which occurred between 1942 and 1946 inclusive. Figure 4 shows that more than the expected number of employees were accident free, and less than the expected number sustained one or two accidents. This attests to the effectiveness of the current safety

work so far as the bulk of employees are concerned. Again, however, there is seen to be a relatively small number of accident prone employees whose behavior needs to be investigated. The worst 2 per cent of the em-

ployees account for 18 per cent of the accidents, and the worst 7 per cent of the employees account for 44 per cent of the accidents. Again an exceedingly fruitful field of endeavor has been brought to light.

FIGURE 3  
COMPARISON OF ACTUAL AND EXPECTED DISTRIBUTION OF MINOR INJURIES  
(X Paper Mill, 1946)

| Injuries per Employee | Employees Having These Injuries |                         | Difference |
|-----------------------|---------------------------------|-------------------------|------------|
|                       | Actual                          | Theoretical Expectation |            |
| 0                     | 309                             | 37                      | 272        |
| 1                     | 173                             | 119                     | 54         |
| 2                     | 124                             | 194                     | -70        |
| 3                     | 67                              | 210                     | -143       |
| 4                     | 46                              | 170                     | -124       |
| 5                     | 35                              | 111                     | -76        |
| 6                     | 27                              | 60                      | -33        |
| 7                     | 20                              | 28                      | -8         |
| 8                     | 22                              | 11                      | 11         |
| 9                     | 14                              | 4                       | 10         |
| 10 and over           | 79                              | 2                       | 77         |
| Total Employees       | 946                             |                         |            |
| Total Injuries        | 3074                            |                         |            |
| Injuries Per Employee | 3.25                            |                         |            |

FIGURE 4  
COMPARISON OF ACTUAL AND EXPECTED DISTRIBUTION OF INJURY ACCIDENTS  
(Minneapolis Gas Company, 1942-1946)

| Injuries per Employee | Employees Having These Injuries |                         | Difference |
|-----------------------|---------------------------------|-------------------------|------------|
|                       | Actual                          | Theoretical Expectation |            |
| 0                     | 243                             | 205                     | 38         |
| 1                     | 91                              | 120                     | -29        |
| 2                     | 23                              | 41                      | -18        |
| 3                     | 15                              | 9                       | 6          |
| 4                     | 8                               | 1                       | 7          |
| 5                     | 2                               |                         | 2          |
| 6                     | 2                               |                         | 2          |
| 7                     | 1                               |                         | 1          |
| Total Employees       | 385                             |                         |            |
| Total Injuries        | 243                             |                         |            |
| Injuries per Employee | .63                             |                         |            |

Similar analyses can be made of specific departments and similar results will be found. Figure 5 gives such data for a department wherein the work consists essentially of installing and adjusting gas appliances. The work contains numerous hazards. After all, gas is an explosive, and the employees within this department deal with defective burners

and leaking gas. They send most of their time on consumer's property and are thus susceptible to the many hazards which may be present. In spite of all these hazards, the safety record is good; an average of almost one injury per man per five years. Again, the effectiveness of the safety work is seen for the majority of employees. Three per cent of the

<sup>1</sup>Tables available in Pearson, Karl, *Tables for statisticians and biometrists*, Cambridge Press, 1934; and Molina, R. C., *Poisson's exponential binomial limit*, D. Van Nostrand Company, 1943.



employees account for 15 per cent of the accidents, and 10 per cent of the employees account for 36 per cent of the accidents.

FIGURE 5

ACCIDENT PRONENESS INVESTIGATION BASED ON WORKMEN'S COMPENSATION ACCIDENTS BETWEEN 1942-1946 INCLUSIVE  
Minneapolis Gas Light Company  
Utilization Department

| Accidents per Employee   | Actual | Expected |
|--------------------------|--------|----------|
| 0                        | 42.5%  | 57.2%    |
| 1                        | 31.0   | 36.8     |
| 2                        | 16.1   | 18.2     |
| 3                        | 6.9    | 6.0      |
| 4 or more                | 3.5    | 1.8      |
| Number of Employees..... | 27     |          |
| Number of Accidents..... | 86     |          |
| Average Accidents.....   |        | .99      |

These are the employees who must be reached if any appreciable accident reduction is to take place.

Not all departments will indicate the presence of accident prone employees. Figure 6 gives one such. The work consists primarily of repairing and rebuilding gas meters including dealing with tinsmith and various other hand and power tools, soldering irons, metal plating baths, spray guns, etc. Figure 6 shows that more than the expected number of employees sustained a single accident during the five year period, but that fewer than the expected number had no accidents and no employee had more than two. This department has no accident prone employees, the cause perhaps being the elimination of accident proneness as soon as any employee has a single accident.

Many additional figures could be presented. Those given, however, should serve to illustrate typical findings.

Having determined who are the accident prone employees within a company, plant, or department, the next step consists in finding the causes of the accident proneness. This must necessarily be done on an individual basis, for the cause will vary from one employee to another. Records of all accidents in which the employee was involved should be studied carefully. Caution must be used to avoid concluding that each accident was a

"break," occurred by chance, or has a cause different from the other accidents of the employee. Although this may be true for a

FIGURE 6

ACCIDENT PRONENESS INVESTIGATION BASED ON WORKMEN'S COMPENSATION ACCIDENTS BETWEEN 1942-1946 INCLUSIVE  
Minneapolis Gas Light Company  
Meter Shop

| Accidents per Employee   | Actual | Expected |
|--------------------------|--------|----------|
| 0                        | 46.7%  | 54.0%    |
| 1                        | 49.7   | 32.9     |
| 2                        | 6.7    | 9.9      |
| 3                        | .0     | 2.3      |
| 4 or more                |        |          |
| Number of Employees..... | 15     |          |
| Number of Accidents..... | 9      |          |
| Average Accidents.....   |        | .60      |

single accident, the multiplicity of accidents shows that a common factor appears in most or all of the accidents of this employee.

In order to find this common factor all records must be studied. These include physical, psychological and psychiatric examinations if available, employment records, absenteeism records, and all others available. Opinions of the employee's supervisor should be obtained, and the employee's work habits should be observed carefully. Frequently it is desirable to hold lengthy interviews and discussions with the employee himself. Far from resenting this, it will usually be appreciated by the employee if it is handled properly. The employee does not want to have accidents, it is merely a case of not being able (under the existing circumstances) to avoid them. In all probability he will be a most willing cooperator if he thinks that he will not be blamed or penalized in any manner.

The possible causes of accident proneness are legion. Physical causes include defects of vision, hearing, and coordination. Physiological causes include organic diseases, blood pressure, fatigue, excess of food or alcohol, senility, etc. Psychological causes include emotional upsets caused by worry concerning job success, discharge, layoff, demotion, ability to get along with the supervisor, fellow employees, or subordinates; out-of-plant worries in-

volving the home and family; lack of personality adjustment; poor attitudes; and many others too numerous to mention here.

The cause of accident proneness may be largely the fault of the supervisor. Lack of sufficient training or an improper type of training is often involved. An employee who is correctly trained will have far fewer accidents than will others. Safe work habits and unsafe work habits are equally easy to learn. It is exceedingly important to train new employees or old employees on new jobs, in safe work habits. If our training is adequate, the workers will have so overlearned safe methods that they will react almost automatically in the safe way.

A very fundamental technique for eliminating accident proneness is that of proper job placement. Discussion of this technique will be left to the following two speakers.

In summary, I have attempted to make the following points.

1. Safety engineering from the mechanical point of view has been highly effective in the past, but has reached and sometimes exceeded the point of diminishing returns. It must be continued to maintain our present safety record, but cannot logically be expected to make any further significant reduction in our accident rate.

2. Mass safety appeals, such as typified by the educational or inspirational approach, have likewise been highly effective but have

reached the point of diminishing returns and cannot be expected to result in any further significant reduction of our accident rate.

3. The accident rate of today is much higher than it need be, and can be reduced sharply if personality and behavior are given their proper emphasis.

4. The prestige due safety has suffered immeasurably because the typical Safety Director has wasted his time on relatively unimportant matters and so failed to do constructive work in the area of employee personality and behavior.

5. A relatively small number of employees account for the great majority of industrial injuries. These employees are so highly susceptible to accidents that they cannot avoid having them regardless how anxious they may be to do so.

6. The accident rate of any company or department is highly dependent upon the number of accident prone employees within that company or department.

7. The accident proneness of employees must be eliminated on the basis of study of individuals rather than generalized mass techniques.

8. Individualized remedial work to eliminate accident proneness must be along the lines of employee placement, employee training, and correction of personal factors of physical, physiological, and psychological nature.

### Values of Job Placement in Accident Control

By WILLIAM H. HOLLIS

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This matter of job placement, its values, and its methods, needs some "straight talk" on what is really being done about placement in industry rather than what is being written and said about it. For every careful and scientific job of proper placement in the shop, there are probably a dozen resting upon collective misunderstanding, badly administered and inadequately interpreted testing programs, hastily planned and incredibly prejudiced or incompetent interviewing, and all the mumbo-jumbo characteristic of moral metaphysics and pseudo-science. And for every

unscientific placement job, there are perhaps one hundred instances in which there is no attempt at proper placement whatever beyond the feeble efforts of some well-meaning but grossly uninformed "straw boss." This is no theory; it is from shop experience.

At the outset, we are not going to discuss the placement, testing, and interviewing of supervisory and managerial personnel. Much has been said about that; much has been written on that; and perhaps too much money and time are being spent on that. There are countless agencies of consulting personnel ex-





perts charging anywhere from \$10 to \$25 a man-hour or more who can provide industrial management with assorted statistical reports, bi-serial and cosine-pl tetrachoric centroid correlations, and Rorschach records in seventeen colors. Please do not misunderstand me. Some of this stuff is good and some of this stuff is practical. But where does it start—top management? Does it ever get down in the shop? Do the boys in the shop smile knowingly when the "psycho-guy" comes around with his red pencils and "answer sheets"? My theme, as usual, is Old Joe Shopman, and his proper placement.

Let us take a specific, concrete instance to show why we are going to talk about the placement of Old Joe Shopman, rather than Eddie the Executive. In a certain plant well-known to some of you, management was considering expanding its machine-shop facilities. It also wanted an industrial manager of personnel. Expansion of the shop involved about fifty skilled workers at the kind of rate that skilled men are getting these days, considerably over one dollar an hour in the majority of cases. The industrial management job analyses had not been made and the job evaluation rested upon various chance factors and snap judgments between six and ten thousands dollars a year.

Getting the machinery of expansion in motion, the company really gave Eddie the Executive a workout. He was interviewed, extra-viewed, and lectured by fifteen company men from the assistant chief interviewer to the chief industrial engineer. He was pre-tested, tested, and post-tested with everything from putting dots in holes to rhapsodizing about the meaning of ink-blots. Believing Eddie was emotionally insecure, temperamentally maladjusted, and constitutionally unable to make important decisions, the plant psychologist and the several cooperating consulting organizations had to turn in an exhaustive and exhausting report on Eddie the Executive.

Reading several varieties of crystal ball, remembering that they could not forget that Eddie's made was a controlling machine, and Eddie's leather was a personified manager of the chief subsidiary—they really gave Eddie a proper placement report. Written in the best parchment-like and parapsychological style, it was found that Eddie was a screwball that he would fit in any job, anywhere there was an ill-conditioned rivet-

chair with photogenic secretarial accessories. How much did it cost to put Eddie in that chair? Let us not lay any statistics end to end until we get to those fifty Joes, Shopmen, and their placement.

These shopmen came in one by one. When the office girl and the bored employment clerk were not busy filing papers, they had a nice talk on the weather and how much the job paid before the last rate review. Some of them were asked to fill out various papers, others had worked in the shop before and had been laid off, and some knew the foreman, a fellow brought in by the new factory superintendent, a production-pusher from Detroit. The fifty men were finally hired and the shop got underway at a total estimated labor cost of several thousand dollars a month, roughly as much as Eddie's job was worth in a year. Incidentally, after trying out a test on a couple of the shopmen, the idea was dropped because the fellows said they could not write and did not want to be like "school-kids again."

Within the first month, one of the shopmen had a broken arm. But he wasn't a lost-time case the way they figured it. They paid him his \$1.53 an hour just to stick around and look busy with his good arm. He was given several rest periods to improve shop morale and union relations.

Another shopman made a mistake—this fellow always made mistakes, it was the way he was born perhaps—and he stuck an open-end wrench instead of a part into the moving parts of an \$18,000 jig bore. That was not a lost-time case either. It was just an "accident," no one was injured. Of course the machine needed some new castings and shafts and several hundred hours of repair and adjustment, but that did not get into the statistics on accidents. That just made the production control expenses worse at his boss about delivery schedules not being met. The downtime even got in the cost accountant's report, but it was reported wrong.

Mistakes, errors, accidents? They are all of a kind—and this shop had its share, more than its share, because there was no proper placement program.

Gentlemen, it is an old story—penny-wise and pound-foolish. Spend thousands of dollars on placement reports for Eddie to reach a decision everyone knew ahead of time and place Eddie in a job handling correspondence

at a few thousand dollars a year. Meanwhile, the shopmen who will handle a hundred thousand dollars of material and equipment a month are pulled in off the streets, looked at and talked to for fifteen minutes, given a few tools and no job instruction, and told to go to work. In a month's operation the accidents, the errors, the mistakes, and the lack of planned performance of that shop cost the company ten to twenty times the value of Eddie's job when that job is performed at its peak efficiency. Is your company spending thousands of dollars on overhead jobs and job placement? Is your company neglecting the hourly workers proper placement? Are you having costly injuries, property damage, production slow-downs, and expensive production delays that the neglect of proper placement so often entails?

Make no mistake about it: Old Joe Shopman, and the thousands like him, with his human equipment, his assets and liabilities, are your company. If he is properly placed and suited to his job, he is capable of backing and helping to build a great enterprise for you. If he is haphazardly thrown into the shop and pushed around in the office, he is capable of mistakes and accidents of incalculable cost. We are not here thinking about the conscious wreckers and strike-happy fanatics, they are a minority and can be controlled. We are talking about Old Joe and his unconscious mechanisms, his emotions, his sentiments, his unanalyzable loyalties, the main springs of his action and decision. An ill-placed man is a dangerous man. Could there be any better demonstration of the value of proper placement to operating management and the salary man?

Let us define a few terms, as the professor does, so that we shall understand one another. Obviously, the values of job placement are both negative and positive. If a man does a job, he is placed, either poorly or properly, as the case may be. If he is properly placed, positive values accrue. If he is poorly placed, negative values accrue. These men and his value involve what we make or get out of it if we do it properly and what we lose if we fail to do it properly.

Now to define "Proper Job Placement." We can get all "guffed up" in detail on this one. The elements of proper placement, I submit, are four:

1. Job Analysis
2. Man Analysis
3. Actual Job Placement
4. Periodic Follow-Up

Job analysis involves methods analysis, job breakdowns, and process analysis. It also involves breakdowns of physical demands, environmental or work specifications, and psychological specifications required for the proper performance of the job.

Man analysis involves determination and measurement of all personal factors of each working individual and applicant which are relevant to a specific and analyzed work situation or standardized occupational method. This involves obvious personal factors like physical condition, experience, and education. It also involves factors of job information and knowledge, skills, and attitudes. It may even involve various measures of physical, physiological, psychological, and psychosomatic factors.

Actual placement involves "cashing in" on all that foregoing analysis. You all know of the plant manager who gets ready to abolish an unproductive department. He calls for a short departmental analysis by the industrial engineers. The industrial engineers, after four months and four fat reports, recommend several changes in the department. The plant manager abolishes the unproductive department, writing a few changes in industrial engineering at the same time, in a one-page memorandum—reading time, two minutes.

Actual placement requires the use of analysis and reports, and this must be the scientific matching of workers and jobs. If the analyses are not made, or if they are not used, we cannot expect proper placement.

Let us really use the analyses to help us make better decisions on placement. The analyses are not substitutes for good judgment; neither are they window-dressing for our instincts and prejudices when we are doing a placement job.

Periodic follow-up means exactly what it says. We may follow-up haphazardly or well. In some plants it is apparent that what ever follow-up of placement there is, it is a function of contract, procurement, and material shortages. If it is not a part of the permanent policy of personnel and employee service, it may be of little value.



Safety men are giving a lot of industrial engineering into their talk. We used to call it "accident prevention"—now it's "hazard control." Sounds as if engineers are trying to "Wound Out" of prevention and get into it. So the "accident" doesn't come down off to the "irreducible minimum," like the last thing kitchen found. A lot of people believe that there will always be these things, these accidents. Sometimes they don't hang there.

Accident will have many "any unplanned event," any mistake, error, mis; a "larger thing." If it is unplanned, it is an accident. If it is planned, it is not accidental; it is "on purpose." But we are going to limit accidents here to certain kinds: "unplanned events which cause, produce, or occasion production losses." Of course there are a lot of accidents that do not interfere with production.

Lastly, control, in deference to the language of my very technical colleagues who have a high respect for physics and mechanics—a language for which I have a transcendental respect, especially when it is used accurately, with a minimum of adjectives and poetry and a maximum of logic and mathematics; control will be that practical activity of the engineer which determines and efficiently produces a desired outcome. Control, then, is the process of getting results, in this case accident-free production, planned and controlled production.

Now to the values, positive and negative, of job placement for accident control. Let us look at the grim and hard facts first. We can blow trumpets and sing songs of salvation later. In the America that lies ahead there is a huge job to be done. Since Pearl Harbor five American civilians have become disabled for every disabled American soldier. At least 1,500,000 men and women in the civilian population have limiting disabilities. And every year their number increases by 500,000, through accidents and illness or from congenital causes. On an average day about seven million people stay away from work on account of illness, injury, or other disabilities. Today, we must not only make plant conditions safe, we have to learn to make the work worthwhile.

Let us look at a few actual cases of placement.

1. A parts-chaser recently got out of the

shop with a severe psycho-neurotic disability. He applied for a job in the plant from which he had been drafted. He was put in exactly the same job he left, chasing parts, despite the fact that his whole behavior and appearance betrayed a serious mental disorder. This job was an exceptionally nerve-shattering type of work which called for a completely balanced and highly self-contained type of cooperative sociability. By this time that parts-chaser has probably "cracked-up." And it may well end in a permanent disability much more severe than the present one.

2. A veteran with loss of a portion of his left leg applied for a job in a small furniture repair shop. The ill-fitting prosthetic device he wore was not comfortable. After several nine-and-a-half-hour shifts standing at machine and bench, with only very occasional rests, his condition became very painful. The kid had guts, he was nineteen, a person with the morale of a Marine. You can add your own ending to this one.

3. A new operator is placed on an automatic multiple-spindle screw machine as an understudy for the set-up man. The set-up man instructs the operator in how to make adjustments when the machine is in motion. While adjusting the depth of thread on the tapping-yoke, the operator's hand is caught in the automatic indexing of the spindle carrier. You can add your own ending to that one.

4. In one small shop in New England the night shift is paid a bonus in addition to straight piece-rate. One of the milling-machine operators gets in the shop under the influence of liquor and goes to sleep in the tool crib after abusing and otherwise molesting some of the boys in the shop. Awakening after four hours of the night shift have elapsed, he works with such speed at the machine to make his rate that he has an accident involving severe personal injury and property damage. That story goes on into traffic accidents and murder.

5. An untrained semi-skilled operator is placed on a job involving various dangerous chemical operations at high temperatures. Despite his known lack of experience and training, his youth, and his recent employment, these all added up to a very severe leg wound which destroyed a large part of the muscle. Now he hobbles around in the same shop.

6. How many machine-shop old timers have held their hands up before you, indicating one or two missing fingers, and how many of these losses were the result of improper placement?

And how about the values for people? You cannot run a business solely with machines, or production, or money, or material, or profit—you run a business with people and for people. Maybe we might have fewer production problems if we did not have so many men in the shop who "gum up the works." But all the mechanization and manufacturing engineering in the world will not dispense with Old Joe, Shopman. Improved mechanization just makes him more dangerous if he is badly placed.

It was a good idea to have a good look at this area of negative value that arises with improper placement. It keeps us away from the starry-eyed sky-pilot who has a scheme for stopping all accidents tomorrow just by taking his little pink pill for proper placement.

There have been many outstanding contributions to the field of job analysis, man analysis, and placement procedures. Immediately one thinks of Tiffin, Viteles, Bingham, Garrett and Schneek, Western Electric, General Motors, the program of The Adjutant General's Office of World War II, the work of time and motion study, the Gilbreths, Barnes, and Carroll and Mogenson, the work of the Veterans Administration under Scott, and the work of the many advisement and guidance centers throughout the nation.

For work that illustrates the value of proper placement in accident prevention we are immediately reminded of the careful work of Bridges, and the program of rehabilitation, selective placement, and training of the National Conservation Bureau and the Center for Safety Education, New York University. The men connected with these programs, principally John Grimsdick and Dr. Wagner, had to go out and make very careful and controlled studies of proper placement and its procedures.

But the fact remains that the values that could accrue to employers in the development of adequate programs of selective placement are hampering only a small portion of American industrial enterprise. This is only another way of saying what we have said before—that much is written and said about proper placement now, it is a fashionable subject, but all too little is being done in step three and four, actual job placement and periodic follow-up.

We are all told that industry's job is to make a better product at a cheaper price. We are all told that America must produce and produce again. We must reward both the employee and the employer with the results of their labor. We all want expanding business, good customer relations, and good relations with organized and unorganized labor. We want to meet our promises, meet our schedule dates and contractual obligations. We want to have our production planning and control, our production forecasting, really mean something. We want to prove to the stockholders and the general public that we have a healthy and productive business. If we are to meet the many challenges of that kind, we shall have to meet the problem of accidents, errors, and mistakes long before they are allowed to destroy the outcomes of the work situation. This means not just proper placement but a continuing and practical program of proper placement with all that it entails in the way of analysis and supervisory training.

Accident prevention, a part of production management and engineering, calls for adequate and effective production planning and control. And when industry finally decides to spend as much time and energy on taking a better and continuing look at Old Joe, Shopman, as it presently does on its bills of materials, operations, flow charts, manufacturing information, and customer specifications, it may be that we shall enter a new era in which the practices of selective placement and job analysis are as common a part of employment policy as are contracts and agreements concerning wages, hours, and conditions of work.



## Psychiatric and Psychological Procedures in Job Placement (Digest of a Talk)

By ARTHUR WEIDER, Ph.D.

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The older, traditional selection and placement procedures because of their subjective element, unscientific methodology, erroneous assumptions, unreliable and invalid results must be replaced by the more modern, scientific psychiatric and psychological methods.

Steps must be taken to improve the employment interview situation by introducing courses designed to train employment interviewers in human relations and interviewing procedures. The guided or standardized interview and the weighted application blank broadens the perspective of employment interviewers. The more familiar psychological tests must be investigated for the purpose of eliminating many misconceptions and abuses that have developed as a result of their misuse by untrained persons.

Some words of caution concerning the proper introduction of these new techniques must be enunciated such as: the necessity for careful research prior to routine use; trained psychological personnel in charge of entire program; management philosophy contingent upon selective placement rather than on outright rejection.

Experiences with psychiatric and psychological methods used in World War II especially in the Office of Strategic Services (OSS) can be used for the purpose of illustrating techniques which can be reconverted for industrial application, e.g., the "stress interview" and "situational testing."

Enlightened management must incorporate human relations into its framework if it wishes to keep pace and progress in this Atomic Age. Improving its methods of selection and placement by the inclusion of the latest psychiatric and psychological procedures is a step in the right direction.

The value of psychiatric and psychological selection and placement procedures to industrial organizations may be listed as follows:

1. Indicate applicant's major fields of interest, background, and training suggesting directions in which he is likely to develop and thereby signify the type of work likely to yield success.
2. Determine potential capacity in intelligence, aptitude, and skill thus revealing general level of promise and signifying the job level candidate may reach and so determine training possibilities.
3. Ascertain limitations as well as assets so that selective placement may yield the greatest return in efficiency and job satisfaction.
4. Afford a check on the type of new employee admitted to the organization hence controlling its morale, efficiency, turn-over, accident-rate, etc.
5. Foundation to a new industrial philosophy wherein humanics, or human relations, or human engineering is invited to supplement the technological program and "know-how" in order to make this the happiest, the healthiest, and the most efficient nation as well as the most powerful.

We may sum up the factors to be considered with psychiatric and psychological procedures in job placement as follows:

1. Program must be supervised by trained personnel.
2. Research in the form of validation must precede routine use of procedures.
3. Special batteries must be assembled for use with supervisory personnel.
4. Psychological tests are today being supplemented with the weighted application blank, the guided or standardized interview, and training courses to employment interviewers in order to perform selection and placement more effectively.

5. Projective techniques, "stress interviews," "situational testing" and other new, dynamic methods in the hands of experts can reveal extremely valuable, and pertinent data relevant to proper job placement.

6. A more complete picture of the applicant is today achieved prior to placement gleaned from the application blank, the interview, the tests of intelligence, of aptitude, of interests and tem-

perament, and of various dimensions of personality make-up including emotional stability.

In conclusion: Enlightened management must incorporate human relations into its framework if it wishes to keep pace and progress in this Atomic Age. Improving its methods of selection and placement by the inclusion of the latest psychiatric and psychological procedures is a step in this direction.



## Safety Belts

THURSDAY MORNING SESSION

October 9, 1947

Presiding: WILLIAM F. YANT, Director, Research & Development, Mine Safety Appliances Company.

### Physiology of Safety Belts and Harnesses

By FRED A. HITCHCOCK

Professor of Physiology, Ohio State University

The problem naturally divides itself into two parts. First, the tolerance of living human tissue to impact force. If this were known we could then determine what forces could safely be applied to the human body. Second, what are the impact forces which result when a man falls in different positions while wearing various types of safety belts and harnesses.

At present there is absolutely no data on the first of these main topics. We have initiated a research on this subject involving cooperation between the Departments of Physiology, Gross Anatomy, and Mechanical Engineering. Since it is obviously impossible to carry out studies on actual living tissue, we are using fresh bodies. The testing of tissues is done by a physiologist using the standard methods and apparatus employed in the Mechanical Engineering Department for testing the strength of materials. We have begun with what is probably the simplest and easiest tissue to test, that is bones. We have been determining the force necessary to fracture a rib, the amount of distortion produced, and the point at which the fracture is most likely to occur. At first, individual ribs were tested. Following this we split a thorax in two parts and tested each side separately. The next step will be tests carried out on a complete thorax. At present, apparatus is being constructed for such tests.

The tests are to be carried out while the body lies on the table of a fluoroscope, and we plan to observe by means of the fluoroscope, and we plan to observe by means of the fluoroscope the distortion which occurs when forces of various magnitude are applied to the thorax. With the same apparatus it

will be possible to make x-ray photographs at critical points in the experiment. Data of considerable importance has already been collected in this way.

In later stages of our work, we hope to be able to test the tolerance of soft tissues to impact forces and in this way determine, for instance, the force necessary to tear the mesentery or to rupture the liver.

The second phase of the research involves determination of the impact force resulting from different types of falls in various sorts of safety belts and harnesses. Some work has already been done on this phase of the problem. Drop tests with a dummy wearing a safety belt and equipped with devices for measuring the decelerative forces acting at various points on the body have been carried out. Later these tests will be extended to include drop tests on living subjects. We also plan to make a survey of the accidents in various industries employing such safety devices and in this way determine the type of hazard most likely to occur. The ideal solution of the problem, we believe, will involve the construction of a dummy so built that the various organs and tissues are accurately reproduced and containing built-in strain gauges by means of which we can automatically record the stresses and strains which develop in all parts of the body when the dummy is dropped for various distances and in different positions. It will then be possible to determine the protective benefits of various types of safety devices and, if the limit of tolerance of the human body is already known, to predict what injuries would result from the impact force resulting from various types of falls.



### Physiology of Safety Belts (Panel Discussion)

#### Members of the Working Committee:

J. C. ASKAM, Safety Dir., The Ohio Oil Co.  
ROLAND F. BLAKE, Senior Safety Eng., Div.  
of Labor Standards, U. S. Department of  
Labor

E. W. BULLARD, Pres., E. D. Bullard Co.  
J. B. DAVIES, Mgr., Industrial Dept., Mine  
Safety Appliances Co.

JOHN A. DICKINSON, Div. of Safety Codes,  
National Bureau of Standards

J. B. FORCHER, Personnel Dept., Ohio Edi-  
son Co.

C. W. ROSE, Pres., Rose Manufacturing Co.  
F. A. VAN ATTA, Industrial Hygienist, Na-  
tional Safety Council

DR. YANT: We would like to hear the in-  
dustrialist's viewpoint and get the picture  
for further help and assistance for this re-  
search project, being conducted by Dr. Hitch-  
cock, Mr. Joffe of Ohio State University.

MR. BROWN (Consolidated Edison,  
N. Y.): I wonder if Dr. Hitchcock plans to  
make some studies on the effect of accelera-  
tion on the spinal cord, particularly. Most  
of our falls have resulted in dislocated verte-  
brae which resulted in partial or total dis-  
ability of the spinal cord.

MR. MILTON JOFFE: I have done a few  
experiments on individual vertebrae and they  
have been somewhat inconclusive, but the  
textbooks state in this case also that, for in-  
stance, the first lumbar vertebra is the one  
most often injured. We know that the first  
lumbar vertebra will actually crush before  
the intervertebral disc will give way. The  
disc is of cartilage which is a softer material  
and has more give. In my few experiments,  
I have never been able to observe exactly  
what happens. I have either crushed them too  
much, or not enough. If you crush them too  
much, you can tell it by observing a whitish  
fluid or polypoid. When you see that, you  
know you have crushed the vertebral body  
itself. In several cases where the body had  
been injured, the disc had also been injured.  
I don't know yet whether the disc would be  
injured first.

The difficulty with handling the spinal  
column is handling it as a whole. It is not

just a straight rod. It has three distinct curva-  
tures and it is difficult to find any machine  
that will fit it. I don't know whether we can  
find a mechanical testing machine that will  
do it.

We think it is extremely important, and as  
important probably as the strength of the  
ribs themselves and yet, because of the curva-  
ture, it is going to be difficult for us to work  
on it.

The spinal column has a convexity, a lum-  
bar region, a concavity and another convex-  
ity, looking at it from the front. It is not  
straight up and down. Every normal one that  
anybody has ever seen has a slight curvature  
from the left over this way and down to the  
right again. That presumably shouldn't be  
there. It should be straight up and down,  
but every normal one has a curvature. To  
maintain the proper relationship, it might  
be a good idea to have some sort of a casting  
made to hold it exactly that way and then  
put the pressure on it. You don't know  
whether normally, it would increase one  
curvature over the other or not.

MR. JOHN DICKINSON: An analysis has  
been made of injuries to persons on elevator  
platforms when the safety was applied or  
which struck off buffers. This may be of a  
little value. A thin man will generally suffer  
injuries to the arch. A heavy man will often  
have back injuries which complicates the  
thing. A thin man will go through a bad  
stop on a buffer or a safety with only ankle  
injuries, while a heavy man probably will  
have a bad back injury.

MR. W. MACLACHLAN (Chairman of  
A.S.S.E.): I was wondering if the use of these  
whirling gadgets that were used in pumping  
the gears on deceleration could be used on  
suits prior to using on the body in the drops.  
We have a piece of apparatus in Toronto,  
that we used in developing deceleration suits  
and I was thinking that might be applied at  
this time.

I am delighted of course, to see the ad-  
vance that is being made in this research  
and others. Some of us had visions of what  
might occur and we are simply repaid in  
what is coming out because as you well said,

the detailed data that is coming up will go  
much farther afield in the design of safety  
belts.

MR. BRITTE (Safety Clothing and  
Equipment Co.): I would like to ask Mr.  
Joffe if he has information as to the age of  
the bones.

MR. JOFFE: These individuals were ap-  
proximately 40 years of age, medium height  
and weight. It may seem to you that 40 years  
old is fairly old to consider for the sort of  
people we are designing these things for,  
but the bone structure, which is all we have  
been interested in so far, remains unchanged  
from early adulthood, about 25 until approxi-  
mately 60. The bone structure remains al-  
most identical and it makes no difference  
there. When we come to investigating the  
muscular condition, then we shall need  
younger individuals.

The material we got was from the ana-  
tomical department which has shown a lot  
of cooperation. They know exactly what we  
want and they recognize a good specimen.  
They have the whole history of the individ-  
ual we are going to use and in many cases  
they know of conditions that would make  
the material unsuitable for us. They know  
of conditions that we are not aware of, so  
that they do the selecting of the material  
and I have no doubt that the material they  
are giving us is perfectly normal and free  
of any other conditions that would change  
these results at all.

QUESTION: I raised that question to de-  
termine whether, in arriving at your con-  
clusions, you take cognizance of the fact that  
men in advanced years may be useless.

MR. JOFFE: We will take that into con-  
sideration at a later study. I think the only  
way to go about this is to get, as far as pos-  
sible, normal, healthy, younger individuals,  
because everything else is a variation from  
that. If you don't know what the normal  
standard is, you can't possibly tell what is  
going to happen in individuals that are not  
essentially normal.

QUESTION: Will you arrive at a figure  
where you will have anything like a safety  
factor?

MR. YANT: I think the first thing is to de-  
termine the actualities and then as safety  
engineers and designers, as users demand  
some factor of safety, put it in. In designing

a bridge, you have to apply a safety factor  
to take care of the contingencies. We focus  
our eye on that after we get the strength of  
materials, the piece of steel. Then we use  
that strength to design something and apply  
a safety factor.

MR. ROSE: I would like to ask Mr. Joffe  
to what extent the bones were dried out and  
if the moisture in them had an effect on the  
results.

MR. JOFFE: They were essentially as you  
find them in the body. The anatomists as-  
sured us that most of these things had been  
preserved in the formalin for some length of  
time, but the formalin does not affect the  
bone structure itself. It affects the muscular  
components. As Dr. Hitchcock said, we can't  
go to the dissecting room and take a speci-  
men and run tests on the whole body. For  
that we shall need fresh bodies—that is the  
only way to put it—but for the bone itself,  
as long as they haven't been taken out and  
dried, they are essentially as you find them in  
the body.

DR. FRED HITCHCOCK: There are two  
methods of approach we haven't used yet. I  
would like to know the value of these meth-  
ods of approach, or what value this audience  
thinks there might be in these methods. I  
have been desirous of obtaining an analysis  
of injuries that occur when people fall in  
safety belts. If we knew the most common in-  
juries that occur and in what parts of the  
body those injuries occur, and the types of  
falls, that would help us a great deal.

The other approach that we have been con-  
sidering is a tour of inspection of industries  
using safety belts and harnesses, in an effort  
to determine the most common hazards, what  
falls occur most frequently, and any differ-  
ence in those falls in the various industries.

MR. YANT: I think both steps might be  
desirable. You gentlemen have heard the re-  
quest and if anyone has something, there  
may be some way the Council can make a  
broader survey of such information.

MR. DICKINSON: I think the New York  
State Department of Labor which covers  
window cleaners' belts and harnesses for the  
state may have some data. They are revising  
their window cleaners' belt code right now.

MR. BLAKE: They promised me they  
would go through the record and get the  
material together.



Now that we are having to throw a challenge at A.S.S.E. to do a better job, and our tie with the Council will be strengthened rather than the reverse and our spirit of usefulness will be greatly extended—I am wondering whether it would be proper for this committee to direct a request to A.S.S.E. to make a canvass of their members that might make a study. Reports coming in are primarily for the purpose of financial compensation, and we don't get the data necessary to tell us much of anything about the kind of information Dr. Hitchcock wants.

DR. YANT: That is a proper request. After all, this is not a single effort. It is not only Dr. Hitchcock's and Mr. Joffe's jobs. They are interested from a professional standpoint. They are doing a job for us. We are spending money to get this done. Now if we can't get together and contribute to get the most for our money, there is something wrong with us from an investment angle. I think Mr. Blake is entirely in order to suggest some means or call for some help, and I think it should be taken seriously and supplied.

MR. ROSE: Might I suggest that if this job is turned over, for instance, to a local chapter of the A.S.S.E. and they put out data in terms of their industry or the individual membership and so on, I am a little worried for fear those men will not know just what kind of report is wanted. They might write a report that will give a lot of information that is not of any use and leave out most of what is of use. I wonder if it wouldn't be proper procedure for the steering committee with the assistance of the two gentlemen, to get out a form on which to report, showing just what information we do need, and then put that out to the Engineering Society chapters.

DR. YANT: I think that is correct. It is up to you gentlemen of the steering committee to decide what you want and give the pattern and the format and get the mechanics which with which to have it filled in.

MR. DICKINSON: Dr. Hitchcock will want a much fuller medical report than you would get in the average injury report.

DR. YANT: That is true, but let's take what we can get.

MR. BLAKE: If we can get the reports of the injury from the hospital record, that will give it to you.

DR. YANT: Another phase of this job is the matter of anchors. The Bureau of Standards has given some thought to anchors and is making some contributions and I would like to have John Dickinson speak on that subject.

MR. DICKINSON: The question of anchors is of vital importance to window cleaners. The late Wesley Graff started work on impact loading on belts, and together with the Underwriter's Laboratories, set up and made drops with a dummy. They found that the stresses on the fastenings on the window were tremendous. If I remember correctly, Mr. Graff had taken some 100 window cleaners' fatalities and grouped them as to types. Broken down, 95 per cent or 97 per cent were due to defective window anchors and roughly a third to mechanical failures of belts, and a third to personal error.

New York State in revising its code, has been going into this question of window anchorage quite extensively. Mr. George Kehoe, in his early years out of Cornell, worked at the Bureau of Standards for a while in metallurgy. He is interested in some of the failures that have been cropping up. They have found that some of the bronzes and bronzes that are high in zinc will eventually fail. As the metallurgist would put it, it is due to the "dezincification" of the alloy.

Some of the companies have recommended silicon bronze. They have had some failures. One of them was on the State Office Building at 80 Center Street. Some hooks had been replaced in December of last year and this summer a window cleaner put a little note on one saying that the fitting had torn loose, swinging him around. One of the holding screws of silicon bronze, had parted at the head and let the forging swing around. The man did not drop.

An investigation was started, and 11 failures in the fastening screws that attached these silicon bronze forgings to the steel window sash were found. We have taken two of those to the Bureau of Standards for investigation and analysis.

Some of the same batch of screws were put in a vice and beaten with a ball peen hammer until the heads bent to a 45 degree angle and they showed no sign of cracking or stress.

The installer then wrote to the brass company which furnished them and they replied: "We do not advocate silicon bronze for any part of window cleaning equipment exposed to weather." A similar inquiry to another copper and bronze company brought a similar reply. Apparently, they are not willing to recommend silicon bronze for this purpose.

Stainless steels apparently have been quite satisfactory, but are difficult to forge. If you attempt to forge them when they are not up to the correct forging temperature, you may develop incipient hair cracks that will spread and give failure. Mild carbon steel, galvanized, has given fairly good service as long as the galvanizing coat remains intact. Even after that coat is broken, the position of zinc welded to iron in the logical chemical series is such that it give protection and not accelerated corrosion. Apparently the materials available today are galvanized steels, ordinary steels, carbon steels, stainless steels. Monel metal has a clean bill of health, as well as some of the low zinc bronzes.

Tentatively, the committee in New York has set a limit of non-ferrous material, of not more than 5 per cent zinc. That is tentative and may be revised before the code is printed.

MR. J. C. ASKAM: We are limited in our industry. We are users of safety belts and derrick belts and we are trying to keep up with the research being done in our state. We have found where the percentage of humidity is very low and a hydrogen sulphide condition present, a new belt cracked like glass fibers. I believe in further research, something might be developed along that

line. The reverse is true in areas along the Gulf Coast. We have observed that where they have a high percentage of humidity and a poisonous gas condition, the fibers become very rotten. As a result, brand new belts given the usual test of two sacks of cement for a free drop break very readily.

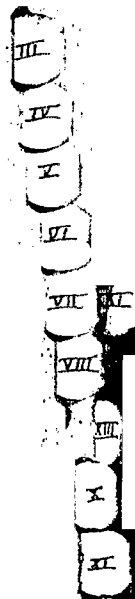
That is not the manufacturer's fault, but is due to conditions that exist and the usage of these very important and very necessary pieces of apparatus in the oil industry. Some of the state laws require safety belts and derrick belts to be given a severe test and this project would be something the oil industry would be very pleased to have undertaken.

MR. McCLELLAN (Southern Pacific Railroad): In roundhouse work it becomes necessary for men to get up on the running boards of hot locomotives where the fire has not been killed and do minor repairs. We have had a difficult time selling the use of life belts due to two facts: one the weight of them, which I think we have overcome with a lightweight belt; and another that men in many cases feel they are trapped.

Has there been developed a safety belt that will give the safety factor and at the same time have the advantage of instant releasing?

DR. YANT: I think if you will go down to the exhibits, you will find quite a few people that will show you belts that have quick releases.

As I told you at the start, this is an interim report and I am hopeful for some real results on something that has been completely absent in the past. If there is nothing more to be added or contributed, we will call the meeting adjourned.



# Safety Instruction

WEDNESDAY MORNING SESSION

October 8, 1947

Presiding: HERBERT J. STACK, Director, Center for Safety Education, New York University.

## New Hires

By D. G. VAUGHAN

Mgr., Engineering & Inspection Dept., Aetna Casualty & Surety Company

Many concerns have given considerable attention to introducing the new employee into their organizations. Others merely turn him loose and let him learn through hard knocks and experience. We are told from various studies of the accident record of new employees that this period, when the job is strange, is very dangerous. The commonwealth of Pennsylvania made a study in which it was found that 7.8 per cent of the injuries occurred to employees of less than one month employment; 9.6 per cent occurred to those with service of one to three months; and 9.8 per cent between three and six months. This study further showed that 37.8 per cent of the accidents occurred to employees with less than one year of service. I will agree that this does not give us a clear picture unless we knew the percentage of employees that were new to the industries. I think, however, that anyone will agree that these figures show the percentage of accidents to new employees is high.

An employee's first impressions are likely to be lasting, and, therefore, safety training should be a part of the early introduction into the company. Some programs are limited to before actual work commences, while others wait until the employee is actually on the job. Others carry through safety teachings in different phases.

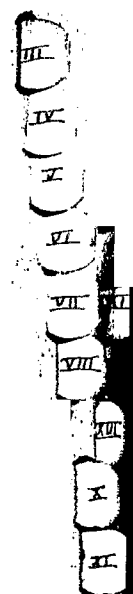
The new employee should be acquainted with the company policy with respect to safety. This may be accomplished through a

booklet, a talk, an interview, or a class. Whether written or oral, the company policy with regard to safe operation of the plant should be emphasized early. Often bulletins or pamphlets in the waiting room at the employment office are used to start the prospective employees thinking about safety.

Many employment managers question prospective employees concerning their past safety training and safety record. Safety rule books are often distributed at the employment office. Many of these booklets contain a slip to be signed and returned, indicating that the new man has read and thoroughly understands the safety rules and regulations.

Aptitude tests are used to better place the applicant with respect to his knowledge and previous training. Physical examinations are used to better place him, giving due consideration to any physical defects. Job training is used where the new employee is not familiar with the type of work to which he is being assigned. Questionnaires of various sorts are used to determine whether or not the new man has acquired sufficient safety knowledge from the material which had been presented to him. A follow-up of these questionnaires is most useful in making sure that the man thoroughly understands safe operation in the plant. An example of one of these questionnaires is illustrated by the following 14 questions:

1. What would you do in case of an oil fire?



2. What would you do in case of a magnesium fire?
  3. What would you do in case of an electric fire?
  4. What would you do in case of a paper fire?
  5. What precautions should be exercised in the use of an air hose?
  6. What do you do in case of an injury to yourself—no matter how slight?
  7. What precautions should you take before starting on a job left by someone else?
  8. Who should be the first one to know of a mistake made or discovered by you?
  9. What precautions should be taken when working in the vicinity of flying particles?
  10. What would you do if a fellow workman received an electric shock while working at his machine and could not let go?
  11. What would you do if a fellow workman became caught in his machine?
  12. When do you use gages provided for the job?
  13. When do you use micrometers of the various types?
  14. How often should your gages and micrometers be checked?
- Another type of questionnaire lists the following ten questions:
1. Why is the teaching of safety desirable or necessary for all employees in the plant?
  2. What are the main reasons for attempting to reduce accidents?
  3. Why should safety work in a plant be organized?
  4. What are the most common causes of accidents in your department?
  5. Is there any connection between safety and health?
  6. Are accidents more frequent during any particular hours of the day or day of the week? What are such times and days, and why?
7. Do you know what is the most common cause of fire in this plant?
  8. There seems to be some doubt as to the best method of removing steel splinters from the hand. Which method is best?
    - (a) The tweezers
    - (b) A knife blade
    - (c) A scribe
  9. A cover for a fixture must be drilled and counterbored. Would you hold it in parallel, in a vise, or on a block of wood?
  10. You are using a ladder. The safest way to place it is to have the distance the ladder is away from the wall equal to:
    - (a) One sixth of the length of the ladder
    - (b) One-fourth of the length of the ladder
    - (c) One-half of the length of the ladder

These questionnaires, in addition to giving the safety director some idea of the prospect's previous safety training and knowledge, do start the prospective employee thinking about accidents. They are made to realize that the company is very much interested in accident prevention.

New employees are also instructed by the personnel or safety departments either through an introductory lecture or training class. The exact method depends on the size and organization of any particular concern. Such initial or introductory training may take up many important subjects, but certainly safety and accident prevention should be allotted a sizable amount of time in any introductory talk or training course.

With safety commencing practically at the entrance door to a plant, a new employee is certainly started in a proper manner and at a time when he is most anxious to learn company policies and attitudes. An early start in safety training will make the future accident prevention work and safety instructions much more effective.

I think that the best way to know just what can be done with respect to training is to briefly study the program of one or two large companies that have adopted rather extensive programs. In reviewing material

that is available on the subject, I found the following comments with respect to a program used by Proctor & Gamble Company of Cincinnati, Ohio, as described in the August 1947 issue of the magazine entitled, *Factory Management and Maintenance*.

An employee's job in the plant is as safe as it is secure. This may seem like a large statement to make of a concern with a national reputation for job security. It can be made largely because of a program of safety training which begins the minute a new employee or a transferred worker leaves the placement office. His instructor is his foreman.

Personalized safety instruction of this type helps new employees feel at home right away. It helps convince them that their welfare is a matter of major importance. It enlists their interest and cooperation in other phases of a program designed to insure good employer-employee relations.

Moreover, initial training forestalls many ills that might plague the company safety program in its long term operation. Actually the entire safety job is made easier when new employees start off convinced that the safe way is the correct and only permissible way to work.

Safety training for the new employee begins in the placement office before he is assigned to his job. A member of the personnel department tells him about the company's safety policy and gives him a copy of a booklet which is a cartoon illustrated summary of company information, including a chapter that lists rules of general safe practice, tells the employee about proper clothing and personal safety equipment, deals with fire prevention, and lists safety precautions for the use of tools and equipment in the plant.

The new employee is turned over to his department foreman who takes up the task of safety instruction. He first explains and demonstrates all the various types of fire extinguishers in the plant.

The foreman continues his safety instruction by showing the employee how to use the evacuation alarm and what's to be done to clear the building in case of fire or other emergency. As instruction proceeds, the foreman questions the worker step by step to make sure he understands the operation of the safety equipment.

Ready to start training on his job, the employee receives his own personal safety equipment. Its purpose and use are explained to him. During the next three or four weeks the foreman will have scheduled talks with him, demonstrate additional safety procedures, and continue to check the employee's understanding of subjects that have been previously explained. Regular ratings on the safe working habits of each new worker are made and kept for reference.

A social call is made at the plant hospital. The new employee is told what medical care is available and how important it is that he report immediately to have any injury treated no matter how slight it may be.

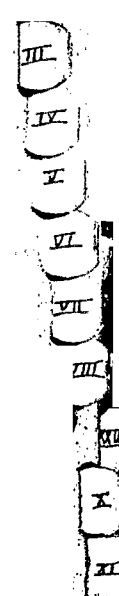
Bulletin boards display the specific rules of each department. The foreman explains their application and points out that frequent reading of special notices will reward the employee with timely tips of how to play safe.

The safe way is the only way to do a job. The foreman explains that the switch must be locked before machinery is adjusted. At the same time, he cites common sense reasons that make this a good practice to observe without exception.

Within this first week of work the new employee is visited by the factory safety engineer who follows up the foreman's weekly report of new employees. Together, safety engineer and employee review the latter's training to make sure no part of the initial instruction has been overlooked.

Another program for new employee training was developed by the Lamp Division of the Westinghouse Electric Corporation in Bloomfield, New Jersey. Over a two-year period the frequency rate for new workers dropped from 6.85 per cent to 2.87 per cent and the division is sure that most of the 47 per cent reduction may be attributed to its 45-minute induction program.

Accident prevention is the major aim of the program. A major part of it, therefore, is devoted to safety. A chart kept by the medical department of serious injuries to new employees is the "Horror" exhibit. A tabulation showing that the number of accidents has been reduced from 22 per month to three, is used to prove that recognizing the fact a hazard exists and then doing something about it, pays off.





Another benefit of the induction program is the lift in the new employee morale. Many new workers have been heard to say, "How nice it is to work for a company that takes time to welcome its new employees and to explain basic policies!"

This program extends through a 45-minute period which is broken down into

- (1) Welcome—5 minutes
- (2) Safety talk—30 minutes
- (3) Suggestion system and other information—10 minutes.

The welcome consists of a greeting plus a few words to put the audience at ease. Then follows an introduction to the company's products. Employees are told how their work fits into the overall picture of the completed product. Next follows a half hour talk and discussion of safety and the accident problem. This talk is varied from time to time by making use of topical and seasonal subjects and events. For instance, in January, the New Year's holiday week-end toll was used as a talking point to drive home the need for safety in all things and at all times.

New accident experiences are utilized for their educational and corrective value. A blackboard is used to emphasize certain aspects in the talk and other visual aids—such as, materials involved in accidents, defective tools, etc., and safety equipment is called into play for its dramatic value. Throughout the talk the personal human factor in accidents is emphasized along with a strong plea for the elimination of unsafe attitudes and work habits. Everyone is invited to participate in the plant safety effort and to act as a safety committee of one, in his own behalf.

The suggestion system is also explained and everyone is invited to use it, particularly as a medium for effecting safer work conditions and increased earnings.

Noticeably good results from the program have been observed by the suggestion department. An appreciable increase in the number of new suggestions was noted after the induction training program had been established a while. This increase was attributed to the information given in the plant suggestion system to all new employees. An induction training program is indeed an in-

vestment—a necessary one and if properly conducted will more than justify its existence.

This gives us examples of new employee training programs. There are many others with numerous variations. Practically everyone agrees, however, that safety should commence at the employment office. The safety department should be in the picture during the introductory talks and when the employee is turned over to his department head or foreman, it is the duty of the supervisor to continue the safety instruction.

Certainly we should not go back to the days when the foreman said, "Well here is the machine, Joe, you go ahead and operate it." The foreman has more responsibility than this and should be sure to give full safety instructions, before leaving the employee on his own. Careful and close checkup by the supervisor is necessary during the first few hours, days, and even weeks. The safety department and safety committee should also keep close check on the new employee. He should be encouraged and aided in observance of safety rules, use of safe-guards, wearing of safety equipment, etc.

We know that the new employee is more apt to be involved in an accident than is the experienced worker. This propensity to accidents can be overcome to a great extent through a thorough and continuous safety indoctrination program. There are many details or methods, the selection of which depends on the size and organizational setup of a particular company. Whatever details are incorporated into the final program, these few thoughts should be kept in mind:

- (1) Safety thoughts should begin at the employment office.
- (2) Safety instruction should be thorough and include the company's policy with regard to safe work.
- (3) The foreman or supervisor should continue the safety instruction to its completion.
- (4) Safety indoctrination of the new employee should be followed closely by the safety department and the safety committee.

With these accomplished, the new worker is gradually absorbed into the company operation and continues on with his safe operation, sliding easily into the plant safety program which, if it is effective, is a continuous

affair. Thus have you not only brought the new employee through his training period, but you have prepared for the plant one more worker who wants to and will conduct his work in the safest possible manner.

### Why Call Them Handicapped?

By JOHN V. GRIMALDI

Director, Industrial Safety, National Conservation Bureau

There truly is no sharp difference between the handicapped and the normal. For the sake of attempting to be clear, here is an accepted definition of a physically impaired worker, "One who requires selective placement in order for him to be successfully employed." That seems like a simple way of segregating those of us who have physical impairments from those of us who supposedly do not. But it doesn't take much in the way of investigation to determine that there is no sharp difference between this group and the so-called normal. A review of an average case study or two is all that is necessary to awaken the realization that there is no difference from a personnel point of view. For example, James M. McDermott (not his real name) went to work for an airplane company during the war. It was the practice of this company to permit the foreman to inspect the job applicants and McDermott was selected by the foreman in charge of the final assembly of light bombers. There is no way of knowing what characteristics of McDermott's appealed to the foreman, for the supervisor's decision was purely a subjective one. McDermott was big, muscular, red-haired and pleasant. If you think of ability to do work in terms of physical size, McDermott appeared to be a one-man gang. But, within a few weeks time, his foreman was disappointed in the limited amount of production that McDermott accomplished in comparison to other workers.

McDermott was also a regular visitor to the first-aid room to receive treatment for minor accidents of one kind or another. His frequent need for first-aid attention was noticed by the safety department in the weekly reports, and McDermott was asked to pay a

visit to the safety director. The purpose of the interview was to learn, if possible, why McDermott got himself into accidental trouble so much more often than most of the other workers in the plant. McDermott said he didn't know why he injured himself as much as he did. Some how or other, as he explained it, he would be going through the motions of his job and all of a sudden, the screw-driver would slip and puncture his finger, or he would bang his head on a sharp corner of the airplane structure, or trip over a riveter's airline.

"Do you like your job?", the safety director asked. "Oh, I guess it's all right," said McDermott. "But I just can't feel comfortable doing it. I always feel that it is a personal battle between me and the assembly line. I can't help a nervous inclination that I have to not only keep even with the pace of the assembly line, but to be just a little bit ahead so that if I am forced to slow down, for some reason, my foreman won't think I am a poor producer." "But isn't it true," the safety director asked, "that in spite of this desire to keep ahead of production you are really not actually keeping even?" "I guess that is right," McDermott answered. "But I would be ahead if I wasn't so tense while I was working." "I have a suggestion to make that I would like to have your opinion on," said the safety director. "With your approval and the permission of your foreman, I would like to transfer you to the shipping and receiving department, where there will be no production schedule to meet. Where you won't have to follow the prescribed pace of an assembly line and where I think you will be happier." McDermott and his foreman



agreed on the experiment, with the result that his first-aid record improved, as well as his record as a worker in the plant.

There are many lessons to be learned by Jim McDermott's story. First, he was a man whom we would normally consider able-bodied. Although no physical examination was made of him before he went to work, I am convinced that the average medical inspection would have produced a report stating that McDermott was a fine and healthy specimen. But he was placed on a job in which he had no interest, probably because he had few of the abilities that were needed to do the work. He was no more successful at a job that he was haphazardly assigned to than would be a physically handicapped worker.

By comparison, let us examine the record of George Case. George had had infantile paralysis when he was less than two years old, and it had left his legs shrunken and almost dead. It wasn't until he was nineteen that he learned to walk, and later he was taught all the techniques of welding, so that he became an expert. George was a protégé of one of the many progressive rehabilitation centers throughout the nation, and when he demonstrated his proficiency as a welder, the rehabilitation people took steps to find him a job. His sponsors made certain that he would be associated with a company that exercised progressive personnel procedure, so that George would show that the physically handicapped man could be a proficient and efficient worker. George's record with his company shows that he was producing as well as the so-called normal workers, and in fact, was producing better than many.

There are many Georges who were properly placed, and whose records were compared to the so-called normals. Dr. Tobias Wagner, a short time ago completed a brilliant two year research study at the Center for Safety Education, New York University, which compared a selected group of physically impaired workers with a group of so-called normals. Each normal and each impaired person worked on the same kind of job and were equal in as many respects as possible—except that one had an obvious handicap, the other none. The study showed that when properly placed, the disabled had a better production

record than the normal as evidenced by earnings, for the disabled earned \$51.21 a week on the average, while the normals earned \$49.22 a week. At the same time the accident frequency rate for the disabled was 12.98, but 17.84 for the normals. The accident severity rates in his report were about the same for both.

If we once thought of the handicapped in terms of limited production and increased accident frequency rates, and we review these figures of Dr. Wagner's and then remember the two case studies just mentioned, it makes one wonder just who are the physically handicapped? If we who are concerned with industry and personnel and accident prevention are thinking in terms of securing the success of employees, then we must harken to this information and change our thinking and say to ourselves, "As far as placement of individuals in industry is concerned, we can now truthfully say, there are no 'normal workers.' Everyone of us has capabilities that make us successful on some jobs and comparative failures on others. It is only sensible that we be assigned to the kind of work at which we will be most successful."

The National Conservation Bureau and the Center for Safety Education at New York University learned through the conducting of research investigations to determine whether physically impaired people constitute a greater accident possibility than the so-called normal, that the placement procedures that were responsible for securing the success of the physically impaired, in both production and safety, were applicable to, and in fact, were desirable for all workers.

In a survey over twenty organizations renowned for their exemplary placement of the physically impaired, it was learned that in most cases the programs reviewed as rehabilitation programs, actually were just well-rounded personnel procedures that had been in operation in some industries for many years. These programs had been applied to all workers disabled, or not, and were responsible in great measure for the success of these companies. From a beginning where the insurance companies were attempting to find the truth about the physically impaired in order to assist employers in hiring them, we of the Association of Casualty and Surety Companies now feel a greater service can be

provided to employers and employees—disabled or not—by calling attention to the simple steps of the well rounded selective placement procedure that can be recommended for all placement practice.

Fundamentally, the steps of successful placement are as follows: First, analyze each job's requirements in terms of its physical demands and working conditions. This is so that the personnel office will have a greater understanding of how each job will affect any worker. A personnel man, or a safety man might think he knows all there is to know about any job, but it is amazing how much he learns about the gaps in his information when he reviews such a job survey. Second, examine each applicant to determine his physical capacities. This should be done not with the objective of screening out employees who are not desirable, but should be an honest attempt to determine an applicant's physical and, if possible, mental strengths so that they can be used to select the most suitable job. Third, the applicant should be interviewed according to an objective interview procedure, so that the personnel office can learn what his interests are, what his attitude is, and the other usual portions of personnel data that are used to make up a background file on new employees. Fourth, the personnel department should then examine which available jobs best match the applicant's physical capacities and his inclinations and interests.

If it is discovered that there are no jobs that match up perfectly, the employee should not be placed at a position that apparently would not interest him without first discussing the matter with him. Obviously, he should not be assigned to work that doesn't meet his physical capacities or may physically harm him. Any questionable decisions as to his placement should be discussed with the medical advisor, and the safety director. Fifth, and final, in the case of physically handicapped employees, the personnel office should maintain a regular follow-up file on each of the handicapped who is assigned a job, so that his progress can be regularly checked until it is ascertained that he has been properly assigned and is a successful employee. A further description of these procedures can be found in the book of Wagner and Bridges, titled respectively, "Selective Job Placement" and "Job Placement of the Physically Handi-

capped." Also the articles published in leading medical, rehabilitation and personnel publications by Hanman and Ranta and in "The Physically Impaired—A Guidebook to Their Employment," published by the Association of Casualty and Surety Companies.

There are some who may think that there is a deceptive simplicity to the five steps just outlined. One may argue that the carrying out of these procedures involves much organization and detail. However, from observation, we can say this is not so. Truthfully, these procedures require more thought and effort than no procedure at all, but then in our opinion, a lack of effort to develop such a program is reflected in the penalties inflicted by incorrect handling of personnel.

Even if we were to consider the need for proper placement purely from an accident prevention point of view, it would justify itself. For example, supplementing Wagner's report which stated that the properly placed had a superior accident frequency rate to the normal who were not properly placed, another report in Industrial Medicine of August, 1947, prepared by industrial physician Dr. R. Ralph Bresler stated that what once had been a poor accident frequency record for his plant, had been improved to the point where it was an exemplary one immediately following a program where all workers were assigned to jobs according to their physical capacities.

Because accident prevention and production should be thought of together and not separately, the procedures for proper placement, which were originally developed to explore the problems of hiring the physically impaired so as to ensure their safety and which demonstrated that the handicapped when properly placed are successful workers, deserve adoption as a method for placing all workers. In fact, since 80 per cent of production costs are attributable to personnel costs according to a recently released figure, it is imperative for those of us who are directly or indirectly concerned with industrial costs to think of methods that can be used which will increase an employer's success on the job and thereby create a greater return for his employer—and for him.

The time has come when we should quit thinking of the physically impaired in industry as a segregated group—when, in fact, all



employees are in some measure impaired with respect to certain jobs. It is necessary, then, for the sake of making further progress in greater production and more efficient acci-

dent prevention to turn to the placement procedures that have been demonstrated as being successful in the placement of the physically impaired.

### In-Plant Training

By F. M. WRIGHT

Training Director, International Harvester Company

To understand our attitude toward education and training, it is necessary to realize the need for adult education and training. For the industrial problems today are only a part of a much larger national problem.

Today for every youngster in school there are three adults out of school who could benefit by further education. Fifty-eight million of these adults are gainfully employed. That is why industry has a stake in adult education, whether it is aware of it or not.

The first step to implement our post-war approach to education and training was to centralize the administration of the program and to assemble a training staff which could contribute three types of experiences—industrial, university, and military.

We had our people who could contribute industrial training experience and also people who were thoroughly conversant with training techniques developed by the military services during the war. It was in obtaining educators from the university level that we took a pioneer step.

From this amalgamation of education experiences there evolved a new concept of what to accomplish through education where, as, previously, the objectives seemed limited to passing on factual information.

Now a further objective is to develop training courses which will, in addition to supplying the technical knowledge, affect the attitude of the employee, helping to shape attitude toward his job, his opportunity and the company.

Until recently we were concerned primarily with the employee during his eight hours on the job. We now feel the best employee is one who is well adjusted to his life outside working time as well as to plant conditions during working hours. With this new idea uppermost several new approaches have been developed since the war.

First, during his first week of employment the new employee receives an orientation course to get him acquainted with the company, and to get the company acquainted with him.

An off hour training program is directed specifically toward helping employees learn to adjust themselves to problems that confront them during the time they are not working; and to help them up-grade themselves in the plant. These courses are offered tuition free, with the company furnishing all the necessary material, and are conducted in various classrooms in the plant. The subjects range all the way from metallurgy to interior decorating.

Another new development since the war is a twenty-six weeks leadership course. This course offers pre-managerial training to selected employees from shop and office departments.

Our company still carries on, as it did before the war, student training and apprentice training courses.

Safety is a very important subject at Harvester, as a matter of fact, safety is the first and greatest responsibility of anyone's job, whether they be employees, foremen or executives.

We do not conduct training in safety by itself but rather make it an integral part of all training just as we do the other phases of accident prevention such as mechanical conditions which are made an integral part of engineering. In all the courses I have mentioned, safety training is interwoven throughout.

Practically all our on-the-job training is done by the foreman using the J.I.T. method of instruction. We feel that our employees are well instructed by the foreman due to the foreman's qualifications.

To make the foreman a qualified instructor, we go well beyond just the techniques of instruction. The foreman has been trained in the methods of handling employees as individuals with all the complicated personality factors which employees have today. Each and every foreman attends regular weekly conferences which deal with the fundamentals of good foremanship.

Safety is injected into each of these conferences and in some cases the entire conference is devoted to safety. Such things as causes of accidents, creating and maintaining interest in safety, practical psychology, correcting attitude and proper placement are just a few of the subjects covered.

Dinner meetings held outside the plant with a prominent speaker talking on the subject of safety, foremen serving on a rota-

tion basis on the safety committee, and many other training mediums are used in order that the foreman may become aware of his responsibilities in safety and make him a qualified instructor.

Our safety department assists in training through the use of posters, safety publications, bulletin boards, broken safety shoes and goggles.

The communications department, which sends out communications to the employees' homes in the form of a news letter, gives safety its just dues.

We do not feel that this is the final answer in "In-Plant Training" on the subject of safety, but we do feel that by making safety an integral part of everybody's activities, it is a step in that direction.



# *Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME III

AIRCRAFT MANUFACTURING SECTION

NATIONAL SAFETY COUNCIL, INC.  
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## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

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**Care and Use of Ladders, Platforms and Scaffolds**

By N. F. BORGAARD

Sales Manager, Engineering Division, Patent Scaffolding Company, Incorporated

The three kinds of ladders most generally used are the extension, single, and step ladder. Because ladders are used by practically everyone, many persons purchase a ladder as they would an ordinary tool, overlooking the fact that some attention should be paid to its construction and all-around sturdiness—even when it is their own leg or neck that they may be risking. In the aircraft field, I know that you are continually inspecting your flying equipment so as to leave nothing to chance. Therefore, as a start in your endeavor to insure safe use of ladders you must certainly should select the kind that is designed to give a good measure of safety. I don't believe there is much argument today as regards the purchasing agent obtaining for your plant ladders as specified by the safety engineer. In most companies ladders are classed as safety equipment and must meet the approval of the safety department. If at the beginning you specify that your ladders are to conform to the ASA (American Standards Association) Safety Code for construction, care and use of ladders, it would be some assurance that you are starting out right.

New ladders should be thoroughly inspected and given some sort of protective coating, preferably linseed oil rather than paint. You will obtain no more protection from paint than you will from oil; paint however, makes a ladder heavier and makes defects more difficult to correct. Furthermore, should you paint a ladder and have the ladder long enough on your property, dry rot may occur. I have seen this in a number of instances in painter and decorator shops.

One of the best preventive measures is periodical inspection. If, upon one of these inspections, the ladder is found to be in bad condition, it should be so marked and tagged, but, this is not all. It should be put away until it has been repaired or destroyed. If you don't put this bad piece of equipment

out of sight, someone certainly will use it even though it has been tagged. I have seen this happen in a very large up-to-date plant. The piece of equipment in this case was a trestle plainly marked "Bad Condition—Do not use"—still I saw it being used.

Men who use ladders should make their own personal inspection. Another important point is proper storage. Ladders should be protected so that warping will not occur.

Needless to say, the proper type of ladder should be used, depending upon the work being done. If you have groups who use ladders, such as millwrights, plumbers, painters, janitors, and electricians, ladders should be properly identified and each craft should be responsible for their particular ones. If not, you are likely to find that an electrician may use a ladder and then leave it lying somewhere, thinking that the other fellow will look after it. This division should also be made in view of the fact that a janitor certainly would not need as heavy a ladder as a millwright.

You can obtain for your men the very safest ladders, but, if these men are not instructed as to the proper type and size to use, accidents will occur. For example, I know of a case where a broken arm resulted because the man was simply too lazy to get from the storeroom a ladder of the proper length. He used a single ladder that was entirely too long and as a consequence this ladder was placed against the wall with the bottom extending too far out and when the man was near the top, the ladder just came down and the man also.

In this case I don't believe ladder shoes would have helped a bit, but, it is a good practice to equip all single and extension ladders with shoes. The fact that these are equipped with shoes should not mean that the ladder can be placed at any angle. A good rule to follow is to have the base of the

ladder about one-fourth of the ladder's length away from the wall.

It is necessary at times to make repairs in your own shop. For example, if a step or two needs to be replaced or only one side rail, certainly it would be better to have it repaired than to throw the whole ladder away; especially in view of the present scarcity of this type of equipment. If a side rail is to be repaired, a whole new side rail should be used and no splices or cleats permitted. There was a case where a large outfit repaired an extension ladder and instead of putting in an entirely new side rail, the old one was spliced and painted over. The ladder was put into service and broke.

Mishandling causes more breakage than anything else and the defects that occur through mishandling will not be noticed unless there is regular periodical inspection. Reasonable care should be used in handling ladders as they do not have to be dropped very far before some crack or split occurs.

The most popular step ladder in use today is the safety platform type. It should be used wherever a step ladder is required. Its use goes a long way toward eliminating any accidents which might result from falls and dropping objects. This ladder has a platform about 14" x 19", two feet below the top of the ladder, and is guarded on three sides. This means that a man has secure footing and both hands are free for the work at hand. The top step has holes drilled in it and can be utilized as a tool rack. This prevents passersby getting hit on the head by a falling hammer or screw driver. A good step ladder will have a steel safety spreader which will not permit the ladder to close of its own accord and will not pinch the users' hands.

Referring again to extension ladders, these should be equipped with automatic spring locks, and a rope and pulley for raising and lowering. Equipped with these the man can be on the ground when raising or lowering the top section and, therefore, you eliminate any possibility of his falling while adjusting the ladder length.

I am not discussing class of wood or dimensions of side rails, steps, and so forth as this is all given in the ASA Ladder Code. A good step ladder, however, should have the steps properly braced with truss rods or with angle bracing, or both. Furthermore, the back should be of the rung type as this adds considerably to the stability as compared to a

ladder having a slatted back. In the ASA Code you will also find data as to customary overlap to be used on an extension ladder. The National Safety Council also puts out a very helpful bulletin as regards ladders which is called "Safe Practices Pamphlet No. 1." I doubt whether half of you men have one or the other in your files. Eleven pretty good suggestions are as follows:

No. 1: Single ladders and extension ladders should be equipped with the proper type of safety feet or shoes. Type of safety feet should be adapted to the surface on which the ladder is to be used.

No. 2: Both hands should be kept free for climbing. It is advisable to use a hand line whenever possible to raise and lower tools and other light material.

No. 3: Do not place ladder in front of opening or door without first seeing that proper safeguard is used.

No. 4: Be sure that shoes are not greasy.

No. 5: Ladders should always be faced while climbing, either up or down.

No. 6: Always inspect a ladder before using it.

No. 7: See that the ladder has proper bearing at the base and at the top. See also that the pitch or angle is a safe one.

No. 8: If ladder is going to be used in or near traffic, foot or otherwise, both the ladder near the bottom or have another man stand watch near the foot of the ladder.

No. 9: Remember a good safe ladder is not a trick ladder and judgment should be used in placing it in position so as to obtain the safest possible working position without undue reaching.

No. 10: Falls which occur in raising and lowering an extension ladder can be eliminated by the use of the automatic spring lock type ladder, as the operator is on the ground when raising or lowering the top section.

No. 11: As a protective measure, oiling is recommended in preference to painting because oiling permits better inspection as well as protection and does not add weight.

In so far as platforms are concerned, most of these are temporary and therefore require the same care in selection, handling and use as ladders. A very good insurance against breakage of stages or platforms is steel reinforcement of each side rail. With all care in the selection of material, we cannot see



through wood and therefore on any temporary platform the side rails should be reinforced.

No more than two men and perhaps some light working tools should be permitted on any temporary light stage. The use of steel cables for a swinging stage will give considerably more safety and economy than will a rope block and fall. Also you eliminate the necessity of making hitches and avoid accidents which might result from the scaffold or cradle iron becoming disengaged from the block hook as so often happens.

The stage should be equipped with toe boards and a guard rail having a center support in addition to the two end supports.

Furthermore, life lines should always be used on any swinging scaffold. It is preferable that these life lines be attached in some manner to the man's safety belt. The life line should be attached distinctly separate from the scaffold anchorage. It is also a good safe practice to equip roof or wall hooks with a steel ring to tie them into some separate attachment on the roof. Swinging scaffolds should be tested near the ground before using.

Insofar as scaffolds are concerned, my company went out of the wood scaffolding business about twenty-five years ago, at which time we developed the steel tubular scaffolding. This steel tubular scaffolding, needless

to say, cuts the fire hazard inherent in wooden scaffold and in addition gives greater safety. Through the use of couplers and tubing this tubular steel scaffolding is very adaptable and will meet fully the requirements of any built up scaffolding or portable tower. There is no limit to the height you can reach which of course depends upon the size of the base.

When dismantled, very little space is required for storage and practically only two components are required; namely, the couplers and tubing.

There is also a second type of welded steel frame, tubular steel scaffolding, in which end frames are connected longitudinally by cross braces, and nest vertically one on top of the other by means of sprockets or dowel pins which connect the frames. Sidewall brackets are also employed and for large spans trusses are used. This fixed type can be quickly erected and dismantled and is generally used for straight wall work and small portable towers. I liken it to a big Mechno Set—it is that simple to put up and take down—particularly for general overhead maintenance and repair jobs. The use of steel scaffolding eliminates to a great extent the close inspection required of wood. Nevertheless, periodical inspection should be made as damage occasionally occurs from handling and overloading.

### Preventive Maintenance Wire Rope and Wire Rope Slings

By E. F. GARRIS  
Manager, Macwhythe Company

Before we can discuss the safe and proper use of any tool, we must be familiar with that tool. What is it designed to do? What is its strength? How should it be used for best results?

What is wire rope? The beginning of modern rope making is generally credited to a German—Albert of Clausthal, who in 1834 made a rope of soft iron wire twisted together to form a crude wire rope to replace the hempen ropes used in the Harz mine.

The wire rope you purchase today represents over 100 years of experience, research, and progress in the art of rope making. To

day's wire rope is a precision product, and it is as nearly perfect as it is possible to make on modern machinery operated by highly trained workmen.

The metallurgist has produced high grade steel particularly suited to rope making. Engineers, trained and experienced in the wire rope business, have designed ropes of many grades and hundreds of types of construction.

The actual fabrication of the wire rope—the cold drawing of the wire and the stranding and closing operations—is a continuous sequence of precision operations guided by close inspection for quality and workmanship.

Before wire is acceptable for use in a particular wire rope, it must meet a minimum tensile strength—it must withstand a certain number of torsions and bends, and meet other strict requirements. Only then is it approved for use. The stranding and closing of the wire rope is also done under close supervision, and on completion the wire rope must pass certain physical tests before it is delivered to you.

Most of you are interested in wire rope for use on overhead cranes and slings. The most popular crane ropes are of 6x37, 8x19, and 6x19 construction and they are usually furnished in the improved plow steel grade. These ropes may have a fibre core or a steel core, depending on operating conditions, and may be preformed or non-preformed.

For operating or running ropes, preformed wire rope has many advantages. The pre-forming operation forms the wires and strands to the exact helical shape they assume in the finished rope, so that they lie naturally in place. This removes internal stresses and produces a more flexible rope which withstands bending stresses and fatigue better than ordinary wire rope.

Where flexibility is of prime importance, a 6x37 or 8x19 rope is desirable. If the drum is grooved, 8x19 is usually preferred. If the rope is subject to crushing or overwinding on the drum, or if heat is a factor, 6x37 or 6x19 rope with a steel core is recommended, the 6x19 being used where maximum flexibility is not required. These ropes are made with various strand constructions, which we will not discuss now.

No tool, no matter how good it is, will give the best service unless it is properly handled and used. As wire rope users, there are a number of precautions you can take to protect the safety features built into wire rope, and help promote safe, efficient and economical operation. When installing wire rope, care should be exercised that the wire rope does not become kinked or twisted. A kink, no matter how slight, affects the "balance" of the rope and thereafter maximum service cannot be expected.

Wire rope of highest quality is usually lubricated externally and internally when it is made. To secure best service wire rope should be lubricated from time to time while in use, to protect the rope against corrosion.

Wire rope should be inspected at regular intervals and when the rope is worn to the

point where its condition is doubtful, it should be replaced at once.

Certain parts of the crane itself should be regularly inspected and defective or worn parts replaced. Sheaves which are too small in diameter shorten rope life. Sheaves with too small a score pinch the rope and damage it. Worn or corrugated sheaves cause a rope to wear rapidly—especially a new rope in an old sheave.

Inspect crane blocks to make sure the sheaves are turning properly—they should be designed so that the rope has no chance to scrub against the sides of the block.

Lifts should always be made with the crane ropes hanging vertical. If the crane hook is pulled out to one side of the crane runway, the ropes are likely to be out of position—giving them the chance to wear against stationary parts—in addition to putting unusual strains on the crane itself.

There are a few of the preventive measures a wire rope user can take to secure safe and efficient service from wire rope.

The majority of loads handled demand the use of a flexible connecting member, or sling, between the crane hook and the load. Slings are subject to more abuse and wear than any other part of lifting equipment.

As we have previously stated, wire rope is made in several grades and constructions, but all of these constructions are not suitable for sling uses.

Slings are usually made from improved plow steel wire rope, which is the highest grade rope made. For single part slings, 6 strand wire rope is most suitable. My company uses 6x19 rope, which is six 19 wire strands laid around a fibre core for slings up to 1" in diameter; and 6x37 ropes—six 37 wire strands around the fibre core for slings larger than 1" diameter.

Wire core rope is used where service is severe or where the sling is subject to heat or crushing, and where flexibility is not of prime importance. Wire core rope is slightly stronger than a fibre core rope, but it is also stiffer and harder to handle.

While the ordinary single-part wire rope sling has many advantages, one disadvantage is lack of flexibility. Another is kinking which is bound to occur if the sling is used around corners without protection. Kinking makes the sling hard to handle, and perhaps more single-part slings have been taken out of service for this reason than for any other.





These disadvantages led to the development of braided slings with round or flat bodies. The round braided sling usually has eight parts of rope in the body. The flat braided sling usually has six parts of rope. The use of a number of small ropes in the body produces a sling of great flexibility which hugs the contour of the load and resists kinking. This makes the sling easy to handle and increases service life.

While the use of blocking, bagging, or other protective devices is recommended to secure maximum service, braided slings do not require them except on sharp cutting edges because the braided body has a tendency to flatten and spread so that four to six ropes engage the load with a gripping action, like the fingers of a human hand.

To secure maximum service and safety from rope slings, the slings must be used correctly. You must be familiar with the characteristics of the sling and its behavior under different conditions.

Particular attention should be given to the strength of the sling after fabrication, rather than the strength of the wire rope used to make it. Manufacturers publish ultimate strengths and safe working loads for slings, and these ultimate strengths apply to properly spliced or socketed connections. They do not apply to all types of fastenings.

For example, a socket properly attached by the hot zinc method is the only method recommended by wire rope manufacturers that will consistently develop all of the rope strength.

The efficiency of properly made splices varies with the size of the rope. On rope up to 1/2" diameter the splice is approximately 95 per cent efficient, while a similar splice in a 2" diameter rope will develop about 75 per cent of the rope strength.

Wire rope clips will develop about 80 per cent of the rope strength provided the clips are properly applied and the recommended number of clips are used. The U-bolts should be placed on the dead end of the rope and the bases of the clip on the live end of the rope. Since the fastening depends on friction, the wider bearing of the clip base does not mash or damage the live end of the rope as much as the U-bolts. Clips should never be staggered.

Wedge type sockets are made by several manufacturers of fittings. The efficiency of these fittings varies with the design of the

socket, and their proper attachment. One manufacturer claims efficiency in excess of 90 per cent.

While wire rope clips, chaps or wedge sockets are used widely for rope terminations, their size and weight makes them better suited for standing or operating ropes than for slings. All factory built slings have spliced or socketed connections.

While we have said that the best of material and workmanship are more than good where the safety of life, limb and property are at stake, the best sling obtainable is not worth much if it is not used properly.

There are three principal ways in which we can attach slings to the load—direct connected, in choker hitch, or in basket hitch.

By direct connected, we mean that the upper ends of the sling legs are connected to the crane hook, and the lower ends are connected to the load by means of hooks, shackles, or the like, and the sling body seldom contacts the load.

Where only one sling is employed, the sling is usually used in choker hitch. If the load consists of several pieces, the choker hitch grips the load and holds the load together.

Where two slings are used, a basket hitch is best—especially if a spreader or lift beam is used where the two slings can hang vertically; or, if the nature of the load will permit using two basket hitch slings at an angle—such as bundles of material on skids.

In applying slings to the load, the sling legs should operate at the most favorable angle possible. As the sling leg approaches the horizontal, stresses build up in the sling and these stresses must be considered when applying slings to a load. The sling might easily be overloaded.

Hooks have safe working loads which apply when they are loaded at the bearing. Lifting on the point of the hook is not safe, as this strains the hook. A hook overloaded in this manner may not straighten out completely, but it may open up to the point that it is not safe. Hooks that have been opened or spread under loads should not be used, at least until they have been inspected and found safe.

Slings should always be protected from sharp bends or cutting edges, if maximum service is expected. Of course, this is not always possible. Where slings cannot be protected against this abuse, they should be

thoroughly watched and taken out of service when found unfit for further use.

It has been said that about 1/4 of all the industrial accidents are connected with handling material, and by far the most serious cause during the aerial movement of loads. This is work requiring the knowledge and skill of trained riggers. Loss of life and destruction of valuable property can easily happen where this knowledge and skill is lacking.

Like a diamond, preventive maintenance of wire rope and wire rope slings has many facets—and all of them are required for perfection—but the most important are:

1. Your riggers must be experienced. They must be familiar with the material they

are handling, and with the equipment they are using to handle it.

2. Select the wire rope or wire rope slings best suited to do the job.
3. Wire rope and wire rope slings should be regularly inspected and kept in good condition. When their condition is doubtful they should be replaced.
4. Crane equipment should be kept in perfect condition. When regular inspection reveals worn or even slightly damaged parts, repairs should be made promptly.
5. Above all, lifting equipment should be inspected frequently, and at regular intervals—so that you will know when replacement or repair is necessary.

## Power Press Preventive Maintenance

By F. D. MUMFORD

Service Manager, Toledo Division, E. W. Bliss Company

Probably there are more power presses than any other single class of metal working machinery. Since the majority of these presses are over ten years old, the maintenance of them is one of our greatest problems.

By law we are held legally responsible for the evidence of exercising reasonable care in the design, manufacture, and marketing of our products. Similarly in a test case, we might be held just as responsible for lack of preventive and corrective maintenance.

Here are some suggestions for our immediate future and effort.

1. That maintenance engineering be considered professional, because of its wide scope, variety, and duration.
2. That the maintenance engineer be qualified by examination.
3. That maintenance engineering include some knowledge of industrial law, accounting, and salesmanship.
4. That the maintenance engineer have access to library periodicals, and be encouraged to keep in contact with developments in his profession.

A problem in Illinois or California may also have existed and been remedied in Texas or Pennsylvania. This may be well known to a service engineer of the manufacturer of your equipment, many of whom have that range of contact. His analysis of your prob-

lem may recall various similar parallels in other industries or places, or his knowledge of the inherent engineering in his company's product may enable him to give a solution, or suggest a line of eliminations.

Speaking for power press manufacturers in general, and our company in particular, be assured that their service engineers do have a wide contact, and have with the backing of their company solved many problems that were firsts many years ago.

Our company makes the following preventive maintenance suggestions for power presses and equipment, both new and existing.

If the original plans call for anything unfamiliar, call on the manufacturer, who can offer much as to processes, methods, specifications, adaptability, conversion, spare parts, spare parts, and good housekeeping; this will result in better economies, deliveries, performance, maintenance, and less down time. The small cost of having the manufacturer's representative give advice for initial operation and instruction is generally warranted.

The wisdom of the spare press having been demonstrated, its consideration is suggested. It should be one that has a range and capacity for more than one of a line of operations. Should one of several line presses fail its operation can be routed through the spare press for minimum production loss, and the



failed press can be repaired at convenient time and non-premium rates.

We suggest that a study be made of spare parts and sub-assemblies. Their use for new and existing power presses and equipment should be considered for maximum interchangeability, minimum inventory, and best housekeeping.

We suggest greater frequency of complete inspection, as this is less costly than the expense of down time and repair.

We suggest full consideration of the possible functioning resulting from the simultaneous use of old and new parts. Frequently,

a new part cannot compensate the malcondition of the companion part. The mating of new parts is often more economical and efficient.

We further suggest that all users of power presses and equipment protect their investment, by having the manufacturer's description and identification in the form of make, size, and serial numerals and alphabetical, and that any one deliberately or unnecessarily obliterating them be held in contempt of fair practices. Without these alphabetical and numerals, the manufacturer is handicapped in giving aid to users.

#### TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: LT. COL. LEONARD F. CARTER, Dir. of Safety, Army Air Forces, Chief, Ground Safety Branch.

#### Research and Development of Aircraft in the Air Force

By BRIGADIER GENERAL DONALD L. PUTT  
Deputy Chief, Engineering Division, Wright Field

The urgency of national welfare vigilance is emphasized in the National Safety Council's statistical revelation that accidents in our country last year alone took a toll of 100,000 lives, 10,400,000 injured, with resultant dollar damage reaching a total of more than five and one-half billion.

While much progress has been made of late in all fields of engineering, notably in the area of safety engineering, none of us will quibble with the conclusion that the technological advances in the fields related to aeronautics have been little short of revolutionary.

Our recent observance of the 40th Anniversary of the founding of the Air Force, for example, brought to mind that we have come a long way since August 1, 1907 when the Division of Aeronautics was established by the United States Army Signal Corps—"for the purpose of study of the flying machine and the possibility of adapting it to military purposes." The organization consisted of one officer—two enlisted men—no airplanes.

Two years ago on V-J Day we were two and one-half million strong, with 85,000 airplanes. By today's standards these once

worthy and purposeful 85,000 aircraft are to a great extent already obsolete or nearing obsolescence.

By virtue of unification we have just been born again—perhaps a more accurate way to describe the situation would be to say we were born 40 years ago, and only recently officially came of age.

We in the Engineering Division of the Air Materiel Command find ourselves in a position very similar to that which confronted the Wright Brothers two generations ago. We are definitely knocking at the door of a new era of flight.

The airplane in its present form is no longer the sole basis for long-range air planning for national defense. We are embarking on a guided missile development program that parallels the unknown man set out to conquer when he first undertook mastery of the heavier-than-air flying machine.

We are learning the meaning of a long list of new technical terms—supersonic, transonic, atmospheric, pulse jets, ram jets, turbo props, nuclear engines and more—all of them representing virgin fields of exploration.

Simultaneously, and because we must ac-

cept the possibilities of global warfare, we are still very much concerned with the conventional subsonic airplane. In the event of emergency, we might well be called upon to move in a minimum of time complete divisions of fully equipped ground troops over thousands of miles. In addition, and because of the likelihood of our aircraft having to go from one extreme climatic condition to another in a probable matter of hours, we are striving to gear all our operational equipment to the whims of the weather over wide geographical areas.

In view of the obvious strategic value of the Arctic regions, we are currently placing great emphasis on so-called winterization of aircraft, aeronautical equipment and personal equipment. On the ground in the Arctic and under the severest of conditions we are seeking better solutions to the familiar problems of wing and propeller deicing, cold engine starting, cabin and cockpit heating, cold weather maintenance and low temperature lubrication.

We have found, for example, that the moving of aircraft from hangars to the icy outside has frequently caused cracking of the Plexiglas. Cold-embrittled rubber fuel hoses have been shattered to bits when dropped on frozen surfaces. There have been occasions when sharp temperature drops have brought outdoor operational functions to an abrupt standstill with personnel compelled to devote practically 100 per cent of their energy to survive. We have actually had to preheat the preheaters. Adequate protection of our personnel has demanded the development of specially-adapted clothing. An example is an electrically heated nylon glove.

A very high priority category of equipment is that involved in *all-weather flying*. It includes airborne radar, radio and automatic flying equipment, and related ground equipment which either supplies intelligence which is picked up by the airplane, or is used to locate and track the airplane.

Fourteen months ago our All-Weather Flying Division located at Wilmington, Ohio, about 25 miles south of Wright Field, inaugurated a daily round trip flight between Wilmington and Andrews Field, Washington, D.C. This flight, regardless of weather, departs at 0900 hours and arrives at Andrews Field at 1100 hours, departs at 1300 and arrives back at Wilmington at 1500 hours.

Only two trips have been cancelled to date—neither because of the weather.

I assume that you are familiar with the 2,000 mile non-stop flight in 8 hours and 45 minutes, from Long Beach, California to Wilmington of our All-Weather Division C-54 transport, in the course of which no member of the ten-man crew once touched the controls from take-off to touchdown.

We still have a lot of development to do in connection with conventional aircraft and related equipment. At the same time, however, as I mentioned a moment ago, we are devoting a considerable portion of our efforts to areas of research and development which are well out in the blue—our work in the fields of supersonic flight and guided missiles.

You are, I am sure, familiar with our Bell XS-1 airplane, the first of a series of experimental crewbars with which we hope to jimmie our way through the transonic barrier. It was specifically designed as a research tool and instrumented for obtaining flight data necessary to conduct further applied research. We have other research aircraft under construction which we hope eventually will give us needed additional data beyond that expected of the XS-1.

One of the fundamental forerunners to successful high-speed, high altitude flight which merits emphasis is the need for a comprehensive and aggressive upper air research program. Our current meteorological data above 50,000 feet are extremely meager and, for our purposes, we must now stretch this to at least 600,000 feet. We have launched an intensive investigation in this direction and this program is being given high priority in relation to other existing research studies.

Some indication of the range of fundamental research necessary may be had from the fact that we currently hold 81 basic research contracts with 43 leading educational and non-profit scientific institutions throughout the United States.

Mathematicians are at work checking experimental data and developing computing machines. Physicists are busy perfecting instruments for determining the characteristics of space from 50,000 feet above the earth to the nearest planet. Astrophysicists are engaged in solving perplexing problems of celestial navigation.

The "human engineering" phase of high speed flight is of the utmost basic importance,



and we are therefore conducting exhaustive physiological, biophysical and psychological studies and tests to determine man's limitations with the objective of providing means to overcome them.

Rapid progress has been made recently in the biophysical aspects of human ejection from high speed aircraft. Human ejection is necessary to effect the emergency escape of pilot and crew because man is powerless to move against the pressure of the wind at very high aircraft speeds. Ejecting devices must be utilized to literally shoot them out of the aircraft with enough speed to insure that they clear the tail surfaces.

The post-war shift in emphasis from large production schedules of conventional aircraft to the development of aircraft and engines with superior performances has considerably widened and accelerated our research and development activities. Before the war, we were concerned primarily with one type of power plant—the reciprocating engine. Today, we are engaged in the development of six separate and distinct types—the gas turbine for jet propulsion; the gas turbine for propeller drive; the pulse jet; the ram jet; and the rocket engine. Then, too, we already have begun, in collaboration with the Atomic Energy Commission and private industry, a probing of all possible applications of nuclear energy to the propulsion of aircraft.

The performance of both aircraft and engines is limited by the materials presently available. The performance of jet propulsion devices for airplanes and missiles requires metals which have high strength at high temperatures. While there has been considerable improvement in high density alloys and in fabricating techniques, metal alloys do not seem able to take it at the highest range of temperatures. The answer may be provided in the exploration of the metal-base compounds, such as the carbides and borides. To date, however, these are laboratory curiosities which will require extensive research before they can be fabricated into usable products.

I should like to point out here that the matter of adequate facilities is one of our more disturbing problems, today's air age necessitating that our facilities be projected far beyond what we now have at hand.

A study of requirements has resulted in a proposal by the Air Force to build an Air Engineering Development Center.

The heart of this Center, as we now visual-

it, would consist of several high powered wind tunnels of various sizes in which the air speeds would vary from just below that of sound to several thousand miles per hour. There would be other related facilities which would fit into the overall mission of developmental testing of ultra high speed aircraft and missiles.

In our opinion, such a cooperative, government-financed center, used in conjunction with other existing or contemplated facilities, would provide science and industry, as well as government agencies charged with the development and procurement of aeronautical equipment, with adequate testing facilities for research, development and evaluation purposes.

Our failure to obtain these facilities could throttle down our whole program to a dangerous extent.

There has been much speculation of late as to just about how long it will take to develop the 5,000 mile guided missile. With unlimited funds and resources, such as characterized the development of the atomic bomb, it is the present opinion of the Air Force that it could conceivably be done in five years. The normal peacetime pace will probably extend this to fifteen years. The Hitler crowd undertook guided missile development in 1935, spent about 18,000 man years of activity and millions of dollars at the single plant, Peenemünde, yet the V-1 and V-2 did not appear until 1944, eight years later.

Our development must, of course, proceed in stages—the first objective being a long-range, radio-controlled airplane. The second stage would be the true rocket, launched from an aircraft and guided to its target by operators aboard the mother plane.

Ten to fifteen years from now, by diligent effort and assuming the good fortune of qualified manpower and adequate funds, we should be able to produce a missile of 5,000 mile range. A missile of that range would be bigger, heavier and certainly more complicated than any airplane in existence today.

The question of funds with which to prosecute our research and development program is a vital one. They must be adequate if we are to accomplish our mission. We are encouraged by the fact that Congress is aware of this vital necessity, accepts the responsibility for providing the funds, and, for the fiscal year which started three months ago,

appropriated every dollar for research and development which the President requested in his program.

We have received cuts in our program during the last year and a half and some have really hurt.

This brings me to remark that while the Air Force has long been largely a corps of flying men—in the future, perhaps as early as fifteen years from now—it will be very much a corps of technicians and scientists. Engineers and the technical specialists will increase in numbers and importance, and steps are now underway to provide within our establishment a career for technically and scientifically trained personnel.

The need for scientists within the services today is most acute and, to raise the intellectual level of our officer personnel who will be called upon to perform many new tasks, we have established at Wright Field the nation's first Air Institute of Technology for the purpose of schooling our pilots and practical engineers in a common understanding of our basic scientific and applied research problems. Approximately 200 officers are at present detailed to the course.

More than 10 per cent of our Regular Air Force officers are today enrolled in advanced study courses at many leading civilian educational institutions throughout the United States. Our Air University at Maxwell Field, Alabama, has a bulging student body.

In conjunction with Ohio State University, we have established at Wright Field a Graduate Center where at present more than 300 of our Engineering Division civilian technical personnel are pursuing advanced self-improvement studies.

In the Air Force today, we have 310,000 personnel—45,000 officers, 165,000 enlisted men—and 80 per cent of our personnel requires additional technical training if we are to get on with our plans for the immediate future.

The air power necessary for our national security calls for a peacetime mobilization of our man-power and our scientific, industrial and military resources such as our nation has never before been known to contemplate, let alone undertake.

Since preoccupation with national preparedness has never been an everyday part of our national thinking, we have a job on our hands. The recent all-out World Air War taught us much technologically, but the full

impact of modern scientific advances has not yet penetrated the understanding of our nation as a whole. Our almost fatal military feebleness which was demonstrated at Pearl Harbor was arrested only because of the mobilized patriotism of a whole people, who, in less than four years, got up off the floor to land the one-two atomic knockout socks at the industrial heart of the Japanese homeland. Victory was ours at the fantastic figure of over 300 billions of dollars and, what is irredeemably worse, more than a million of our finest men and women were claimed casualties, 400,000 of whom lie in their graves here at home and in strange ground all over the globe.

The time has come for us to get onto ourselves. Twice in the last 30 years we have been forced to fight a war. High sounding phrases on the need for a comprehensive and cooperative program for national safety are not enough. We are bordering on dangerous self-delusion in the light of the fact that last year a total of only 1,010 military aircraft of all types was delivered to the Air Force. In 1945, the last year of the war, more than 30,000 military aircraft were procured, and this compares with the 1944 peak acceptances for all-out warfare which ran to 70,000.

The abrupt drop in one year following the close of the war from 30,000 to 1,000 aircraft delivered for all purposes gives cause for alarm.

It is our judgement that the peacetime program of the Armed Forces calls for a minimum annual procurement of 3,000 military aircraft. We consider this doubly necessary if we are to keep our aircraft industry at a robust level of production and if the Air Force is to remain proficient in the ever-changing art of aerial warfare by being kept continuously provided with service test quantities of new equipment large enough to permit defense maneuvers on a reasonably large scale.

Human frailties being what they are, anything can happen. Our primary peacetime mobilization objectives is to avoid war. The risks of our being attacked will be minimized in direct ratio to our state of preparedness. The Army-Navy Munitions Board has inaugurated what is planned as a permanent air materiel production program. Because we recognize modern war as a war of material, prime contractors and sub-contractors are being recruited to participate actively in nation-



al defense. Available funds have permitted our undertaking an initial total of 25 industrial preparedness contracts with aircraft, aircraft engine and propeller manufacturers.

We have set aside a reserve of 40,000 general purpose aircraft manufacturing tools that would take the entire machine tool industry an estimated year or more to turn out if we had to start from scratch. We have established 9 of our Government-owned World War II aircraft plants as a permanent reserve, primed to go into production in the event of an emergency.

This is just a beginning. The drive to create some 1500 specialized reserve units in Government agencies and industrial plants throughout the country is another step in the right defense-in-time direction.

This plan, patterned after a technique tested on a small scale during the war, would enroll some 300,000 workers into organizations of "minute men of industry and government"—ready to go.

None of this is militarism. It is just plain realism—Twentieth Century Americanism—and a stern test of our will to win the peace.

Certainly at this stage of the game it would be fatal to stuff our military structure into a peacetime hope-chest.

We hear much talk these days about the three big wheels of national defense—science, industry and the armed forces. Much has also been written and voiced about another set of three big wheels—money, man-power, and facilities. And big three's they are. But neither of these three-wheeled vehicles is going anywhere without that vital fourth wheel necessary for proper build-up and balance—public understanding and support of our mission.

Thus fortified and equipped, we can move ahead on our mission to maintain for America our war-won technical superiority in the air, and simultaneously pave the way to future universal peace of mind as well as world tranquility.

### Statistical Control of Accidents

By LEE B. JOHNSON

Statistics Committee Chairman of the Aircraft Manufacturing Section,  
and Safety Engineer, Northrop Aircraft, Inc.

The exchange of statistical reports among the aircraft plants during the war, served a worthy purpose in pointing out accident-producing situations in all plants. Today, some safety engineers of aircraft plants question if there is sufficient value in these reports for the effort it takes to compile them. The accident reports referred to here include only the breakdown of industrial accidents by causes, effects, parts of body, responsibility, etc. Safety pioneering days in aircraft manufacturing plants should be drawing to a close as accident prevention engineers become better aware of the accident-producing problems.

What convinced me more than anything else that the effort of compiling such reports today would be wasted effort was the recent survey made among the Pacific Coast aircraft plants. The survey showed that just comparing accident causes, etc., among the various plants was not sufficient. Working conditions and other variable factors in each plant would

have to be considered if a true comparison were to be drawn. The survey also showed that previous reports were not being used to the fullest extent and, in most cases, were filed and never used.

This may sound like your Statistics Committee Chairman was finding an excuse for not producing such a statistical report for this meeting. I assure you this was not my intention. If the members had wanted such a report, I am sure your chairman would have had one to give at this meeting. The National Safety Council compiles the accident frequency and severity rates for this section, which has relieved the committee of that burden.

So much for the old kind of accident statistics. Now, I should like to discuss accident statistics in a different style than, I believe, has ever been presented before. The Statistical Control of Accidents chart is purely of an experimental nature and it is not being pre-

sented as a proposed project. However, I believe it has merit and should prove interesting.

Similar statistical methods have been used to control the quality of manufactured products for several years. Such characteristics as dimensions, weight, hardness, and many others have been controlled by the use of such charts. Now this chart has been applied to the control of accidents. From preliminary study, it appears that this application has aided materially in reducing accidents.

The system used in compiling this chart is somewhat complicated and there would not be sufficient time at this meeting to explain all the mechanics of the system. In fact, I cannot personally explain the chart as I am not a technical statistician nor a statistical control engineer. The statistical engineering work on the chart was compiled by the Northrop Company's Statistical Control Engineers.

Basically, the chart measures all accidents including first aid cases, doctor cases and lost time cases, per 1000 man-hours worked. The data is worked out on the chart according to the same formula that is used to obtain the mathematical curve. Several statistical distributions approach the normal distribution and the theory of the normal distribution is used to determine limits for most control charts. The purpose of the chart is to keep accidents within the control limits, always keeping in mind the idea that the main purpose is to work toward lowering the normal rate. The following seven points will give some interesting data on this chart.

1. The correlation coefficient is the measure of the strength of the relationship between two variables. When the correlation coefficient is  $\pm 1$ , it indicates that a maximum relationship exists between the variables. (This statement is a mathematical interpretation only and does not consider cause or effect.)

2. In this instance the variables are *Injuries* and *Manhours* worked. Since it is obvious that a high degree of relationship should exist for these variables, it was decided to test the accuracy of the data presented by computing the correlation coefficient. The results were satisfying since the correlation coefficient was 0.96 for the 1946 data and 0.99 for the 1947 data.

3. The composite average of the 1946 data (for the six West Coast plants) was used as

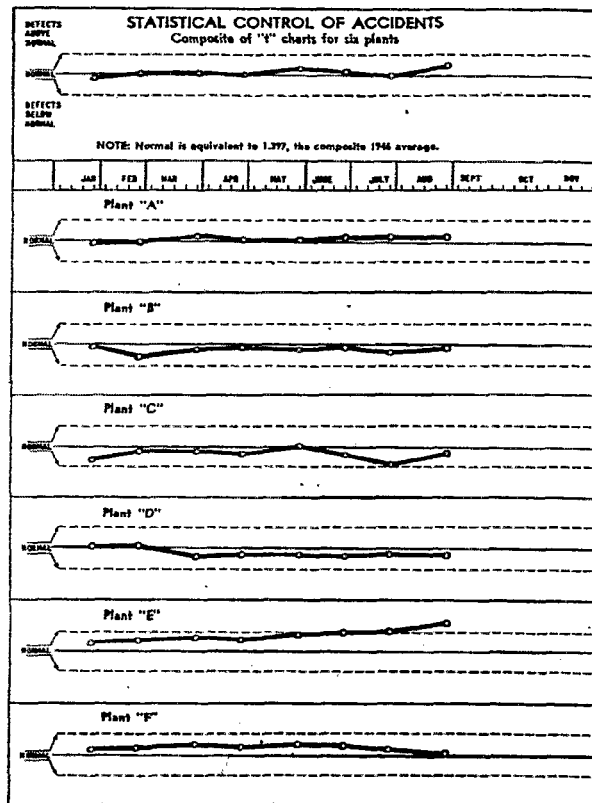
the central line in determining the control status of the 1947 data. See chart below. It might be interesting to observe that the composite average for 1946 and 1947 was very close, being 1.997 and 1.412 injuries per thousand manhours respectively.

4. In order to allow a comparison for the various plants the data was calculated in standard units. However, it was found that a factor had to be introduced to allow the chart presentation to be sensitive. The standard deviation was therefore reduced by one-quarter. From a practical standpoint, this merely reduces the control limits by one-quarter so that the control chart is four times as sensitive to change. This factor is arbitrarily set; it is arrived at only through trial and error by plotting the computed data and observing the fluctuations. The introduction of the factor to sensitize the control limits may be likened to the "STOP" signs on highways; when high speeds are expected, the sign warns the driver much sooner than when the speed expected is comparatively slow.

5. The "I" chart used to present the "data" has a central line based on the mean of 1.997 injuries per thousand man hours. The chart may be interpreted in the following manner. When the rate of injuries is 1.997 per thousand man hours, the plotted point falls on the central line which is equal to zero (0). It merely says that there is no deviation from the expected normal amount of injuries. If the rate of injuries is other than 1.997, the plotted point would fall above or below the central line. The limits are  $\pm 3$  standard units. When the plotted point exceeds the established limits, it is out of control. Theoretically, it is as important to investigate the cause for the rate being so low as to let the plotted point fall below the lower limit, as it is to investigate the cause of the rate being so high as to let the plotted point "fall" above the upper limit. The important thing is that it is not ordinary; and that an assignable cause should contribute to the "out of control" condition. If the plotted point falls below the lower control limit the assignable cause may be one which may have been introduced as a measure for reducing injuries or it may be some unknown condition which, when discovered, might be coordinated to reduce injuries permanently.

6. Observation of the "I" chart shows that plant "E" was out of control for the months





of July and August (the rates were 2.04 and 2.38 injuries per thousand respectively). However, this is true only because of the arbitrary factor of 0.25 which we employed and only with respect to the composite average of the six plants. The data does not permit of assignable causes, but the first approach would be to compare with a plant such as "A" the method of obtaining the data and the quality of the data. If this compares favorably, then the assignable cause might be in the safety measures, since an error in the data has been ruled out.

7. There is a great deal of merit in comparing the data of various plants as presented in the "t" charts. However, to assure that the data is comparable, it is recommended that a committee be charged with devising a uniform method of reporting the data.

The "t" chart showed a sudden drop in injuries for plant "D." Investigation at plant "D" revealed the reason for the sudden drop in injuries in March was due to a new idea which was put into effect the first of the year. The full impact of this idea was not realized until the plan was enforced by the shop foremen. The new idea required that all employees get a written pass to go to the hos-

pital for first aid treatment. This plan presumably caused employees to be more safety-minded and they would only go to the hospital when there was a legitimate excuse. Also, the foremen were informed of the injuries at the time they occurred and this permitted them to start work immediately on eliminating causes. This company reported that this plan did not increase the infection cases. This plant did not realize how effective this idea was until it showed up on the chart.

There is no doubt that this chart can be improved. Perhaps tighter limits should be established to make the chart more sensitive. If such a chart is ever proposed for adoption, one cannot stress too strongly the importance of having all plants report in a uniform manner.

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# *Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME IV

AIR TRANSPORT SECTION

NATIONAL SAFETY COUNCIL, INC.  
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## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

**THE NATIONAL SAFETY COUNCIL**  
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October 8, 1947

Presiding: W. T. JOHNSON, Safety Director, American Airlines, Inc.

**Airline Safety and the Congress of the United States**

By CARL HINSHAW, M.C.

(Paper Presented by Gil Tyler, Safety Suplt., Pan American Airways, Inc.)

In his statement before the President's Air Policy Commission, Mr. W. A. Patterson, President of United Airlines, stated "We now need positive action to make air transportation completely safe and dependable. With that achievement will come full public acceptance and all the business we can handle." In those few words, Mr. Patterson has pointed up and accurately summarized the basic problems of the air transport industry. Any further embellishment of those words is merely descriptive of the problems.

From the viewpoint of a Member of Congress who through the work of his Committee is actively interested and concerned in the subject of aeronautics, it would appear that the subject of dependability of air transport service is indeed quite secondary to safety as Mr. Patterson intimates. In fact it is a subject that should be a matter of principal concern to those engaged in the air transport business and to manufacturers of aircraft. Dependability of air transport service, except as dependability is related to safety, is not a matter of special concern to the Congress.

The air transport industry, through the Civil Aeronautics Administration and otherwise, continually presses the Congress for (1) aid in the improvement of existing airports, and in increasing the number of airports in terminal areas as well as in places where no airport worthy of the name yet exists, (2) for the full cost of the installation and operation of aids to air navigation and landing, (3) for the full cost of the establishment and operation of bigger and better weather reporting and forecasting services and the very extensive network of communications involved, and (4) for the full cost of installation and operation of improved systems of air traffic control. But the Congress is pressed on the other side by the taxpayers (including in no small measure the surface transportation agencies) to charge this bill

directly against air transportation. The aviation interests proclaim that the above-listed items are for the purpose of providing greater safety in flight, but at the same time, and with the installation of some of the new aids requested, they also intend to push completion of schedules, because completion of schedules appears to be of considerable importance in measuring the difference between loss and profit in airline operation.

The bill for the payment of the costs of the Civil Aeronautics Administration and the Weather Bureau, not to mention the operation of Loran stations by the Coast Guard, is reaching proportions of no little importance in the Federal budget. The larger the bill becomes the more carefully it is scrutinized by the Congress and the more interest is taken in it by the public, including all of the agencies engaged in surface transportation. The latter, of course, are feeling the pinch of airline passenger competition and anticipate a growing freight competition. Needless to say the Congress of the United States is interested in all forms of transportation and must consider the overall transportation policy. In that connection each form of transportation has a good story to tell and good arguments to present as to why that particular form should be aided and protected by the Congress.

The Congress is deeply concerned among other things with surface and air transportation as they relate to the National Defense. It is particularly interested in the subject of air power. The principal aspects of air power are, of course, military aviation, civil aviation, and the manufacturing industry supporting both. In the interest of promoting national airpower, the Congress will undoubtedly go far in providing funds for the establishment of airports, weather services and aids to air navigation and landing. These instruments of aeronautics in order to receive the highest

consideration of the Congress must be such as will contribute to the interests of National Defense. However much the air transport industry may desire these aids for the purpose of increasing their dependability of service, the Congress is bound to look at them from the standpoint of whether or not they contribute to the National Defense. In so far as they contribute principally to dependability of service of the air transport industry as such, the Congress is relatively uninterested. That sort of thing is generally believed to be something that should be supported by the commercial income of the commercial undertakings. Strong efforts have been made in the Congress to throw the entire bill or as much of it as is not directly related to the National Defense upon the commercial aviation industry.

The Congress is very much interested in the promotion of safety in air navigation and landing, particularly as it relates to the National Defense. It is reluctant to provide funds for the installation of certain aids when it is obvious that they are to be used for the almost exclusive benefit of commercial aviation. That is particularly true as the bill becomes more and more important in the Federal budget. The Congress is reluctant to provide funds for installation for the special benefit of commercial aviation of additional and different aids than those which the National Defense forces feel to be required for their purposes. The Congress feels that it should be called upon to supply funds for the installation of but one system of aids to air navigation and landing and that should be the system which is in the direct interest of the National Defense forces. If the commercial undertakings feel that there is some other system or systems which will be of particular benefit in the solution of their problems then perhaps the bill for the installation and operation of those aids should be supported by the commercial undertakings themselves and not through the Federal budget.

In connection with such aids to air navigation and landing and other facilities as may be established pursuant to appropriations made by the Congress, the Congress will be both interested and concerned as to whether these aids are being used for the promotion of safety by the civil users of them or whether these aids will be used principally for pushing schedule completions further toward sea per

cent. The present weather minimums for landing and takeoff have been established within what are considered to be limits of safety by the civil air authorities. As improved aids to air navigation and landing are provided, there is an apparent avidity on the part of the commercial carriers for pressing down the weather limits in order to increase the percentage of schedules undertaken and completed. That is to say, while increased safety is the slogan the practical result is the depreciation of the former safety limits to the new limits of safety provided by these devices and hence the improvement of the scheduling situation. At this point it should be gently reiterated that such aids as the Congress provides have been for the purpose of providing safety in air navigation and landing and not for providing dependability of schedules except as dependability is related to safety.

It is therefore suggested that if during this coming winter the air transport industry will be satisfied in undertaking with every possible degree of certainty to go through the winter without accident rather than to undertake the completion of schedules over and above those which might be safely completed with the facilities heretofore existing, that they will do more toward re-establishing public confidence in air transportation than if they take the other course, namely: pushing the limits of weather and airports. I think it should be thoroughly understood by the operations managers that the capacity of an airport is not the number of landings and takeoffs that can be accomplished under CAVU conditions, but rather, it is the number of landings and takeoffs that can be safely accomplished, and I mean safely accomplished, under minimum weather conditions.

The future of the air transport industry is at stake this winter. What happened to it last winter and spring is a matter of public record. The results of that series of tragic accidents are written on tombstones which the families and friends of those whose names are cut thereon will not soon forget. It is written, likewise, in the red ink of the air transport industry. Therefore, safety must be the watchword of the air transport industry through this coming season of bad flying weather.

Safety to the air transport industry means:

I  
VI  
VII  
VIII

First, top notch maintenance of equipment.

Second, careful dispatch of operations.

Third, the exercise of careful restraint by management harassed by the vision of red ink.

It is more important to the air transport industry that this winter be accident free than that it be profitable—because through safety alone will the air transport industry regain the full confidence of the traveling public.

### Explosive Decompression

By MAJ. H. M. SWEENEY, A.C.

Aero Medical Laboratory, Wright Field

In recent years the requirement for cabin pressurization in military aircraft has increased in importance because of continued advances in aerodynamics and power plants, and the ability of newer planes to fly at high altitude for long periods of time. The increasing susceptibility of aircrews to decompression sickness or bends at altitudes above 30,000 feet and the trend toward multiple crews for these high altitude aircraft have stimulated further development in cabin pressurization of aircraft.

As a method of protection against the effects of high altitude/cabin pressurization may be used in one of three ways: (1) to eliminate the necessity of wearing oxygen equipment on long missions by maintaining a simulated cabin altitude below 12,000 feet; (2) to prevent bends by maintaining a simulated cabin altitude of less than 30,000 feet; (3) when demand oxygen is used, to protect against anoxia above 38,000 feet by maintaining a simulated cabin altitude at 38,000 feet or below.

The B-29 operates in a pressure differential up to 6.55 p.s.i., which permits flights to 30,000 feet while maintaining an 8,000 foot cabin altitude, or to 35,000 feet with a 10,300 foot cabin altitude. It falls in the first and second of the above three categories.

The principal operational hazard in cabin pressurization is the effect of sudden loss in cabin pressure (explosive decompression) on aircrews. The purpose of this article is to discuss and evaluate this hazard.

Decompression at a rate greater than 5,000 feet per minute was considered by Armstrong<sup>1</sup> to be "explosive." He was the first to recognize this as one of the most important physiologic problems in the use of the pressure cabin. In the years from 1935 to 1942, Arm-

strong,<sup>2</sup> Dill,<sup>3</sup> Smith,<sup>4,5</sup> and others subjected animals and human beings to explosive decompression. Decompressions of the fastest rate were performed on animals by Smith<sup>4</sup> in 1942. He subjected rabbits, rats, and dogs to explosive decompression at rates equivalent to ascents of 1,042,000 feet per second (from an initial level of 8,000 feet to a final level of 45,000 feet in .019 seconds). The gas expanded to 8.1 times its original volume and as a result, 3 of 6 rabbits were killed. Neither dogs nor rats succumbed, although partial collapse and hemorrhage occurred in the lungs of rats, and hemorrhage of the middle ears was found in the dogs.

The most rapid ascent for human beings during this period was accomplished by Armstrong<sup>2</sup> who subjected 5 persons to 56 decompressions at the rate of 168,000 feet per second. Expansion of body gases was 1.3 times and in no case was either injury or undue discomfort shown by any subject. Contrary to expectations it was found that ear discomfort on ascent was less at the higher rates than at the lower, possibly because the eustachian tubes are blown open immediately and remain open during the whole pressure change. In normal flight the eustachian tube "clicks" open and shut at intervals during ascent, causing discomfort.

In 1941 Dill<sup>3</sup> found human subjects capable of ascending 40,000 feet in two minutes and forty-five seconds, and remaining there for five minutes with no symptoms other than those from gastro-intestinal gas cramps. Smith<sup>4</sup> also performed some slow decompressions on human subjects by taking them from 10,000 feet to 40,000 feet altitude at the rate of 30,000 feet per second.

The degree of explosive decompression which one can withstand safely is determined

by either the extent or the rate of expansion of internal body gases. The hollow organs to be considered are the stomach, the intestine, and the lungs.

During ordinary ascent in flight, expansion of the air in the lungs will never build up an appreciable pressure because the trachea affords an adequate passage for equalization. In the gastro-intestinal tract the excess volume of gas is usually expelled before the pressure produces serious distension. In going from sea level to 40,000 feet wet body gases theoretically increase in volume 7.6 times, an excess over the original amounting to 6.6 volumes. Although the capacity of the lungs can be doubled, 3.6 volumes of gas remain to be expelled. If decompression takes place in 0.1 second, a volume of air 3.6 times the original must be expelled during this brief period or stretch the lungs beyond physiologic limits.

In the above example the rate of gas expansion is 66 volumes per second. The effect on the body of explosive decompression cannot be determined by the rate of expansion alone. With high expansion rates, in which there is inadequate time for expanding gases to escape through the trachea or to be expelled from the gastro-intestinal tract, the actual amount of expansion becomes an additional factor. For example, if the volume of air is not more than doubled by expansion, subjective respiratory sensations are not aroused even though the expansion rate is extremely high. This is due to the fact that the lungs can easily double their capacity without undue stretching.

There is a potential danger when the expansion rate approaches that of instantaneous decompression, even if only a small expansion is involved. For elastic tissue to elongate, a change of the shape of individual cells occurs which requires time. If the decompression is sufficiently brief it is possible to damage the tissues because of the inability of the cells to overcome internal resistance rapidly enough.

Four physical factors are involved in explosive decompression:

1. The volume of the pressurized compartment (cu. ft.)
2. The size of the opening (diameter in inches)
3. The pressure differential (p.s.i.)
4. The flight altitude at which decompression takes place (feet)

The first three regulate the time or duration of decompression. With the time accurately measured and the pressure differential known, the rate of decompression can be determined in p.s.i. per second. The last two factors listed regulate the extent of expansion of the internal body gases, and from this figure and the time of decompression the expansion rate can be determined.

The smaller the volume of the pressurized compartment or the larger the opening, the shorter is the time of decompression. When other factors are constant an increase in the pressure differential extends the time of decompression, but the decompression rate and expansion rate are also increased. The most drastic decompression possible would be that occurring in the smallest cabin, with the lowest cabin altitude at the highest flight altitude attainable, when it is struck by a missile which instantly disintegrates the entire cabin.

In March 1943 the Aero Medical Laboratory was asked by the Technical Staff, Engineering Division, Materiel Command, to state the requirements for pressurization of fighter and bomber aircraft which would reduce the hazard of explosive decompression to minimum. On the meager evidence at hand, it was recommended that the fuselage be stressed and pressurizing equipment be built for a 6.55 p.s.i. differential in bombers and for a 2.75 p.s.i. differential pressure in fighter aircraft. The former differential is sufficient to allow ascents as high as 35,000 feet without oxygen equipment, while the latter will keep the cabin altitude below "bends level" (30,000 feet) in flights up to 50,000 feet actual altitude.

Experiments were initiated to evaluate the tolerance of flyers to explosive decompression of the magnitude likely to occur under these conditions. The first of these experiments was performed with a pressure suit in an altitude chamber.<sup>6</sup> Since the volume of the suit was but a few cubic feet, the opening comparable to the largest hole in a plane likely to result from enemy gunfire needed to be only a few inches in diameter.

Since the pressure suit was difficult to don and was not constructed to withstand a 6.55 p.s.i. differential pressure, a mock-up of a P-38 cabin was devised. In the fore end of the mock-up an entrance with a removable

<sup>6</sup>Conventional quantitative term used by aeronautical engineers.



door was made. To provide exploding openings of various sizes, several interchangeable doors were made with apertures of different sizes. The cabin was equipped with demand and pressure oxygen systems, a communication system, and a time-pressure recorder designed to give an accurate time tracing of the rapid changes. The cabin was placed in a decompression chamber; the subject entered it and a simulated flight was begun. When the desired pressure cabin altitude was reached, the opening was sealed. The chamber continued to the desired flight altitude, and explosive decompression was accomplished by puncturing the paper seal which disintegrated. Air rushed out of the mock-up cabin until the pressure was equalized with that of the simulated altitude of flight.

The first tests on human subjects were gradually intensified by increasing the size of the exploding opening, the pressure differential, and the altitudes. Before and after each new step, roentgenograms of the lungs were made, and mean vital capacity of the lungs was measured in an effort to reveal any injury resulting from the experience. The rationale of the latter procedure was that any multiple, minute contusions and resulting edema in the lungs would decrease the lung capacity. Subjects waited several days between more drastic tests to determine possible latent reactions.

No ill effects were detected and the subjects had no latent symptoms. The effects of explosive decompression on the subjects were all comparable. At the moment of decompression the subject experienced a sense of inflation in the chest and abdomen as a result of expanded gas. The subject coughed or sneezed as air rushed out the mouth and nose. The observer could see the subject's chest and abdomen expand rapidly. This was verified by moving pictures.

With the more drastic decompressions a few subjects felt slight twinges of pain in the upper abdominal region, possibly a result of stretching of the attachments of the diaphragm. One subject felt moderate pain in the umbilical region. These subjects may have had excessive gas in the gastro-intestinal tract, but roentgenographic studies after ingestion of barium failed to show any correlation between the amount of gas and the incidence of pain. With the more intense decompressions, subjects were dazed mo-

mentarily but always remained conscious. They were able to put on their oxygen masks and unscrew the bolts on the cabin door, a fair indication that a pilot would be able to fly his plane to a safer level if his pressure cabin suddenly leaked.

About 80 per cent of the subjects decompressed to altitudes above 40,000 feet suffered bends during the ensuing five minutes at altitude. Had they been pilots, however, they would have had time to fly their airplanes to lower altitudes.

In order to obtain information on the size of openings resulting from gunfire in pressurized airplanes, firing tests were conducted on the XB-38 and the XB-39. The most vulnerable spots were pierced with 50 caliber and 80 mm. high explosive bullets. The largest openings obtained were from disintegration of scanning blisters, about 90 inches in diameter.

Explosive decompression was first done at an altitude of 45,000 feet, using a 2.75 p.s.i. differential pressure, and an opening equivalent to one of 18 inches in a fighter airplane. In the next tests, 47 subjects, 14 of whom were flight surgeons of the Twentieth Bomber Command, were used for a total of 100 tests. Since then, 50 more tests of the same type have been made. Decompressions were at 55,000 feet with a 6.55 p.s.i. differential pressure (cabin altitude of 10,200 feet), an exploding opening equivalent to a 66-inch opening in a fuselage of 1,000 cubic feet capacity. This is a larger opening than any produced experimentally or reported from enemy gunfire. These decompressions took place in 0.75 seconds, giving a decompression rate of 87 p.s.i. per second. The expansion of internal body gases amounted to an increase of 3.5 times. In no case was there any discernible injury to the subjects. Later decompressions at 55,000 feet with a 7.5 p.s.i. differential pressure (cabin altitudes 8,000 feet, have been well tolerated by human subjects. These experiments prove that differential pressures as high as 7.5 p.s.i. are safe for present large volume heavy bombardment aircraft, even when flying through enemy gunfire.

With the advent of the bubble type canopy on fighter aircraft, a new problem of explosive decompression arose. Since bubble canopies are similar to scanning blisters on bombers, it is probable that they too will disintegrate when struck by a 80 mm. pro-

jectile. In one new airplane this potential explosive opening is 27 inches in diameter. Early experiments revealed that explosive decompression with an 18-inch opening in a 45-cubic-foot cabin at 45,000 feet, using a 2.75 p.s.i. differential pressure, approached the limit of human tolerance. Explosive decompressions were performed to determine if at 50,000 feet a 1 p.s.i. differential pressure could be withstood safely when an opening of 27 inches was made. One p.s.i. differential is sufficient to reduce the cabin altitude of an airplane flying at 50,000 feet to 40,000 feet where anoxia will not be a problem if subjects use pressure demand oxygen equipment and safety pressure of one to two inches of water.

Decompression at 45,000 feet with 1.5 p.s.i. differential and at 50,000 feet with 1 p.s.i. differential pressure was tolerated by the subjects. At the higher altitudes there was some difficulty in properly adjusting the pressure breathing regulator to ward off anoxia.

It is imperative that all personnel flying to altitudes above 40,000 feet be well indoctrinated in the use of pressure breathing equipment. Twenty per cent of the subjects experienced bends of rapid onset following decompression.

Ways of reducing the size of the metallic opening in the cockpit or means to prevent disintegration of the whole canopy may be forthcoming. Either may allow an increase in the differential pressure great enough to protect against bends.

Explosive decompression is associated with strong blasts of air through explosive openings and communication tunnels in bombers. A few instances have occurred in which a crew member was ejected from the plane as he sat near the scanning blister which disintegrated while the plane was in flight. This can be avoided by proper use of the safety belt and by staying away from scanning blisters except when necessary.

During the firing tests on the XB-39 a dummy was placed in the communication

tunnel between the fore and rear pressure compartments. When large openings were produced, such as destroying a scanning blister, the wind velocities created in the tunnel were as high as 140 miles per hour, and ejected the dummy with great force. In one instance when the legs of the dummy were hooked in the padding of the tunnel the force was sufficient to remove both the dummy and padding. Precautionary measures consist of the proper use of doors to the tunnel.

The Committee on the Standardization of Test Procedures for Aircraft, Joint Chiefs of Staff of the Army and Navy, has looked favorably on a recommendation that firing tests be conducted on all new pressure cabin aircraft in an effort to determine the greatest opening that enemy gunfire can produce. This information, with data discussed, will make it possible to determine safe pressurization for any particular aircraft.

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October 9, 1947

Presiding: W. T. JOHNSON, Safety Director, American Airlines, Inc.

**An Inspection Report on Suicide Field**

By E. L. STEPHENSON

Middle East Manager, Associated Aviation Underwriters

Dear Steve:

"As per your telephoned instructions, I made a partial inspection of this field today. As I brought the old Stinson in over the wires and set it down on the runway, I hit a Coca Cola bottle blowing a tire and causing me to ground loop and kill a stray dog with the propeller. After carefully hiding the remains of the dead dog in a badger hole on the runway and wiping the blood off the plane, I started for the men's room where I always begin my inspections.

"You know you told me that an airport operator who cannot run a clean toilet cannot run an airport and it certainly is the truth. This particular one was of the type described by John Paul Jones of Des Moines and I could not get close enough to it to inspect it so I was unable to form any opinion as to the ability of the airport management by inspecting the toilet and I proceeded with the inspection of the rest of the airport.

"First, I went to the combination office and pilot's lounge to wake up the chief pilot and general manager and buy a new tire and get it installed. Luckily, he found a pretty good tire under the davenport on which he had been sleeping. It had been holding up part of the davenport springs.

"We took the tire and went through a hole in the wall into the main hangar which is 40' by 80' and built of old sheet iron on unprotected steel frame. The floor was of wood well soaked with oil. The main doors were closed. They were the sliding type that slide when pushed by a truck. There were no side or rear exits. The front of the hangar was used by the operator to store his own planes.

"At the back, in one corner near the big hot air furnace where it was warm, was the curtained-off dope room. Dope dries much faster near the furnace and the furnace draft does away with the necessity of an approved ventilating system. There were no fire ex-

tinguishers anywhere and I did not recommend any because they needed parachute more than they needed fire extinguishers.

"In this heavenly spot, practically next door to Paradise, we found the superintendent of maintenance. He was standing with his back to the hot air furnace, with a cigarette in one hand and a spray gun in the other, doping a wing. We told him we wanted a tire installed and he called over to the other corner where his assistant was trying to weld a broken die cast door handle on the door of a plane with the door still in the plane. The two of them took the tire and went out to put it on my plane while the general manager went back to the office and I inspected the tie-down facilities for planes stored outside.

"The tie-down area was not mowed last summer and dead grass was heavy. That keeps their feet dry in wet weather and in dry weather it makes good grass fires. Most of the planes were tied down with clothes line and tent pegs. A few used 3/4 inch rope and then tied the rope to the mast peg with one strand of rusty bailing wire. Some used concrete building blocks weighing about 14 pounds and lying on the ground under the wing. There were some so called permanent tie-downs with eye bolts sticking out of concrete. They looked good on top, but I pulled one out and looked at it and it wasn't much bigger than my hat. You know the story from hundreds of claim reports. "A terrific wind, or tornado, (of 40 M.P.H.) broke the ropes or pulled out the concrete 'anchors' and tossed the plane into the adjoining field."

"Then I inspected five multiple T hangars built 80' apart on the slope of a clay hill, and with airplanes parked between them. All of these hangars were built since the war. In fact, one was completed in 1947 and two were built in the Summer of 1946. These two still had the original grass floor. It was dead and discolored, but it was still soft and

spongy. Dead grass still stands right up to the hangar walls. All of the doors sagged, all the wiring was terrible and many of the planes had their parking brakes set. There were about thirty Stinsons, Ercoupes, Aeronaucas, etc., in these hangars.

"If the one at the top of the hill catches fire first, the burning gasoline can run down the hill to the next hangar and on through all five hangars and into the main hangar.

"By that time, I was getting groggy so I went back to the office to get a Coke out of the machine. On the wall was a big poster announcing an air show. Under the words "Air Show" was another line "Thrills, Chills & Spills" and a list of the events. Number 1 was a \$45 prize for amateurs for a spot landing contest in parachutes from 500 feet. There were several other thrill events and then the star of the show was billed. "Madman" Hot Rock would do show rolls at fifty feet and end his act in a blaze of glory by flying in front of the spectators upside down and picking a handkerchief off the ground with his teeth. The poster said nothing about air transportation. It was strictly a "Thrill" show of the kind we have used for forty years to scare people away from flying.

"The general manager woke up again and asked me when insurance rates were coming down and asked me why good careful operators like himself couldn't get a lower rate than his lousy competitors. He told me exactly how we should run our business and I took it. He intimated that if we knew half as much about our business as he knew about his, our rates could be cut 50 per cent. Still I didn't get mad, but when he said the insurance companies had never done anything to help aviation, I couldn't stand it any longer so I killed him with my bare hands and threw his carcass into the toilet."

"That partial inspection report was found near the body of my inspector who had hanged himself that evening in his hotel room.

About a week later, I got a note from the spirit of my departed inspector written from the Airport of the Sun and reading as follows:

"Dear Steve:

"After I crossed the Coast Divide, my rate of climb jumped up to 2,000' per minute. Before long, I broke out on top and there, right by a huge canyon, were the Pearly Gates. St. Peter was pulling out the red carpet for me—he does that for all insurance men.

He told me that it was no crime to choke that airport operator to death and that on the contrary, he was going to give me a special reward and let me write this letter to you and tell you all about this aviation Paradise and who is going to come here.

"This is really the kind of Heaven we always dreamed about. Everybody flies up here—all God's children got wings. The sun shines all the time, so radios always work. Runways are 100 miles long without obstructions. Gasoline is free. Toilets are clean. Accidents are unknown so insurance men don't have to work. All I have to do is help St. Peter direct the buzz boys, the air show promoters, the lousy operators and others, who hinder the development of aviation on earth, down to the lower regions. No operator who ran a dirty airport on earth will ever get in here.

"That old proverb, 'Cleanliness is next to Godliness' is certainly true. Without cleanliness, you cannot have safety in aviation—in fact you cannot even have aviation. A broom, a mop, a cake of soap and some elbow grease come first in any safety program. A dirty airport is not a safe airport now is it prosperous. A clean airport is usually safety minded.

"You have got to recognize that these who fly can be divided into two classes. First, those who have a real use for air transportation in their business or recreation and can afford it. Second, those who are in it for the thrill and glamour. This latter class generally has an inferiority complex so they want to fly and be supermen. They generally lead a hunched existence six days a week but on Sunday they rent a plane and are 'King for an hour'. This latter class is by far the larger. No one wants to deny a soda jerk the right to build up his own ego by flying, but the fact remains that most of your buzz jobs are done by the latter group.

"Out of 20 buzz boys that I have directed below, 15 were under 25 years of age, earned less than \$5.00 dollars weekly and had inferiority complexes.

"A dirty airport attracts the buzz boys.

"As I mentioned before, insurance men really rate up here, but there is also a fine place waiting for those salesmen who will go out and sell air transportation to a million traveling men who need it but do not know it yet. St. Peter will roll out the red carpet for those boys because they will be the boys who build the aviation industry. It will be some time yet before they get here because



they haven't even started their job on earth yet and it is a big one.

"Next in order comes a very small group of flying instructors who taught students so well that none of them ever had any insurance claims.

"Next come the operators who ran clean, safe airports on earth, and tied their planes down with  $\frac{3}{4}$  inch rope to two cubic feet of

concrete buried four feet deep so their planes never blew away.

"Then come the mechanics and the manufacturers, the parts men and all the others who did their jobs on earth like men. All of them will be here because doing a good job on earth is the only way to get here to this aviation Heaven where even the operators get along with one another."

### Passenger Safety on the Ramp and in the Plane Before Take-off

By C. S. MILLER  
Vice-President, Whitney and Miller

In the early days of aviation, better known as the barn storming days, the owner of an airplane usually had more ideas than money. He would take his crate to an open lot and post a sign, "\$2.00 for 30 minutes in the air." Any of the prospective customers were eligible to swing the propeller and start the engine. There were no safety belts. The wings were held on with barbed wire, and you could usually become pretty well nicked up just entering the aircraft. Any injuries connected with this semi-exhibition era never developed a claim against the owner or pilot. The injured customer usually remarked on his own clumsiness, and was chagrined that other people had seen the demonstration.

Then came the first air mail. There was an occasional daring passenger, who would crowd into the front cockpit of a two-place airplane, sit on some half-filled mail sacks, and then tell his friends about the countryside over which he flew, and which he probably didn't see. Any injuries suffered—from hang nails to pneumonia were never put in claim form against the owner or operator.

Today's airlines handle a tremendous volume of people, cargo, and mail, and there has developed a much different attitude on the part of passengers. We have handled claims in which a person slips on an icy ramp. The resultant slight injury is immediately built up into a claim against the airline. Purchase of a release may involve settling for one doctor bill, rebuilding one wrist watch, supplying one new dress and pair of hose, less depreciation. A release such as this is called a "nuisance" or expense settlement, and the insurance carriers for the airlines are not

interested in making any law!

Some months ago, a woman was entering an airline plane at Detroit. She claims that the wind blew the door closed before she could get her foot into the airplane. The alleged fractured ankle, pain, suffering, mental anguish, etc. was built up during the following months, and that case was settled before trial. Propeller accidents continue, and after we get rid of the fans on the front of these strange contraptions we will probably have the customers burned by the exhaust from jet engines.

A customer on one of our midwest airlines was a little late in getting out to board the airplane. The plane he was supposed to board had taxied down some half mile from the loading ramp. The customer saw another, which belonged to a different airline, standing with the inbound engines idling and he decided that it was his ship. He ran along side the ship from the tail toward the wing, waving his ticket and trying to attract the pilot's attention who cut the power. Before the props could come to rest one blade had struck this passenger, as he emerged from the leading edge, and he died some four hours later. The mother of the deceased is now seeking to make a recovery from the airlines.

Minor injuries caused by falling over chock lines, battery equipment, and CO<sub>2</sub> bottles, are becoming less frequent as airport operators do a better job of herding passengers. They are not allowed to approach the plane now until loading and starting equipment have been removed. Human failure, such as that which permits a C-34 to be loaded with-

out the tail support fork in place, is difficult to eliminate entirely. Aside from possible structural damage to expensive aircraft, nothing looks sillier than to find the load back of the center of gravity lifting up the front of the airplane and the nose wheel waving at the customers.

In one case the pilot, as he landed at Geneva, Switzerland, was informed by the tower that his plane was apparently on fire, and that airport equipment would be at the end of the landing run. It was later learned that the tail support fork had not been disconnected at Amsterdam—had been flown to Geneva—and not until the sparks from the steel support hanging on the runway were noted by the tower man, did the pilot have any notion that there was anything wrong. (From Clayton Knight's story, *Airplanes—Drafty and Dangerous*.)

Accidents in and around airport buildings used by the public are similar to the ones that occur in baseball parks, football stadiums, skating rinks, theatres or other gathering places. Legally, there is nothing very much new about these claims. A woman who slips on the floor of a local airport ticket office may or may not be seriously hurt. Regardless of the injury, the first thought seems to be "from whom can I get the most money?" The plaintiff's attorney claims to not everybody; the airline from whom she purchased the ticket or she was about to purchase the ticket; any other airlines which may exercise some control over the space; the municipality which owns or operates the building; the

local manager; the janitor; and any gen-darmes, who may be within earshot. Even though the floor may be in perfect condition, pedestrian traffic is properly controlled, and there is no apparent negligence on the part of any of the airlines concerned, still the aviation insurance carriers usually pay money for a release rather than run up legal expense or take a chance on finding some damaging law precedent made by the courts.

It should be remembered by airline people, that the better you run your business—in relation to handling the public—the less will be the insurance cost.

To obtain a decreasing accident frequency and to give your insurance carrier a better chance to defend successfully your rights, it strikes me that better liaison among airlines would help. Avoid the petty jealousy, which prevents one airline from using the passenger stands and ramps of another. Get together and develop a standard type of loading stand. They will probably cost you less. You don't lose any individuality for your line, and you have more brains available to help solve the loading problem.

More frequent briefing of personnel who load and unload passengers should also help. You have to impress upon your people that the traveling public is naive about airplanes and constantly wandering into trouble; and badly, discreet advertising which does not cause the hazards and yet would create a friendly feeling by the traveling public, would be of benefit to all concerned.

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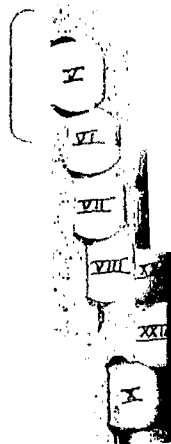
# *Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME V

AUTOMOTIVE AND MACHINE SHOP SECTION



NATIONAL SAFETY COUNCIL, INC.  
20 NO. WACKER DRIVE - CHICAGO 6, ILL.

## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

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**MONDAY AFTERNOON SESSION**

October 8, 1947

Presiding: Dr. A. L. BACOKS, Medical Director, Fisher Body Division, General Motors Corporation

**Recognition and Control of Fume and Dust Exposure**

By V. J. CASTROP

Research Laboratories Division, General Motors Corporation

Illness which can be attributed to the occupation may occur in the automotive and allied industries. While occupational disease cases are much fewer in number than those resulting from accidental injury, there still remains the need for vigilance in maintaining a healthful working environment. The responsibility for employee health is delegated by management to the medical director with the safety director charged with matters pertaining to safety. For the smooth functioning of either department it is necessary that these individuals work in close harmony with each other.

A safety engineer who is capable of recognizing conditions which may be detrimental to the health of the employee is an excellent roommate for the doctor in any employee health maintenance program. The safety engineer need not be capable of actually sampling air in the environment or designing a ventilation system for the control of toxic materials. He should, however, have knowledge of the materials which have been proved harmful, should be fairly well informed of how these materials may be used safely, have some understanding of basic control measures which are normally recommended when such materials are used.

The intention is not to present a highly technical discussion of fume and dust exposures or detailed information regarding ventilation systems, as such matters are of interest to the professional industrial hygienist and of comparatively little value to safety engineers. This discussion will be limited to the more basic principles of industrial hygiene as they relate to fume and dust exposures, to indicate what control measures are available or need to protect the employee's health, and to call to your attention operations and materials which are commonly used in the automotive and allied industries, at the same time indicating the generally

accepted opinion as to their effect on health.

Many conditions are corrected or improved because of reasons other than their effect upon the health of the employees. Better products, better employee relationship, reduction in maintenance of equipment may be cited as justification for management's decisions for such correction or improvement.

Generally speaking there are two means of entrance of toxic compounds into the human body under industrial conditions, namely, by ingestion or via the respiratory tract through the inhalation of fumes, dusts, mists or gases. Ingestion is of importance if toxic materials which have a systemic effect are used and adequate washing facilities are not provided, or, where the employees are slovenly in their personal habits. Inhalation is considered the most important portal of entry of fumes or dusts and the particle size, therefore, becomes significant in evaluating an exposure. The particles which cause the physiological changes are those which are small enough to remain suspended in the air and not those which immediately fall to the floor. Flying particles, which are of concern to a safety man and for which he advocates the use of goggles, are not of hygienic significance since they are not of respirable size. To judge the seriousness of an exposure by the quantity of detritus adjacent to an operation is often misleading. This is especially true where mechanical ventilation has been provided which will remove the fine material but is inadequate to trap or convey the larger particles.

In evaluating an exposure it is necessary to consider the toxicity of the material, the duration of the exposure, the average concentration of the contaminant with special attention being paid to those operations which produce high concentrations at some phase of an operating cycle, and the measures which have been provided to control the exposure.



Medical records of the individuals subjected to the exposure may be of value if the examinations are thorough and frequent and not of a cursory type. It must be remembered that occupational diseases are slow in development and in some instances lasting in effect. Slow changes may not be detected and the mere fact that cases have not occurred is no definite assurance that exposures to known toxic materials may be ignored.

The determination of the concentration of the toxic material in the air is important in evaluating the exposure. Tests of this type are not only indicative of the degree of contamination but in some instances which operation is the major offender.

The apparatus used in collecting the contaminant and the method used in estimating the amount present in the atmosphere vary with the type of material. Tests of this type are specialized in nature and are beset with many pitfalls which can lead to very erroneous results and conclusions if done by other than experienced personnel.

In a discussion pertaining to toxic materials it is generally necessary to quote permissible concentrations or as it is sometimes expressed—maximum allowable concentrations—permissible limits, or threshold limits. These terms are used extensively by industrial hygienists to indicate concentrations of a substance in the air which are considered compatible with good health. The limit usually applies to exposures of eight hours duration for a prolonged period.

The limits are, for the most part, advisory standards or bench marks which are practical to meet. In general, these limits are derived from three types of evidence all of which have value and limitations.

1. Animals have been exposed at different concentrations and the effects noted.
2. A few experiments have been made on human subjects for short periods of time.
3. Safe limits have been arrived at by measuring the concentrations of substance in the workroom air and correlating this information with results of medical examinations of workmen.

There is no magic connected with these limits and the mere fact that they are exceeded does not necessarily mean that someone will definitely become ill, but there is a good probability that someone will suffer ill effects if the limit is greatly exceeded for a

considerable period. There remains much to be learned regarding the toxicity of many substances used in industry, and it is hoped that with more research and study that the answers will be found.

So much for the general picture. Now let's take a look at some specific operations.

**Welding**—Welding processes most commonly used can be divided into three types, arc, gas, and resistance. The safety measures pertaining to clothing, goggles, and helmets are of common knowledge and therefore, shall not be considered in this discussion.

Arc welding when performed on uncoated steel does not produce a condition which is considered harmful to the welder provided it is accomplished in a comparatively large open area. The fumes which result from welding consist essentially of the oxides of iron and oxides of metals which may comprise the steel or coating of the welding rod. Some investigators have found characteristic markings on chest x-rays of men who have welded under severe conditions for long periods of time. These markings are presumably due to the deposition of iron fumes within the lungs, but it has not been demonstrated that such fumes have caused physical impairment.

A frequently suggested limit for welding fume is 15 milligrams of iron oxide per cubic meter of air. Concentrations of this magnitude existing in the workroom would materially reduce visibility and thereby become a nuisance or an unsafe condition requiring correction.

Welding within confined areas such as tanks, inside machinery or equipment, or in small rooms presents a condition which can be of concern. The concentration of fume is materially higher under these conditions as there is little opportunity for dilution by natural air currents normally present in a large shop. Nitrogen oxides formed by the electric arc when inhaled in sufficient quantities causes fluids to form in the lung—edema—with the resultant failure of the respiratory system. While welding in large open areas these toxic gases are normally not present in sufficient quantities to cause harmful effects. However, when welding is done in confined areas, the nitrogen oxides may reach a concentration which will be harmful.

Gas welding generally is not productive of harmful fumes. There are, however, in brazing two potentially harmful exposures. While boric acid or borates generally are used in

brazing fluxes, some metals require fluxes containing significant quantities of fluoride compounds and fumes from these fluxes have been known to produce significant nasal irritation. Fluorides in general are looked upon with suspicion since they may produce harmful effects upon the bone structure. A limit of 2.5 mg. per cubic meter has been suggested for fluorides, but no standard has been agreed upon. Most industrial hygienists attempt to keep them as low as practicable in order to be absolutely certain that bone damage does not occur among the workers.

Silver solder is one of the more common alloys used in brazing. Solders of this type vary in composition and may in some instances contain cadmium which if volatilized in sufficient quantities is considered to be harmful. At present the suggested limit for cadmium fume in air is 1 milligram per cubic meter of air.

Resistance, spot, or butt welding of plain steel is of no concern from the physiological standpoint. The fumes arising from such operations generally are caused by the volatilized oil which has come upon the metal stock during previous operations or which has been placed upon the metal as a rust preventive.

The preceding discussion of welding operations has been based upon the assumption that the metals being welded are of plain stock. The performance of welding operations, either arc, gas, or resistance, upon metals which have been coated with such toxic materials as lead, cadmium, or mercury may cause harmful exposures. The heat of the flame or of the arc causes volatilization of these metals. Welding or cutting ofterne plate or other metals containing significant quantities of lead can result in the volatilization of lead fume, which if inhaled for a sufficient period of time, may result in lead absorption and ultimate poisoning. The cutting or welding of surfaces which have been coated with paint containing lead has caused lead poisoning in the past and will continue to do so unless adequately controlled.

Welding of cadmium plated material was attributed as the cause of illness and even death to a number of individuals during the recent war activity. The reported cases indicated that death occurred in a comparatively short time after the exposure.

Welding of galvanized metal causes the volatilization of the zinc coating. Temporary

discomfort associated with metal fume fever may result from such an exposure.

Where warranted the control of welding fumes is generally accomplished by providing a mechanical ventilation system. The type of ventilation used is dependent upon the nature of the welding. When the object to be welded is positioned in a fixture or jig it is possible to obtain effective control of the fumes by the use of a grill side hood, or flexible duct near the source of fume. If the parts are large and it is necessary to weld more than a foot from a fixed point it is difficult to obtain good control of the fume with reasonable air volumes through system using flexible ducts. Since the effective range of most flexible ducts is approximately 8 inches from the duct opening, it is necessary for the welder to move the duct whenever the arc is outside this range. The practical result is that most ducts are normally not moved and the ventilation system does not remove the fumes when liberated. According to reports this type of system has been effectively used in shipyards, for the control of welding fumes in confined areas. In view of this experience it should therefore be a satisfactory means of control for welding fumes in tanks. However, excellent supervision and education is necessary to make such systems effective.

Where the room volume per welder is large, the natural ventilation within the plant is usually sufficient to prevent the accumulation of excessive concentration of fumes from plain steel welding. Circulating fans directed from the side help to dilute the fume which may be concentrated in the breathing zone of the welder.

Another means of control is the use of personal respiratory equipment. Air line respirators and fume respirators have been developed which will provide adequate protection. Some manufacturers of this type of equipment have on the market welders' helmets with facilities for providing fresh air to the wearer. The use of this type of equipment has been limited. Since the welder is already burdened with helmet, goggles, and protective clothing he probably will not be receptive to a respirator. It is usually sufficient in most welding for the employee to wear an ordinary helmet and to arrange the position of the work so as to prevent the concentrated fume from flowing under the helmet.

**Dry Grinding**—The dust resulting from the



grinding of nontoxic metals which are free of sand is generally considered a nuisance and is not harmful per se. Despite this fact some state laws require grinding operations to be ventilated. This requirement has probably been a hold over from the days when sandstone wheels were prevalent and also to prevent the creation of a nuisance condition. Grinding wheels in use in industry have artificial abrasives such as aluminum oxide or silicon carbide. Emery, which is a natural product composed of essentially aluminum and the magnetic oxide of iron, may also be used. A permissible limit of 50 million particles per cubic foot of air for aluminum oxide and silicon carbide was recently accepted by the members of the American Conference of Governmental Industrial Hygienists. Such a limit is liberal and concentrations of such magnitude are normally not encountered.

When lead, silica, or some similar toxic material comes in contact with the grinding wheel the exposure to the abrasive matter may be ignored and the exposure evaluated on the basis of the toxic material. If this latter material is controlled the nuisance will also be eliminated.

Ventilation systems for grinding wheels have been fairly well standardized and generally are satisfactory to prevent a nuisance. Hoods should enclose the wheel as completely as is practicable. Air volumes should be provided which are sufficient to cause an upward flow into the hood when using the smallest wheel. This is especially true where toxic materials are involved.

**Wet Grinding.**—Baffles, hoods, and guards are generally located near wet grinding wheels to prevent dispersion of the liquid used as a coolant. These devices are usually sufficient to control the dust if it is nontoxic in nature. If the dust liberated is toxic, mechanical exhaust ventilation may be required.

**Buffing and polishing.**—The buffing compound applied to wheels used for buffing and polishing vary in composition. Waxes and various types of abrasive are the major components. These materials plus lint and fibers from the wheel are the essential ingredients of the airborne dust. The toxicity is dependent upon the type of abrasive. Generally ventilation is provided so as to improve housekeeping and reduce the number of complaints and not because of the hazard to health.

**Machining-Smoke** from oily parts is the prevailing source of air contamination at machining operations. Illness has not been attributed to this type of exposure. As is the case with most fumes and dusts of the nuisance variety little is known as to what effect such materials have on already existing physical abnormalities.

Machining operations on steel produce large chips or turnings; consequently, dust is not a problem. Operations involving the machining of high lead alloys have been studied, and significant quantities of airborne lead have not been demonstrated.

Graphite which becomes airborne during the machining of cast iron is not considered to be physiologically significant, and therefore is classified as a nuisance dust. Frequently management considers it advisable to provide ventilation for the machines which are productive of the most dust, as graphite on the clothing and person and surrounding machinery is conducive to many complaints. Ventilation systems for the machining, drilling, and so forth, of cast iron should include hoods located as near the cutters or drills as is practicable. Many of these hoods are in use on production machinery and are doing an excellent job of dust control.

**Abrasive Cleaning.**—Since silica is recognized as the most harmful of mineral dusts, an adequate ventilation system is normally provided at the time of installation of commercially built sand blast equipment. Continuous usage and lack of maintenance result in a breakdown of adequate control. Visible escape of dust is the best evidence that this has occurred and it is advisable to correct such a condition without undue delay.

Employees who are stationed in blast rooms are dependent upon personal respiratory equipment. It is of utmost importance that such devices are of a type which will provide the necessary protection. Devices of this type are of the supplied-air variety, and it is necessary that the air provided be free of harmful contaminants. The air compressors should be located in an area free of contamination otherwise the contaminant will be transmitted to the helmet and the breathing zone of the worker.

Normally, ventilation within the room is provided so as to improve visibility and to help prevent the escape of dust to the surrounding areas not to reduce the concentration of silica dust to a safe level.

Tumbleblast or rotating table type of sand blast units should be provided with sufficient ventilation to prevent the escape of silica dust. Leakage due to excessive wear should be remedied.

Small sand blast cabinets, where the operator controls the blast nozzles from outside the cabinet, frequently have faulty seals around the doors or the rubber gauntlets are loose or torn. The dust which escapes from the cabinet through these openings is in close proximity to the breathing zone of the employee and in many instances exceeds the permissible limit for silica. This leakage should be corrected and the men should not be required to use respirators.

If the articles being blasted are free of silica or other toxic material, the dust resulting from grit or shot blasting is classified in the nuisance category. It follows that the maintenance of ventilating systems for grit blasting, although desirable, is not always so necessary as for sand blasting.

The use of steel grit or shot in blasting rooms produces excessively high concentrations of dust within the enclosure. It is therefore, necessary to protect the worker within the room. The remarks included in the section devoted to sand blasting rooms are therefore, pertinent when considering rooms in which steel grit or shot are used as the abrasive.

Vapor blasting, a variation of sand blasting, is of comparatively recent development. This procedure involves the use of fine silica and water under pressure. The silica used in vapor blast units varies in size and may even be as small as 1250 mesh (approximately 10 microns). It is generally believed that airborne silica particles below 5 microns are most significant in causing silicosis. It then follows that operations involving the use of silica abrasive whose initial particle size approaches that order of magnitude are more hazardous, and require continual vigilance in maintaining good control. It is, therefore, essential that the vapor blast cabinets be maintained so that leakage of mist does not occur. Good housekeeping is also essential as spillage of the sand and water sludge upon the floor will create a source for dust dissemination when the water evaporates. Likewise, containers of the dried sludge should not be allowed to stand in the factory where they can be influenced by air currents of high velocity.

Practically all industrial plants have operations which involve the use of leaded base bearing metal or solder. Babbitt bearing metal containing approximately 75 per cent lead has been encountered. The composition of solder metal is variable and dependent upon the purpose for which it is used, with ordinary soft solder containing a comparatively high percentage of lead.

Assuming that the babbitt or solder in use is one containing a significant amount of lead, the question then arises as to whether or not the employees working with this material will become ill. The answer to such a question could be given by a qualified industrial hygienist after he had seen the operation and considered such factors as the temperature to which the metal is heated, the method of removing excess solder, the length of exposure, and the effectiveness of the control measures provided.

It is a well known fact that lead causes illness if absorbed in excessive amounts, and therefore operations wherein lead is used have received considerable attention and study. Out of this experience certain practices are known to produce excessive exposure whereas other practices have been proved not to be harmful. It is generally conceded that excessive concentrations do not result from operations where solder is applied by means of an electric soldering iron. This is probably due to the small amounts of solder used and the comparatively low heat of the metal. When an iron is used which is heated in a small gas fired furnace, the exposure may be of greater consequence. Solder which remains on the iron coming into contact with the flame or heat is vulnerable for volatilization. Small amounts of solder drop from the iron onto the hot floor of the furnace where it is readily volatilized or oxidized. The oxidized material may become airborne due to disturbances created by the flame or by removing or placing the soldering iron in the furnace. Frequently industrial hygienists recommend that ventilation be provided for heating units of this type thereby removing lead fumes and dust from the environment. This is particularly true in small rooms or where many units are in use.

The atmospheric contamination occasioned by the use of either gas or electrically heated pots containing solder is dependent on a number of factors. With higher temperatures more volatilization will occur and the greater



will be the exposure. With the higher temperature the metal is more readily oxidized to produce a dross consisting of a high percentage of lead oxide. The dross may provide a protective coating to reduce the volatilization of the lead; however, disturbance of this coating will create an exposure. As a safeguard against excessive contamination, pots containing solder or babbitt are usually ventilated. Wherever possible it is advisable to enclose the pot as completely as possible and provide sufficient air volume to overcome the thermal effects of the molten metal. Attempts have been made to use natural draft ventilation systems to control these fumes and in those instances where the ducts were not of sufficient diameter the system was inadequate. A preferable method is the use of mechanical systems.

The removal of excess solder with power driven tools, such as grinding wheels, disc, or wire wheels, creates airborne dust which may contaminate large areas of the factory if the operation is extensive. Diligent use of abrasive cloth will also result in excessive concentrations of lead dust. Filing, however, is not productive of small particles and is preferred over the use of power driven tools. If filing is not practicable or feasible it will be necessary to provide some type of mechanical ventilation system for the solder removal operations involving the use of power tools. Since the permissible limit generally accepted for lead is 1.5 milligrams per cubic meter of air (353 cubic feet) it will be necessary to have an effective system to provide adequate control. Engineers experienced in designing ventilation systems to control toxic materials should be consulted, otherwise a costly system might be erected and later discovered to be entirely ineffective. Frequently solder removal operations require the use of portable tools on large objects and a local exhaust system would not be effective, as is the case in the fabrication of automobile bodies. General contamination of the factory with lead dust has been eliminated by enclosing the entire operation in a large booth and exhausting a sufficient quantity of air from the enclosure to insure a constant inward flow of air from the factory into the booth. Under these circumstances no practical amount of air could be removed from the booth to reduce the lead concentration to a safe level, and therefore it is necessary that the men working therein be provided with adequate personal protective devices.

**Heat Treating**—High temperatures are a frequent source of complaint from employees in heat treat departments but such conditions and their control are not within the subject matter under discussion.

Fumes disseminated from cyanide pots are often associated with cyanides used as fumigants or as the lethal agent in death chambers and supervision as well as the employee becomes apprehensive. Fumes from such a source are irritating and because of this property should be adequately ventilated. The irritant nature of the fume is caused by alkali formed upon decomposition of the cyanide.

Molten lead is sometimes used as a hardening medium for metals. Frequently charcoal or some similar material is placed on the surface of the metal to conserve heat and prevent oxidation. A covering of this type reduces the volatilization of lead while the bath is in use. Adequate ventilation should therefore be provided for baths of this type. As complete an enclosure as is practical for the operation being performed is advisable with air quantities dependent upon the open areas in the hood. To prevent contamination resulting from volatilization of lead accumulating in the combustion chambers the products of combustion from gas fired lead pots should be vented to the outdoors and not be allowed to dissipate into the workroom.

**Iron Foundries**—The principal ingredients of foundry dusts are silica, sea coal, clays, and parting compounds. The predominant material will be dependent upon which phase of the foundry operation is being studied and what operation is being performed. The control of dust is the major problem, whereas fume is of secondary importance.

A discussion of all the aspects of the industrial hygiene problems in such plants would require a separate treatise. For the present discussion it should be sufficient to state that all obvious sources of dust dispersion should be reduced to a minimum by adequate localized exhaust systems. In a mechanized foundry such places would be sand conditioning and mixing equipment, tumbling mills, shakers, core removal and knockout stations, transfer points of dry sand, abrasive blasting operations, and all grinding operations performed on castings containing appreciable quantities of sand.

Maintenance of ventilation equipment is a major item in foundries because of the abrasive action of the dust. It is imperative that a good program be maintained so as to keep the equipment functioning at maximum efficiency.

Because of the heat associated with large scale foundry activities it is a common sight to see pedestal fans or air cooling ducts directed in such a manner as to create cross drafts which interfere with the efficient removal of the dust dispersion. Better discretion in the placement of these fans or ducts will go far in reducing dust concentrations in the areas where they are used.

After the obvious has been corrected, it is advisable that a survey of the foundry be made by an industrial hygienist so that an accurate evaluation of the exposure may be obtained.

**Respiratory Protective Devices**—As has been stated, the atmospheric concentration of dust and fume and other materials may be reduced to a safe level by adequate exhaust ventilation. In some cases it is possible to correct the condition by substituting a less toxic material. If these measures are not practical respiratory protective devices may be used. They may also prove valuable in giving protection during an emergency or to provide protection for intermittent exposures or to supplement other methods of control. They should, however, not be considered as the desirable means of controlling a health hazard.

Experience has shown that frequently protective devices have been issued which do not provide adequate protection. Upon inquiry information was generally offered that the safety engineer was not too well informed as to what should have been provided.

The U. S. Bureau of Mines at their experimental station in Pittsburgh tests equipment of this type and studies the protection offered to the wearer. If the device is satisfactory in performance, they issue an approval number to the manufacturer which appears on the device as well as the container in which it is received from the manufacturer. The approval granted by the Bureau also stipulates that type of materials for which it is approved.

It has become general practice in the field of industrial hygiene to recommend the use of only those respirators which have been approved by the Bureau. Safety engineers should likewise insist that such devices be procured and acquaint themselves with the type of protection afforded by each device and thereby provide adequate control for the individual wearing the equipment. Some engineers prefer to stock only that type of respirator which will protect against the more harmful dusts or fumes, since a respirator of this type will also give adequate protection for materials of lower toxicity. The advantage of such a procedure has merit as it reduces the types of devices needed in stock and likewise insures the correct device for the more serious exposures.

## Metal Cleaning

By THOMAS MOONEY

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The complete finishing of metals by electroplating may include:

1. Cleaning by abrasives.
2. Polishing the base metals.
3. Cleaning with solvents.
4. Cleaning with alkaline solutions.
5. Cleaning with acids often referred to as "pickling."
6. Metal deposition or electroplating.
7. Buffing the deposit.
8. Lacquering the finished product.

In abrasive cleaning, sand or steel shot is

used under pressure. The potential health hazards in this type of cleaning are exposure to dust of a high free silica (SiO<sub>2</sub>) content caused by the sand and also to metallic dusts where metals capable of producing toxic dusts are cleaned by shot and sand blasting. Steel shot blasting is a much less severe health hazard than sand blasting; consequently, steel shot abrasive cleaning methods should be used wherever possible.

The maximum allowable concentrations (M.A.C.) for free silica are five million parti-



dies of dust in one cubic foot of air, as determined by actual count, using the standard light field technique.

The dust hazard in abrasive blasting may be controlled in several ways; however, most of the industries now use mechanically enclosed exhaust-ventilated machines where the operator observes and controls his work from the outside by looking through a protected glass window.

These machines are built in the form of a cabinet forming a sealed or enclosed area, so that little of the dust escape into the general workroom area. If necessary, the workers are provided with personal protective devices, such as hoods with airline respirators, and approved filter type respirators, and other equipment necessary to protect against dusts and rebounding abrasives.

Cleaning by polishing the base metals is usually carried out by the use of revolving wire brushes, which are used to remove rust and loose scale, adhering dust, dirt or materials which have to be removed before the metal can be electroplated. The principal hazard to health is dusts, and these wire brush buffing machines should be provided with adequate suction to remove the dusts from the working area; otherwise the worker should be provided with an approved respirator to protect against any toxic innocuous dusts which might be present.

Cleaning with the use of solvents is the principal method used to clean metal parts before electroplating. It is usually referred to as "solvent degreasing." Cleaning by this method involves the use of such chlorinated solvents as Permachlor (trichloroethylene), perchloroethylene and carbon tetrachloride. These solvents are all toxic and adequate protective measures must be employed for their safe use.

When used in a mechanically operated, properly designed and maintained degreaser, little health hazard is involved, if the manufacturer's rules and other safety regulations are followed. In manually operated degreasing operations, however, considerable solvent vapor can be released and inhaled if close and constant supervision is not exercised over the workers. In hand cleaning of small batches of materials to be plated, if speed in drying is not too important, perchloroethylene on account of its lower vapor pressure and higher boiling point is to be preferred over trichloroethylene or carbon tetrachloride.

ride.

Exhaust ventilation of solvent degreasing operations is rarely recommended on account of solvent loss. In the great majority of cases, as we have already indicated—if the manufacturer's instructions are followed as to installation and maintenance and safety rules, and provided the degreaser is protected from drafts, little or no health hazard is involved in its use.

The M.A.C. of trichloroethylene or perchloroethylene for most states is 200 parts per million (p.p.m.). The M.A.C. for carbon tetrachloride is 100 p.p.m. Some health departments think this last solvent is of such toxic character that its M.A.C. should be reduced to 50 p.p.m. Tests should be made in the vicinity of solvent degreasers to see these values are not exceeded for continuous eight hour exposures.

The health hazard in cleaning by caustic treatment results from exposure to caustic mists and vapors liberated from the hot caustic solutions in which the metal is dipped for treatment.

Local exhaust and other control measures may be needed. This will be the more needful if the solutions are strongly heated.

Some of the potential health hazards in pickling metals are the acid mists, acid gases, and gases liberated due to impurities either in the pickling acid or in the metal being cleaned, which is immersed in the sulphuric acid solution. Some of these products are hydrogen chloride, hydrogen sulphide, sulphur dioxide, arsine, phosphine and nitrogen oxides.

Pickling operations should be enclosed or isolated to prevent the liberated mists and gases from entering and contaminating the general workroom air. This enclosure should have sufficient exhaust ventilation so that air is admitted to it at all openings at a rate of at least 100 feet per minute. This should prevent exfiltration of the gases to workers in adjoining areas.

If the pickling operation can not be isolated, then local exhaust ventilation should be provided at the tank by means of slot type hoods located at the upper edge of the container which holds the acid. The exhaust ventilation rate should be a minimum be at least 150 cubic feet per minute for each square foot of tank area. The workers should be protected with acid proof clothing and should be instructed as to the corrosive character of the solutions used, as well as the necessary first aid measures to be used should some of the acid solution accidentally come in contact with their skin.

For the removal of oxides, tarnish and scales from copper, bronze and some other materials, a solution known as "Bright Dip" is used. This solution consists of sulphuric, nitric and hydrochloric acids. It is very corrosive, and when used, good ventilation must be provided.

If sand is present in the surface grains of the metal, then hydrofluoric acid is used. This is also a very corrosive acid and care is needed in handling it. The M.A.C. is low.

The "Stripping" of defective plated coatings may be accomplished electrolytically, or in strong acid or alcoholic solutions. In these cases gases and sprays are involved which require good ventilation.

In operations using solutions of cyanides in a bath, care should be taken to avoid the introductions of acid into the bath since hydrogen cyanide is liberated under such conditions. This gas is very poisonous. All cyanide baths should be conspicuously marked "Poisonous."

Electroplating consists of the passage of an electric current through a solution of a metallic salt and the separation of a metal on one of the electrodes.

The potential health hazards associated with electroplating are chromic acid mists, metallic salts, cyanides and other toxic gases and compounds.

Electroplating protects against tarnish and corrosion and improves appearance.

The applications of electroplating are almost as extensive as the uses of metals. The largest industrial application is in the automobile industry, in which not only many visible parts are finished by plating, chiefly with nickel and chromium; but also many concealed parts are plated with zinc, cadmium or tin.

Most of the plating is done in several hundred large plants, that are supervised by technical persons and provided with modern equipment, including that for effective ventilation. In addition, there are at least 5,000 smaller plating plants, many engaged in "job plating," in which the facilities and staff are more limited, and for which more instruction and supervision are required.

Many of the plating operations involve the use of large volumes of solutions of poisonous materials, including strong acids and alkalis, cyanides, chromic acid, and salts of toxic metals, such as lead and cadmium. In addition to the danger of contact with the solutions, there is also the hazard of inhaling poisonous gases, and sprays that are carried into the air by evolved gases. One such gas that may be liberated is hydrocyanic acid by the action of the carbon dioxide of the air on cyanide solutions.

Chromic acid, the principal constituent of chromium plating baths has specific effects that are distinct from those of the common strong acids. Its high oxidizing properties cause it to attack membranes, especially of the nasal tissues, and to cause "ulcers" to form wherever the skin is abraded.

It is important to note that these effects are confined to hexavalent chromium (chromic acid and chromates). Trivalent chromium, as in chromic sulfate, has no such effects. It has been reported that large amounts can be ingested without injury. This distinction is important in considering the possible health hazards should any chromium be dissolved from cooking utensils, as then the trivalent compounds are formed, and not the hexavalent.

There is always a large evolution of gas during chromium plating. Oxygen is evolved at the insoluble anodes and considerable hydrogen is evolved at the cathodes. These gases tend to carry a fine mist or spray of the liquid present in the tank into the surrounding air. The injurious component is deemed to be chromic acid. For this reason effective ventilation must be provided. Early in the development of chromium plating a study was made of the hazards involved by Bloomfield and Blum (1).

The results of this early exploratory study appear to be confirmed by later observations and experience. They showed that nasal injuries were likely to occur on long exposure to air containing more than 1 milligram of chromic acid in 10 cubic meters of air. It was then concluded that, under favorable conditions of cross ventilation, the desired low concentration can be maintained by drawing air through a narrow slot on one or more sides of the tank with a slot velocity of about 2,000 linear feet per minute.

In the American Standard for "Safety in Electroplating Operations," approved August 15, 1941 by the American Standards Association, the degree of ventilation suggested for



severely hazardous plating operations such as chromium plating, is expressed as equivalent to 120 feet (cubic) per minute for each square foot of tank surface, when drawn through a slot from 1 to 3 inches wide, extending the full length of the tank, and ventilating a width of not more than 24 inches. With a 2 inch slot and a tank width of 24 inches, this volume of air results in a slot velocity of 1,440 linear feet per minute, i.e. about 75 percent of that suggested by Bloomfield and Blum.

To achieve satisfactory ventilation in chromium plating, it is desirable to have the slot in the edge of the tank and the solution level at least 8 inches below the slot. Anodes and other devices should be so placed as not to interfere with the movement of gas and spray into the slot. Cross currents of air from window or other ventilators should be avoided.

Attack of the tissues by the chromic acid can be reduced by the use of vaseline in the nasal passages and on any abraded skin, and by wearing rubber gloves, aprons and waterproof shoes. Healing of chromium ulcers is fostered by early applications of a reducing agent, such as sodium bisulfite or polysulfide.

All of the cyanide baths, including those for copper, zinc, brass, bronze, cadmium, silver and gold plating contain (a) a soluble double cyanide of the metal plated, with either sodium or potassium, (b) some "free" sodium or potassium cyanide, and (c) in some cases, e.g. zinc baths, free sodium hydroxide. The copper baths are frequently operated at high temperatures, e.g. 70° C or 158° F, but most of the others are used at room temperature.

From all such baths there is a constant slow evolution of the very toxic hydrocyanic acid, which is more rapid if the baths are heated. This gas arises from the action of the carbon dioxide of the air, to form sodium carbonate and hydrocyanic acid. This reaction is retarded by the addition of free alkali to the baths. Except with heated baths, if good normal room ventilation is used, the concentration of the hydrocyanic acid in the surrounding air is not likely to be sufficient to cause permanent injuries.

The most serious hazard with cyanide solutions is the possibility that acid may be introduced and cause evolution of large volumes of hydrocyanic acid. Fortunately, careful precautions are taken against this possibility, so that very few instances have been

reported. During the early bombing of London, some fatalities in plating plants were reported as a result of the mixing of cyanides and acids.

Many of the hazards in plating arise from the types of compounds used, rather than from inherent toxicity of the metals themselves. There are, however, several plated metals that are toxic in all their compounds, e.g. lead, cadmium, arsenic and mercury. Arsenic deposits are sometimes used to produce dark or "oxidized" finishes on copper and brass. For each of these metals specific precautions must be taken.

Cadmium poisoning may not always be recognized because it has a delayed action. The first symptom of acute cadmium poisoning is a severe cough, followed by dizziness, shortness of breath, and constrictive pain in the chest. Severe lung damage may result and prevent the lungs from supplying oxygen to the blood. Death may then quickly ensue.

One hazard is in the melting of these metals, e.g. lead or cadmium, in the casting of anodes, as any fumes evolved are extremely poisonous. Protection of workers against these metal fumes can be secured by the use of a metal fume filter respirator approved by the U. S. Bureau of Mines; by special ventilation, properly designed for this purpose; and by good sanitary practice.

The electroplating industry necessarily involves the use of toxic materials, with the dangers and effects of which all workers should be carefully instructed. With proper safeguards, including the use of gloves, aprons, boots, available running water, good general ventilation, and adequate local ventilation, these hazards can be generally reduced and have been so minimized that the occupation of electroplating need not now be a dangerous one.

In electroplating, buffing the deposits is used to develop the finished lustre of the plated article. This process presents no health hazard apart from some dusts.

A coat of lacquer protects the plated surface from marks and scratches until it reaches the market or user. The lacquer solvent, which is usually composed of alcohols and esters with some acetone, presents no serious health hazard; however, the solvents used are very flammable.

Metal finishing is an operation which is performed to remove imperfections from metal surfaces, such as dents, wrinkles and

scratches, before the metal is plated or painted. The principal hazards to health in metal finishing are the dusts of toxic metals such as lead, which are used to fill hollow surfaces when power grinding or disc machines are used to grind them down to a smooth finish, as is often done in automobile finishing.

In operations of this kind, where the lead surface is ground with power tools, the job should be isolated from other adjoining departments and have suction applied to it to remove the fine lead particulate dusts from

the area. All workers involved in metal finishing where lead is used and ground with power tools should be required to wear a metal fume respirator approved by the U. S. Bureau of Mines for lead dust, if the concentration of lead in the air is 1.5 milligrams per ten cubic meters of air as determined by test. The writer knows of no lead hazard introduced when finishing lead surfaces by hand filing.

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## Control of Solvent Exposures

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The term "solvent" as used in industry denotes a variety of liquids that are used mainly for the purpose of dissolving some other material. The term is used rather loosely and may include such liquids as water or acids. Although there are many interesting factors involved in the proper control of all types of solvents, perhaps the greatest concern is attached to the organic solvents, and this discussion will be limited to that group of solvents generally referred to as "organic solvents." Most of these solvents are purchased to perform a specific function and they are later thrown away, usually in the form of a vapor. For example, a varnish may be made by dissolving a resin in toluol. The varnish is applied to some piece of equipment and the toluol is then evaporated by placing the equipment in an oven. Or, perhaps it is desired to wash grease from some metal parts. The parts may be wet with the solvent until the grease is removed and they are then allowed to dry. We can almost generalize and say that solvents are purchased for the express purpose of creating solvent vapors. These vapors create hazards which must be controlled.

There are about 200 different organic solvents available in drum or tank car quantities. These solvents are supplied to industry both as a specific chemical compound and also as a mixture of one or more of these chemical compounds. Thousands of these

mixtures are supplied to industry. In addition to this group of liquids which is available to industry in large quantities, there are several thousand others which are available in quantities of a few quarts or gallons.

Out of the many millions of gallons involved, the 200 organic solvents which are available in large quantities present the greatest problem of control. At the same time, this group of solvents has been used and studied sufficiently, so that reasonably good technical information and methods of control are available. Many of the several thousand organic solvents used in small quantities are not so well known and adequate technical information may not always be available. They thus present a more difficult problem in control.

In addition to these solvents which are now available, there are probably at least a dozen new organic solvents made available in large quantities each year, and hundreds of new solvents are made available in limited quantities. A continual check on new materials and new processes is therefore advisable to be certain that the use of new solvents will be adequately controlled.

When we speak of controlling solvent exposures, we obviously must include all the hazards associated with the use of the solvent. We must include such elements as fire, explosion, and health hazard. When speaking of control, we may feel the desirability of



establishing some kind of an automatic control which would shut off or reduce the exposure before hazardous conditions are created. It would be nice if we had a thermostat or regulator that would automatically turn off the exposure before any hazard was created.

Automatic controls should obviously be applied wherever they are practical. For example, combustible gas alarms may be used to control the explosion hazard in an oven being used to volatilize solvents. Automatic releases may be installed to actuate fire fighting equipment the moment a fire starts. Unfortunately, we do not have such a gadget which can be attached to one of the workers to indicate when he is over-exposed. Other methods of controlling the human exposures must be utilized, and these will be discussed later. Essentially, control of solvent exposures must be based on prevention of hazardous exposures. In order to prevent these exposures, certain technical information must be available. Equipment and processes must be properly designed. Finally, quantitative measurements must be made to establish the extent of the exposure. Perhaps we should consider these three elements more carefully.

Before giving much consideration to the design of a piece of processing equipment or a manufacturing operation involving organic solvents, a considerable amount of technical information must be available. Such elementary data as the boiling point, vapor pressure, vapor density, flammability, flash point, explosive limits, corrosive action, and last but not least, the Maximum Allowable Concentration and skin irritation properties must be known.

The boiling point of a liquid is of interest because it indicates the temperature at which large quantities of vapor will be given off at ordinary atmospheric pressure. It also serves as a guide in estimating the volatility of a solvent.

The vapor pressure of the liquid at room temperature, and also at any processing temperature, is of importance because it indicates the possible concentrations of solvent vapor that might be present under varying conditions. When the vapor pressure is known, the maximum vapor concentration that will be present under saturated conditions can be calculated.

The vapor density is significant since it

indicates whether the vapor is lighter or heavier than air, and in cases where highly concentrated vapors may escape from enclosures, it will be known whether these vapors will tend to flow downward or upward through the air. You will note that I said "concentrated vapors." I should like to emphasize this because there is frequently a misunderstanding in connection with the interpretation of the flow of vapors of varying densities. If there are only a few hundred parts per million of vapor in air, this mixture will not tend to flow upward or downward through the air when it is released, but will rather be carried along with whatever air currents may be present at the point where it is released. You are all familiar with the high school chemistry experiment of pouring carbon dioxide from one beaker into another beaker containing a burning candle and the resultant extinguishment of the flame on the candle. If the carbon dioxide in the first beaker were diluted to a concentration of only a few hundred parts per million of carbon dioxide in air, it would not pour from the first beaker into the second but would be carried away with any air currents and rapidly diffused in the surrounding air. Thus, any interpretation placed upon vapor density must take into consideration only those vapors which have not been diluted appreciably with air or other gases.

It is certainly desirable to know whether a solvent is flammable or non-flammable. If the solvent is non-flammable, no special consideration need be given to the possibility of an explosion or the danger of fire. If the solvent is flammable, however, special consideration must be given to its use so that the possibility of an uncontrolled fire or explosion may not occur. Even though conditions may be established for use of the solvent which minimize the fire or explosion hazard, it is essential that a suitable type of fire fighting equipment be made available in case some accident should occur which would cause the solvent to burn. Fire fighting equipment of a type suitable for the specific solvent involved should be selected. Assuming that the proper fire fighting equipment has been provided, it then becomes necessary to train a sufficient number of persons in its proper use.

Assuming that we are dealing with a flammable solvent, its flash point must be known to properly evaluate the means of protection

which is required. The flash point of a flammable liquid is the lowest liquid temperature at which enough vapors are given off to form a flammable mixture of vapor in air immediately above the liquid surface. If the liquid is above the flash point temperature, a small flame will ignite vapors from the liquid and they will continue to burn. Below this temperature, a small flame passed over the surface of the liquid will not ignite the vapors.

Where a solvent is constantly maintained at a temperature below its flash point, there is not much chance of it being ignited by sparks or small flame. If, however, the solvent is at a temperature higher than its flash point, any small spark or flame near the surface of the liquid will ignite it and the liquid will burn with increasing intensity. Thus, we see that a solvent whose flash point is above room temperature can be used without much danger of fire or explosion wherever the solvent remains at room temperature. If, however, its flash point is below room temperature, care must be taken to avoid igniting it. Care must also be taken to avoid the formation of explosive mixtures where the flash point is less than room temperature. In general, it can be said that when liquids are maintained at temperatures above their flash point, it is possible that explosive mixtures of the vapor in air will be formed.

The lower explosive limit of a gas or vapor is that concentration of vapor in air, below which an explosion cannot occur even though a source of ignition is present. If we are operating an oven under conditions where explosive concentrations of solvents are present, then it requires only a spark or small flame to cause a shattering explosion. Since it is difficult to be certain that no spark or flame will be present, it seems reasonable that we should always operate this type of equipment in such a way that the solvent vapors will always be well below the lower explosive limit. Then we can be sure that if a spark or flame occurs, there will be no possibility of an explosion. We have felt that it is desirable to maintain a four to one safety factor on such exposures, and therefore we limit the vapor concentrations in ovens or similar pieces of processing equipment to 25 percent of the lower explosive limit. When new equipment is being designed, the amount of solvent vapor to be released can usually be calculated and from this the amount of exhaust ventilation can be es-

tablished, using the four to one safety factor. After installation of the equipment, actual measurements are made to be certain that the design conditions have been met.

In general, the corrosive action of organic solvents is not very great. However, this factor must be known so that suitable piping and processing equipment can be provided. We can thus be assured that a corroded pipe or piece of equipment will not fail and produce hazardous conditions.

The Maximum Allowable Concentration and skin irritation properties of a solvent are part of the technical information which must be available if we are to satisfactorily control exposures. We do not find these properties listed in the handbooks the same as boiling point, vapor pressure, flash point, etc. They are just as important, however, and must be furnished as a part of the technical information which must be in the hands of people who are developing, designing and operating processing equipment or manufacturing operations involving organic solvents. The Maximum Allowable Concentration for different solvent vapors varies over a wide range—from a few parts per million to thousands of parts per million. It is obvious that a piece of processing equipment involving the use of a highly toxic solvent would be designed quite differently than one using a solvent of low toxicity.

The need for providing engineers and supervisors with all essential technical information regarding solvents has been emphasized. Perhaps it should be re-emphasized. All this information may be very helpful and useful if it is in the files of the safety engineer or the industrial hygiene engineer. However, to be most useful, it must be in the hands of those persons who are actually developing, designing or operating the processes which use these solvents. We have used several methods of supplying such information, which I will describe briefly.

All materials used in our plants are assigned a material number. For each material a 4 x 6 card is written by our Headquarters Engineering Department. On each card they list the following information—

Material Number  
Material Name  
Caution (A brief statement of precautions to be observed in using this material)  
For Use By (Name of plant)  
Furnished By (Name of supplier)



Order From Supplier As (Supplier's designation or catalog number)

Characteristics (A brief statement of the properties or engineering characteristics of the material).

Application (A brief statement of where the material is used and its general application).

Specify As (How to specify the material on drawings or other written documents). You will note that the third item on this material card is "caution." Before issuing any of these material cards, the Engineering Department consults the Industrial Hygiene Laboratory and they are furnished with a brief statement of the precautions that should be used for this specific material. These are brief statements such as "do not breathe vapors of this material," or "avoid contact of this material with the skin." This system has two advantages—first, it provides the Industrial Hygiene Laboratory with information about all new or changed materials that are used in the plants; second, a suitable warning as to any hazards can be given. These material cards are distributed to purchasing agents, materials and process engineers, development laboratories, design and engineering departments and all other persons having a definite need for information about materials.

Another method that is used for providing good technical information to the proper persons in the organization is the data which are furnished with our Process Specifications. Any process operation used at any plant is described on a process specification. Each process specification is assigned a specific number, and in general it can be said that each of these process specifications describes in detail any methods to be used in preparing a specific item or product. For example, one process specification may describe in detail the method to be used for insulating armature coils, and another may specify the details of the method of molding resins.

Before issuing or revising any of these process specifications, our Headquarters Engineering Department sends a copy to our Industrial Hygiene Laboratory for approval. It is checked to be certain that wherever hazardous materials are used, a suitable warning regarding the hazards has been included. For a number of years we included certain technical information such as Maximum Allowable Concentration, flash point, explosive

limits, etc. in each specification. More recently, we are making reference in the specifications to a Safe Practice Data Sheet. These Safe Practice Data Sheets are provided along with the process specifications so that when a person has a process specification he also has a safe practice data sheet. The Safe Practice Data Sheets list the following information about each material that may involve any hazard—

#### Containers and Storage

##### Properties

##### Fire

##### Explosion

##### Asphyxiation

##### Swallowing

##### Skin Irritation

##### Personal Protective Equipment

##### Precautions

##### First Aid

We feel that this provides fundamental technical information to all persons who are involved in the design, development or operation of processing equipment.

We have made a number of references to the "engineering design" of equipment or processes involving the use of organic solvents. With complete technical information available, the designer of the equipment is in a good position to take advantage of any special characteristics which a material may have. He can utilize equipment and methods to suit the specific needs of the solvent involved. If he is dealing with a solvent which has a relatively low vapor pressure and also a low order of toxicity, such as kerosene, there may be no need for totally enclosed equipment. If the solvent has a relatively high vapor pressure and a high order of toxicity, such as carbon disulfide, the designer will recognize that totally enclosed equipment is essential, and in addition, local exhaust ventilation will be required wherever vapors might escape. In the second case, a considerable expenditure of money will be necessary for this type of equipment.

It is surprising the number of solvent exposures that can be eliminated by proper design of equipment or shop layout. Of course, if we inherit a piece of equipment, or manufacturing methods have not been originally set up to eliminate the solvent exposures, some means of protection against the exposures must be devised. Such methods as the installation of exhaust ventilating equipment, the use of respirators, or the ap-

plication of hand creams may be indicated. Sometimes these methods of protection may be satisfactory. In general, however, they require an abnormal amount of supervision.

Wherever solvents are used, it seems essential that some quantitative measurements be made to establish the extent of the exposure. We may have good technical information and good engineering design, but we are never certain that we have attained our goal in controlling the solvent exposure unless the actual exposure has been properly measured. The fire hazard can usually be determined by inspection. If there is any possibility of an explosion hazard, the measurement of vapor concentration by use of one of the readily available combustible gas indicators will determine accurately whether satisfactory control has been established.

Unfortunately, it is a little more difficult to determine the exposure of a person. There are two basic methods of determining the exposure of a person to a solvent. The first is by some measurement or inspection. For example, we may determine by measurement the concentration of solvent vapor in the air where the employee works, or an inspection may reveal whether there is any contact of the solvent with the skin of the employee. Another method of determining the true exposure of an employee is by some measurement which indicates the amount of solvent vapor which has been breathed by the employee during his working period. Exposure to benzol, for example, may be determined by a chemical analysis of a urine specimen, to determine the ratio of organic sulfates to total sulfates in the urine. Some recent research work indicates that it will be possible to determine the exposure of an employee to trichloroethylene vapors by a measurement of the trichloroacetic acid in urine.

A number of solvents increase the rate of excretion of glucuronic acid in the urine. These methods have not been extensively used, but certainly will find wider application in the future. We have found it very helpful in controlling benzol exposures to determine the sulfate ratios in the urine at periodic intervals. Whenever these determinations indicate an excessive exposure, an investigation is immediately made to determine why such exposure exists and to instigate corrective measures.

I should like to emphasize that these are methods of determining exposure and should

be used as such. They may not be related in any way to any harmful effect of the solvent.

The second general method of determining an exposure of an employee to a solvent vapor is by a periodic physical examination. This method depends upon making some specific determination which will give an indication of early effects of the solvent in the body. For example, blood counts, when properly performed, can be used to indicate any early effects from exposure to a number of solvents, such as benzol. Other laboratory tests may be made, depending on the type of injury reaction that may occur in the body from a specific solvent. If we depend upon physical examinations to determine exposure to solvent vapors, they obviously must be done at rather frequent intervals, and the physical examination program must continue indefinitely.

I should like to emphasize the difference between these two general methods of control. By making measurements which indicate the exact extent of any individual person's exposure, we are carrying out a procedure which gives an indication of over-exposure before there is any chance for a harmful reaction to occur in the employee. When we depend solely upon physical examinations to determine these exposures, it is possible to get an indication of over-exposure only after some physiological change has taken place in the body. The desirability of the first procedure is obvious.

Even though we may not wish to utilize the periodic physical examination as a means of controlling our solvent exposures, there is still a need for proper pre-placement and periodic physical examinations. The pre-placement examination can indicate any abnormalities in an employee which later might be interpreted as the result of some solvent exposure. Likewise, certain physiological changes may take place in an employee during his period of employment, even though there has been no harmful exposure. It is desirable to detect these unrelated changes and make them known to the employee so that proper treatment can be instituted and the employee will not have a feeling that perhaps his solvent exposure was a factor.

To summarize briefly, there are a wide variety of organic solvents used in industry in relatively large quantities. From these solvents a tremendous quantity of solvent vapors are liberated. To control exposures to these





solvent vapors necessitates a utilization of all the technical information that is known about each solvent. Engineering design must take into account these technical facts, and finally measurements must be made to determine the actual employee exposure. All types of exposure must be given consideration, in-

cluding such factors as health hazard, fire hazard, or explosion hazard. The final results of our control measures are indicated by the absence of fires or explosions, and a physical examination of the employee to finally prove that there has been no harmful effect from this type of solvent.

## TUESDAY AFTERNOON SESSION October 7, 1947

Presiding: EDWARD G. HOLTZMAN, Head of Safety & Medical Departments, Wagner Electric Corporation

### Stump the Experts

(A Question and Answer Program on Safety Problems)

Discussion Leader—EDWARD G. HOLTZMAN.

#### Participants:

DR. R. B. MERRISON, Diagnostic Div., Medical Dept., Chrysler Corporation.

J. A. LONG, General Supt., Bay West Paper Co.

WILLOUGHBY J. MOWERY, Plant Foreman, The Columbus Auto Parts Co.

JAMES A. PURDY, Vice Pres., Engineering, Michigan Mutual Liability Co.

WILLIAM S. SMITH, Safety Dir., Ford Motor Co.

H. A. WALLACE, Plant Mgr., Johnson Suture Corp.

CHAIRMAN HOLTZMAN: The first question in this "Stump the Experts" panel comes from Mr. Krone (Cincinnati Gas and Electric Company).

MR. KRONE: What part, if any, do unions take in the advancement and operation of a safety program?

MR. WILLIAM SMITH: I think that the unions play a very big part in any safety program. Even before the formation of unions, the workmen played an important part in making the plants safe. I mean by that, that before there were unions we had safety suggestions and recommendations from the men. Now they appear in a far more organized manner.

It is extremely helpful to any safety director to have that help, whether it is written in grievances or given orally in a shop as a suggestion.

MR. RILEY: (Electric Auto-Lite Storage Battery Co., Toledo, Ohio): I would like to ask Mr. Smith this: If I understood the question properly do you have union representa-

tion on your safety committee set up at all levels of your committee operation?

MR. SMITH: We do not have any safety committees in the Ford Motor Company. But we have what I think is a very effective system whereby the large plants are divided into zones called "labor relations zones."

Into those zones go all questions of safety, the clarity of our safety policy, and anything the men do not think is quite effective. The same thing applies throughout labor relations centers in all the assembly plants.

#### Union Participation

MR. PURDY: The gentleman asked a specific question with relation to union men being on the committee. Inasmuch as I come in contact with a great many committees both in the so-called large and the smaller plants, I should like to say that, we do find that the union members of the committee contribute a great deal to the success of the committee. As a matter of fact, in many instances we have found that we have gotten far better results by having the union representation on the committee. These union representatives have accomplished things that management did not seem inclined to do alone. In many instances, they have secured the cooperation of the employee which the employer had not seemed able to acquire.

The mere fact they belong to a union does not make them any different type of men as far as accidents are concerned. They are all human. They are the men who are being hurt and those are the fellows whom you have to work with, whether they belong to a union or not.

MR. H. A. WALLACE: There has been a lot of talk and a lot of activity the last few years on labor management cooperation and relationships. If we take the sentiment and the human angle out of this subject of safety and put it strictly on an economic, dollar-and-cent basis, safety becomes very important. I can't think of a single thing that requires more cooperation than the maintenance of a good safety record or minimizing of accidents which cost dollars and cents.

It is true that in certain kinds of unions you will probably find the kind of fellow who does a lot of bellyaching and causes trouble. He brings up a lot of little things that do not amount to much; but generally, those fellows can be educated to do a good constructive job.

I feel very strongly about the workingman, whether he belongs to the union or not, being a definite part of this safety program. I think it is absolutely mandatory if you are going to have a successful safety program.

CHAIRMAN HOLTZMAN: Since we have six foremen from our company in attendance here, I am going to ask Mr. Mowery for the foreman's stand on this question.

MR. W. MOWERY: I can see a decidedly different attitude on the part of the labor organizations, especially in the last contract—they showed a willingness to cite accidents and the things that might cause them. It has just been during the last year or so that they seem to have been doing that. I think it is due to outside pressure, probably calling it to their attention and sort of having them jack up all management.

CHAIRMAN HOLTZMAN: Mr. Long, as a general superintendent, let us hear a few words from you on that subject.

MR. J. A. LONG: We do not have a union plant, but I feel that if we did have a union, that the union boys would be right in there trying to make the plant safe and should have a part in the entire program.

CHAIRMAN HOLTZMAN: Usually professional men hold aloof from that sort of discussion, but Dr. Mereshon, would you care to add to that?

DR. R. B. MERESHON: I am afraid this discussion is a little bit out of my field, but I do think that safety and medicine are very closely connected. The workingman has a definite place in this program through the medical department.

MR. KNIBBS (Safety Director, American

Brass Company, Waterbury, Connecticut): May I add this one remark to the question that has just been under discussion?

We tried first by appointing our union men and having those appointments confirmed by the unions, but that didn't work very well.

The following year we let the union make the appointments, and they appointed mostly union stewards. Since then, the cooperation has been excellent. It then became their "baby." Their own stewards or their own representatives were working for them and not for management.

I think that this lesson might save someone some trouble when and if they want union participation.

MR. RILEY: I would like to ask Mr. Knibbs, is the employee representation on a rotating basis, or is it for the life of their stewardship?

MR. KNIBBS: We haven't encountered that problem so far.

MR. RILEY: I would like to know if there is anyone else who has that problem of rotating membership? It is something we are expecting to be faced with soon, and I would like to know what some other people are doing with it.

CHAIRMAN HOLTZMAN: The question is does anyone have a rotating membership, and what do they do when the times come to rotate membership?

Does anyone have an answer for that one? MR. BENJAMIN (Haines-Elliott Co., Kokomo, Indiana): We have the rotating system in connection with our safety committees.

When we first organized it, we were organized with the specification that each committeeman must be voted on by the members of his department and changed every year. That worked all right for about two years until we had an especially good committee. When it came time for the election, the boys of that department just nominated them for the second term.

They were told this was illegal; that one year was all the man could serve, and that he could not be a candidate. Those fellows then moved that the nominations be closed, and they refused to vote any other way.

We went to the manager and asked him what to do about it, and he said that when men vote that way there is nothing for management to do but to weaken.

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Now we leave it to the men of the department to elect their committee member. Some of them change if they are not satisfied with their committeemen. We have committeemen who have been on the committee for several years. It is up to the workers in the departments as to whom they like, who they feel is giving them the best service.

It has worked well as we won the National Safety Award in 12 out of the last 18 years.

MR. CAMPBELL (Union Switch and Signal Co., Swissvale): We have had a rotating committee for the last 15 years. We change every six months with 10 members on the committee. We are trying to educate the whole plant in safety.

Our company is wholly unionized, and these men come from the union. They are appointed by the foreman and superintendent in each department.

The company pays them \$15.00 a month for extra work along with the time spent while investigating hazards or accidents.

Our new committee was formed the first of October. I think there are about 90 people in the plant who want to get on the safety committee now.

I think the rotating committee is one of the most helpful educational features that we have been taught by the National Safety Council. Teach all of your plant safety; teach all the men, wherever or whatever they are, safety, and you will get results.

MR. WAHLS (World Adding Machine Co., Detroit, Michigan): Do these safety committees that they have appointed meet on their own time, and do you have to pay them for overtime if they meet afterwards? It is customary to pay the safety committee if they meet after working hours. Do they meet during working hours?

MR. PURDY: It is quite the ordinary practice when the committees meet after working hours that they are paid at the rate of time and a half. Some firms differ in that respect, but they do pay them for the time they put in beyond the regular working hours.

I might add that I presume there are some committees who meet on their own time and of their own accord; but the general practice is to pay the men, and I think they are entitled to it.

CHAIRMAN HOLTZMAN: Let me see a show of hands of those who pay their safety committeemen if they have meetings after hours. (Approximately 50)

Let me see a show of hands of those who do not. (Approximately 4)

That about answers your question.

MR. CAMPBELL: How about the fellows who get paid during working hours? We pay our men for working on the committee during working hours.

CHAIRMAN HOLTZMAN: You want a show of hands of people who pay their men during the working hours for committee meetings. They do not check off the job and get paid. Let us have a show of hands of those who do not pay them during working hours.

My good friend, Mr. Fiatt, of St. Louis, is the only one. I know you all want to know how he does it. He is available after the meeting.

MR. DELL FIATT (Titanium Products, St. Louis, Missouri): This is quite a surprise that I happen to be the only one here representing a company that doesn't pay employees for serving on the committee.

They realize they have quite a safety program in our company. These boys realize it is to their own advantage that these safety measures are taken. These boys spend as much as an hour of overtime at these meetings to give us suggestions on the hazards in our plant. We do not have the least bit of trouble with them, and there is no argument whatsoever on the pay part of it.

There are nine men on the committee, and eight of them represent the union, with one representing management. I happen to be chairman of this organization, and I think we have a good organization. We always start with the men in the local and have them realize that it is to their advantage that these boys work on the committee, and that they present their recommendations or suggestions. We do not have any trouble with unions as they pertain to the overtime feature when it concerns the men serving on that committee.

MR. GJERDE (Edison; West Gorge): We have 12 operating divisions which manufacture various articles. One a month we have a general safety meeting. The superintendents from each of the manufacturing divisions are represented at this meeting. They in turn go back and hold committee meetings within their own divisions.

In some divisions we have a rotating plan for representing all levels of employees. In some of our highly-specialized products where we need technical men, they are appointed

and serve for a period of one year. On all of our committee staffs from each division, however, there is usually one labor leader, usually a shop steward.

We sometimes encounter this trouble when we have an accident. Before the medical department has the opportunity of treating the individual to the extent where he is able to be represented at an informal hearing, the shop steward or some other official will say, "Go and see our lawyer." We then have a case on our hands before the man has had one or sometimes two treatments.

MR. HARRY MAILE (United Screw Manufacturing Co., Lima, Ohio): I would like to ask how the average safety committee is chosen, whether it is chosen by safety director, or is it chosen by the standing committee, or what?

MR. LONG: In our plant the safety director selects the man who serves on the safety committee. He does this in cooperation with the mill foreman.

In other words, our plant is a rather small one, and we cannot deprive certain operations of men for safety meetings. We have our safety meetings in the daytime. We rotate; they select these men, and they rotate them. In other words, each month they make their selections. This new man on the committee serves for three months. We try to work our new men into the safety committees as soon as we can after they start their employment.

MR. SMITH: We follow along our recommendations from the employees' suggestions on a very liberal plan throughout, through our industrial relations group, and particularly the labor relations divisions. We have found that not only a democratic way of doing it, but also a very successful way of doing it.

MR. PURDY: We have been talking almost entirely about the plant with the safety director. Where you have one plant with a safety director, you have 10,000 that do not have a safety director.

In the small plant the appointment of a committee will vary to some extent. It may be a man in the organization who is not officially designated or carrying the title "safety director." Nevertheless, he may have the responsibility of directing the safety efforts. He may be the man who will select the members of the committee.

I would say, generally speaking, in the small plant where a safety committee actually performs the safety activities of the plant, the men are usually selected by the manager or his superintendent.

MR. McCUSHION (Dow Chemical Co., Midland, Michigan): Every man in our plant is on a safety committee because every man has a supervisor, and every supervisor is the chairman of the safety committee of the men under him.

MR. BRISONE (National Carbon Co., North Carolina): In our plant we have a rotating committee that we rotate once a month. It is composed of five people, one man and four women. It is appointed according to payroll numbers.

We started in the beginning with the first man on the payroll, and the first four women. Each month that committee is changed. We feel that we may lose a little bit by changing our safety committee as often as we do, but we have gained a lot more by having all the workers on the committee during a period of a year and a half or two years.

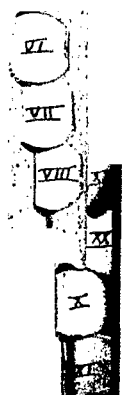
As a result of the committee being changed, the people who have been on the safety committee are cognizant of safety; and when they see something in the plant that they believe should require the attention of the safety committee they will go directly to someone on the safety committee so that at the next meeting that person will bring up the problem.

CHAIRMAN HOLTZMAN: I have another question here: "What are the fundamentals of a good plant safety program?" This was addressed to Mr. Purdy.

MR. PURDY: I would say that the very first fundamental is the selling of management on a safety program, and then it is up to someone to follow through on the management's wishes or desires, to see that a workable and practical program is put into effect.

There is another fundamental which we should study. Our approach should be the same as that of a doctor. We should go in and study our patient and find what kind of medicine he needs before we start shoving something down his throat. That is one of the great errors that is made in safety—somebody gets a wild idea.

In other words, I think we should do an engineering job. We should go in and study the need, and then work out a program. We



should have the tools to work with and then get the people to work with us.

Fundamentals are very broad in safety work, but you do get them by summing up. You have to have the support and favor of management. You have to have the salesmanship of the employees, and certainly the salesmanship carries through for the supervision because without the management's supervision and the cooperation of the employees, you cannot expect to have a safety program.

There are very definitely the basic fundamentals.

CHAIRMAN HOLTZMAN: Many safety men will say, "When I go through the plant and make recommendations, I am invariably turned down by the management saying, 'It costs too much money,' or 'We can't do this, and we can't do that.' How can I get a safe plant if management is going to keep turning me down?"

MR. LONG: I think it is up to the safety engineer to point out to management his legal support and also moral support, and then show him the benefits—or try to show him the benefits—that can be gained by good safety programs; also, how closely it aligns itself with production.

Too many people believe that a safety program and safety lie with the worker. Confidentially I don't think it lies with the worker. I don't think it is his first responsibility. I think it lies with management.

Safety is a product. The safety engineer has to go out and make a product in the plant in order to make safety a success. He has to make that program as important as the product the plant makes.

If management wants a safety program and wants it to operate, they must be sold.

CHAIRMAN HOLTZMAN: There are many instances where you will find that the foreman will say, "They have a high-powered safety organization down there in that industrial relations division, and all I know is they keep telling me about my accidents. I don't understand why they don't charge accidents to the safety department instead of the foreman."

MR. MOWERY: I think the foreman should assume his part of the blame for accident prevention, because he is the first-line sergeant out there on the job, and he should be the safety man in his department.

The foreman often attempts to dodge re-

sponsibility by saying: "Our plant is too small; we can't do that; our plant is too small," or perhaps he says, "Our plant is too big. We don't get the opportunity and we don't have the close contact."

I think there is one thing every foreman can do. He can practice safety to such an extent in his own department that not only his workers but the safety director also will recognize that he is doing a good job down there.

MR. STOKELY (Rockford, Illinois): I would like to ask if you think a safety program will pay for itself?

MR. SMITH: Yes, I very definitely think a safety program pays for itself.

I find that all of us in the Ford Motor Company think that safety definitely pays for itself, but, of course, you can't recognize accidents on a book book auditing system, as human life can't be measured in dollars and cents.

#### Safety Men—Line or Staff

CHAIRMAN HOLTZMAN: I have heard a lot of discussion about safety men. They all say, "Well, I don't see why they consider him as in a staff position? Why isn't he in line? Why doesn't he report to the production people with the same sort of setup that we have in connection with foremen?"

I would like to ask Mr. Wallace what he thinks about that? Who should a safety man report to in his place of business? Should he be a production man, a general superintendent, or should he be on some staff organization?

MR. WALLACE: On a large-scale operation in a large company I think the safety director should report directly to the vice-president in charge of manufacturing; in a small-scale operation he should report to the plant manager or to the production superintendent.

I feel that a safety director or engineer is definitely a line job and not a staff job.

I have heard a lot of discussion because industrial relations were something new. The industrial relations department was a lot of new overhead, and the shop was being pounded on overhead because the burden was too high; and immediately they pointed to the fact that we had a bunch of swivel chairs up there and a new office of industrial relations. We don't need them.

I know those ideas and those attitudes existed to a large degree at a certain com-

pany, and they made it very difficult for the safety department to get the kind of cooperation they require to make a safety program a success.

I am firmly convinced that in the same company if the safety man had been a part of the production organization, with the right kind of power behind him, he could have sold any superintendent in the place (if he could not sell him an idea that was a right one) that he had to do it. Times like that arise, and I have seen many of them.

It is all well and good to tell your foreman how you want him to do something, but many times you don't have time to go into a long sales program to get a point across, and you have to issue a direct order. I think it is just as true in safety as it is in production because they go hand-in-hand.

I would like to repeat, I believe in a two-faced safety program with a two-faced safety director, the kind of a guy who can stand up and tell a production man what the score is. He doesn't have to excuse himself; he doesn't have to be particularly nice and ask the fellow what he thinks when it is a question of a dead end-out hazard in the plant. Once again, I would like to say that a safety director's job is a line job not a staff job.

CHAIRMAN HOLTZMAN: Do you agree with that?

MR. SMITH: On this question of staff executive authority and the line executive authority, it is my feeling that the best thing the safety director can do is roll up his sleeves and go to work and make the job safe. If he is going to sit and puzzle too much about whether it is a line operation or any other operation, he is going to think too much about that and too little about the hazards in the plant. I think the thing to do is to go out and make it safe, and my experience is that no one will interfere with you.

MR. LONG: I want to state that I am a safety director as well as a superintendent, and I don't mind telling you I have some pretty tough battles once in a while with myself to see just where I stand on certain issues.

Gentlemen, I think the safety director in order to do a good job should not be under the superintendent or the production manager. I can't see where he could do a good job, because these jobs are conflicting in

themselves.

Management is after production, and they also want a safety record. It sometimes gets to a point where you can't have both. You should have both.

I think your safety director should be directly under the manager of the company in smaller plants, or the vice-president and so on, in larger plants, on the same parallel as superintendent. His job should be just as valuable. That is the only way you can work the thing out so that at the regular executive meetings the safety director can present his problems and they can be hashed out, and the manager can say he is either for it or against it. That is the only way to have harmony.

I know of a large paper mill where the safety director was under the superintendent, and of another large mill of another company where the safety director was under management, the same as the superintendent. The comparison between the two is really something to admire. I would say for the mill that has him under management. At the other mill, he just doesn't seem to get anywhere because he can just go so far and then he is stopped in his efforts to promote the safety program.

CHAIRMAN HOLTZMAN: A gentleman here asks what are the advantages or having the safety department and the medical department under one head?

DR. MERSHON: There is a distinct and a rather difficult cleavage between the two departments. Unless there is a coordinating head to see that the information necessary for placement, necessary for claims, necessary for investigation of dermatitis and a million other things is properly channeled so that the best can be gotten out of it for the benefit of the organization and not the advancement of the doctor or the safety engineer, a full job cannot be accomplished.

Each has his own work, and I don't think they should be tied in with one head. We feel if the doctors can examine their men without having to worry about where the man is going to be placed, that is an advantage.

I would like to describe our system, which we think is a good one. When we find a man that has some disability, we do not say, "Well, we can't use that man. He can't be placed on this job or that job." If this man has some condition, we code it. All of the de-



partments in the plant have this code written out, and what it means. It is then up to them to place the man on the job.

The doctor then calls the case as he sees it, the same as if he were in private practice. We feel in this way he is not prejudiced when he sees the case, one way or the other, if he sees some disease or some ailment.

If you are in private practice you would say that the man has a certain condition. Naturally that condition might limit him as to walking, lifting, carrying, pushing or pulling. We give him a code; then, it becomes the job of either the employment director or the safety man and the superintendent or foreman to try and find a job where that man is best fitted.

**CHAIRMAN HOLTZMAN:** The doctors many times feel they have that little right that no other department has in the entire organization. They feel they are a little power set over by themselves and should never be interfered with.

Where there is professional diagnosis, the layman should not invade; but where there is a question of plant unity. The automatic screw machine department doesn't operate by itself, the purchasing department doesn't operate as a homogeneous unit if we are to get the ultimate in production.

If we set up one department, whether it be the safety or the medical departments, as a little thing on a shelf you will find that a lot of difficulty will result.

I do not say that we have had that in our plant, but I do know that there are other plants that have had that difficulty. No layman has the right to dictate to the medical department on professional advice, but he should be able to confer with the medical department to be sure that the maximum benefit of hiring, rehiring, or the rest, the multitudinous other things that go along with safety and the medical department, have at least that concurring right.

**MR. PURDY:** It is a known fact that too frequently the medical department and the safety engineering department are at each other's throat for some reason or other. This is my diagnosis of the problem—too often the safety engineer becomes a doctor, and then the doctor becomes a safety engineer.

If they would stick to their own job and hang out their own dirty linen and clean it, I think you would find that a lot of the dif-

ficulties between the safety engineer and the doctor would disappear.

#### Pre-employment Examinations

**CHAIRMAN HOLTZMAN:** I am going to ask Dr. Mershon to tell us why he thinks physical examinations are important and how they aid a safety program, if at all.

**DR. MERSHON:** I think pre-employment examinations have their place, very definitely. In the first place, you are able to discover whether a new man has any physical disabilities or not; whether he may be slow in thinking, or whether he is slow in acting. After you get that information, job placement comes in, and I think it is connected with safety. I think if a man is properly placed, you will have a great many less accidents. For instance, I have one particular case in mind in which a veteran returned, was placed on a drill press, but he wasn't able to keep up with production.

This man had been given a physical examination. He was found to be a little nervous but was given the job anyway. He came back to the medical department when he wasn't keeping up with production, and we found there were a great many things bothering him. For instance, this job was a bit hard for him. He had a lot of worries at home, which made him tense. The more he tried to keep up with production, the less he was able to do.

We recommended to the safety department that this man be given a different type of job where he didn't have to meet production until he became acclimated. We felt that giving him a little time to adjust would mean that he could adjust himself, and he would then be able to keep up with production.

That man did much better after he was properly placed.

**MR. PURDY:** I think Dr. Mershon has given a very splendid professional viewpoint on the matter. I would like to add strictly from the layman's practical standpoint that I can't see how anybody would employ a man without knowing what they are employing. Certainly when you buy a machine to do a certain job there is much comment and much to-do about the kind of job you want to have it do.

When you go out to buy materials to manufacture a certain product, you certainly know the specifications. As a matter of fact,

one of the first things you set up are specifications. When you buy a shop truck or any other kind of equipment for your plant, you go into it thoroughly, and yet how often a man is hired without any knowledge of what his equipment consists. I think that this injures the plant, and it is absolutely wrong to the man to hire a person who is definitely physically unable to do the job.

I think a man is better off if he is refused a job, even though he needs it badly. I think it is to the man's own benefit and to the benefit of his family and community if he is not hired and placed on a job for which he is physically unqualified.

I think a physical examination is very definitely essential, as essential as your purchasing department and other departments which buy your equipment and your materials.

I am highly in favor of physical examinations. I presume there may be a question in somebody's mind as to what extent should a man be examined? I think that can best be determined by the work the man is going to do.

Some plants like to go into a very extensive examination program. They go over a man from head to foot, including X-rays. Others give him a very mild or superficial physical examination to make certain that the man can see, perhaps, and doesn't have a hernia or a heart murmur, or some of the more mild conditions. Those examinations sometimes are sufficient. At least they are better than none.

I believe that every plant (and this applies to the small ones as well) should have a doctor. We are often told that, "We are so small we can't afford a doctor." You fellows who are in the smaller plants are the ones who can't afford to work otherwise. You do not have the resources the large plants have to work with. Everything you can do to avoid industrial injuries or industrial health hazards in your plant are of very distinct benefit to you, and that can only be determined by a pre-employment examination and proper placement of your employees.

**MR. WALLACE:** I think there is another problem that every safety director and everybody involved in safety programs will be concerned with for some years yet. During the war there was a shortage of help, and you all had the experience when the situation was such that you would go out to the

gate and if there was someone there who wanted a job, and he was warm, you brought him in.

Consequently, a lot of people went into industry who were not physically fit for industry, at a time when they were needed even if they could only produce 50 per cent efficiently. Some of that occurred back in 1939, 1940, and 1941. Those people accumulated a lot of seniority in places where you have unions. You have to recognize that seniority, and you can't just drop these people off when there are younger and perhaps much better people available from the physical and even mental standpoint.

Some of the safety people have confronting them the problem of proper placement, and they are doing the best they can with some of these people who are not the most desirable workers. I can scarcely see how that can be done even on a small scale very efficiently without some professional medical help.

**MR. RILEY:** I would like to ask the doctor how often he feels the personnel of a plant should be re-examined, that is, given a complete physical?

**DR. MERSHON:** It has been said it would be well to have an examination made every year. In a small plant that would be very possible.

To do this in some of the large automobile plants would be very difficult. You would have to employ a staff of doctors who would be overloaded, to examine all of these men.

I think there again, when you have a pre-employment examination, you get a pretty good idea of a man's condition. Then if anything comes up in the meantime, or if this man is off work say with an illness, when he returns he is then given an examination.

In the big plants, it has been my experience, this has taken the place of a routine yearly examination.

We find we get a good majority of these people every year or year and a half, who get the flu, or some other illness that keeps them out for a matter of a week. When they receive an examination before taking up their work again, we find out whether or not they have completely recovered and are able to go back to their work, or whether some of the work should be made easier for them until they get their health back.

I might say that at the Chrysler Corporation, in the pre-employment examination, we



take a chest plate of every man. We have found a great many cases who had old lesions. These men are brought back after definite intervals depending on what we find.

Men who have good physical health are not seen again unless they become ill and visit the medical department.

We feel this pretty well takes care of our men. I might also say on the examinations, we give a short examination on pre-employment with the sight chart. We find we are able to pick up most disabilities in sight. We can get a pretty good idea whether they had any trouble or not with this sight chart.

CHAIRMAN HOLTZMAN: We have the inquiry of the doctor as to whether he thinks it pays to X-ray the lower back on pre-employment physicals?

DR. MERSHON: I have not had too much experience with that, but I do know there has been some discussion that such a thing might be a good plan.

We do have a lot of back trouble sometimes, but I don't believe that a pre-employment back X-ray would give us enough information at that time to be worth-while.

MR. SCHULTZ (Allis-Chalmers Mfg. Co., Milwaukee, Wisconsin): Don't you think it would or might be desirable to set up your periodic physical examinations on the specific occupational scale rather than having a set-up for once a year, let us say as an example, where you have a lead worker or dust worker and set up periodic examinations on the type of exposure rather than on a definite schedule?

DR. MERSHON: That is done. The examinations are scheduled according to the type of exposure. If the exposure requires it, of course, we would examine them every six months or every three months if that becomes necessary.

We feel we have the hazards pretty well under control at the present time. If we do see a need for it, however, certainly we would examine them as often as necessary.

MR. GJERDE: I would like to ask the doctor if he knows of a way or can suggest a way of determining an employee's allergy to dermatitis?

CHAIRMAN HOLTZMAN: I would like to know that myself.

DR. MERSHON: I think a man has a case history in something of that sort. For instance, if a man has asthma, hay fever or sensitivity to soaps, it only takes a question

or two on his pre-employment examination to find out whether he is allergic.

Many people never find that out until they get to work with something and they find they are sensitive and have a reaction. Immediately, of course, we give them tests against that material, and we give them a job on something where they do not come in contact with it.

I am afraid it would be difficult to determine all of the cases ahead of time.

MR. PURDY: I just want to add to that. You will find that certain types of people are a little more allergic to certain conditions.

You will find that redheads are not a good gamble where brass is being used. We used to call them "brass boys"—now it is a little more highbrow, and we call it "dermatitis" in one of its forms.

I think you can help yourself considerably in that matter by just watching the complexion of your people a little bit. That may sound far-fetched, but it is a fact just the same.

I don't mean by that that your employment department or engineer should become a dermatologist or psychologist or something of the sort. It is just common sense. That is one of the things you have to study in the safety engineering field.

The qualifications of a safety engineer are rather broad; and that is one of them. I think if you will give a little thought to this you will find that in quite a number of cases the complexion of the people has something to do with the case.

I just brought that out as a suggestion to you. Sometimes a doctor doesn't bring out those little points. They stay more to the professional side of it; and in the meantime we wander around trying to find out what made this fellow break out with this. The doctor says it is just a condition. I think about 90 per cent of your dermatitis cases are due to the people rather than the material they are using.

If you can get perhaps a little more personal and confidential with your employees, you will find that your dermatitis cases will go down. Don't start running to the laboratory with your oils and other materials to find the solution of your problems, because you won't find it there. You can take oils that are being used and run your analysis. You will get a certain percentage of bacteria.

Then you go over to the other barrels and get a higher percentage; and then you are stuck. If you go to the workers and find out how much they have had something of this sort, you will reduce your dermatitis cases.

MR. CARL REED (Westinghouse, Springfield, Massachusetts): I would like to direct a question to the doctor. If you were a worker going into a plant and you needed a job, and you have asthma, and the doctor asks you, "Do you have asthma?"—what would be your reply?

DR. MERSHON: If I wanted the job badly enough I probably wouldn't tell him that I had it.

Let me answer it this way: We feel that we have these hazards in our plant well under control, so that even if this man were placed in some of these positions the hazards are low enough so that it probably wouldn't bother him too much.

MR. REED: My point is this: Of what value are these medical examinations if we don't get truthful replies to our questions by the doctor?

DR. MERSHON: You will get some truthful replies. True, there are some who won't answer your questions. There is nothing that I know of that you can do about that but at least you will get some which should be of some benefit.

MR. NEURNBERGER (A. B. Dick Co., Chicago, Illinois): I want to bring up another very pertinent point in regard to physical capacities and physical abilities for a job. The doctor also touched on it when he talked about pre-employment examinations and periodic examinations.

What I would like to know is how such cases are handled when you find a worker who has 5, 10, or 20 years of seniority, and we find now that through a periodic physical examination the man no longer has the capacity to cope with the physical demands of the job? What are we going to do with that man?

DR. MERSHON: When we examine a man and find that he doesn't have the physical qualifications that he did have, we code him that way; and then he is turned back. I don't know just who has charge of that after he leaves the medical department, but it is taken care of and an attempt is made, in most cases, to try and place this man on something that he can do. That is all the medical department can do.

We do not like to get mixed up in the placement of these men. We are hired as doctors to find out what the condition of these men happens to be. From our standpoint, that is all the farther we would like to go. If we get mixed up in these other things, then we are apt to become prejudiced.

MR. WALLACE: I think that at this point, the safety director and the doctor should have a heart-to-heart talk about whether or not there is a possibility of a job in the plant that this man can do safely from the cost standpoint and from the safety standpoint. If there is no such position, then I think it is a question of management. Management has to decide what to do with this particular type of employee in the way of paying him a pension of some sort, or some sort of a partial severance pay. Different companies have different answers to that.

MR. NEURNBERGER and I have had some experience with a company that had a number of loyal oldtime employees, on their payroll for 30 and 40 years. They became physically unfit and were no longer safe in the plant. The company kept them on the payroll, but these men sat in a corner all day long.

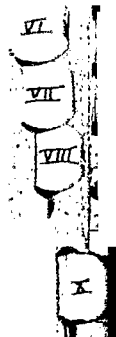
They had not solved the problem as to what to do with these employees who had become physically unfit. I repeat, I think that one is right in top management's lap.

#### The Foreman's Function

CHAIRMAN HOLTZMAN: There are a great many people who feel that when an employee comes into the industrial relations department, or the employment department, and has received his indoctrination safety talk, goggles, shoes and so forth, that he is now ready to be put on the job. I wonder how much of a job is done after he has left? That is, after the man is ready to be placed on the job? What is the foreman's part from there on?

MR. MOWERY: I think the first thing most foremen will do is question the individual and see if he really was told anything about safety. Most workers are prone to say, "Yes, I know all about that." That is where most foremen stop. They think he knows all about it, and they forget about the man.

I think the foreman should be conscientious and also make the worker conscientious at all times about safety. As I said, maybe the



employment department told him something about what the rate was going to be, and so forth, and then when they asked about safety, he said, "Yes, I know about it." Then they forgot about it.

I do not think the foreman should do that. They can do something to help the man beyond that point.

I think every foreman should be able to dramatize safety to the worker, for instance, if a safety bulletin comes out and has a picture on it, the foreman must use his initiative and see something in that bulletin that he can take to his workers.

By the same token, if something happens in another department, he should tell his men what happened in order that they may avoid the same hazard.

Too many foremen will say "Go over and do that job." You forget to tell him to do something about safety. You just put him on the job, and then come back later and see if he used his head. I tell him the safe way first.

#### The Safety Director's Authority

CHAIRMAN HOLTZMAN: I know there are many safety inspectors and safety engineers who will go in, or who have the authority to go into a department and say, "That machine is hazardous. Shut it down. We are not operating it until it is changed."

There is quite a bit of controversy about that. I would like to get the panel discussion or the panel reaction to that authority, or lack of it. Bill Smith, what do you have on that?

MR. SMITH: I don't see how anyone who is going to operate the safety engineer's department successfully and properly can do it unless he has the authority to shut down any dangerous machine.

We have that authority. It has to be used with discretion, and it requires a great deal of education.

For instance, it wasn't long ago that I shut down one of the power-operating presses in our fender department. The word was to shut it down. We called the shop foreman down to find out why it wasn't guarded properly. After that we called in the department foreman and asked him about it. In the meantime the machine was shut down. We called in the general foreman, the assistant superintendent of the building, and the superintendent.

Then we had what I call an "education" class. In the meantime there was no production.

Then the machine was corrected and allowed to operate. It was amazing how the procedure taken resulted in everybody's saying, "This will not happen again."

There is a very important factor in this matter of shutting down machinery. That is that any safety director can shut the machine down and immediately put on a temporary device. You can't just shut it down and walk away, leaving it behind you. Very often a temporary guard can be put on and the machine placed in operation again. But I definitely stand for shutting down machinery which is dangerous to operate.

MR. WALLACE: Bill, I would like to ask you a question. You are the safety director of all the Ford plants. That is a very big job. You have a lot of authority. How far down the line in your safety department does that authority to shut down machines go?

MR. SMITH: Those plants are divided into zones. There are 65,000 people in our one plant, and we use 184 million cubic feet of gas a day to heat the furnaces; 120 miles of railroad track to switch the trains in and out of the buildings; gas trucks to move things along without going outside. We divided that, naturally, into zones. The zone inspector, safety engineer, has the authority within that zone.

MR. WALLACE: I have always believed in the authority of the safety man on the firing-line. He has to have the authority to shut down a machine.

Accidents occur from unsafe practices only once in 100 times it has been said, but you don't know if that is going to be the 100th time. It may be the first time.

Every minute an unsafe condition exists is just that much more time to allow for the possibility of a serious accident. That just bears out what I said before. I firmly believe in a two-listed program. I think that is part of it. Many times superintendents or foremen on the floor do not have time to take care of a particular guarding problem that exists, or they haven't reached it. They have just neglected it.

With a two-listed safety man on the job, if he shuts the machine down then he gets action. I have never seen it fail yet. When a production man is held to a certain amount of production and you shut down the ma-

chine it affects his entire production and you get some action.

MR. MOWERY: I was on a safety program once before and tabbed the safety director as "the man in the gilded cage." I have seen a safety director who doesn't know anything about machines. I even know a case where a man had equipped a machine with his own suggestion and then wanted to shut it down. When he did that, he immediately lowered the respect of the workers in his department.

In one of the plants in our city a returned veteran wasn't given a job on a punch-press because he was a hazardous worker. They gave him another job in another plant in another city. This safety director thought he had everything all plugged, and the foreman told this fellow that he thought there was a hazard left there, but the safety director thought it was all taken care of in the particular instance, as he had installed a double push-button switch on the punch press.

In order to get his family out of the red, this G.I. thought he could "beat the gun" so he immediately began using his knee to touch one of the buttons and leave his hands free. He lost his hand at the wrist.

According to the safety director that machine was protected; nothing could happen. Yet, when it did happen, he went out and made another change on the machine so that it would not happen again.

In that case the foreman would have a hard time in telling the safety director that the machine wasn't right. There is an argument; it can happen especially when you go into a plant and have to show them.

I believe in showing by example. I think that safety directors sometimes shut down equipment when it isn't absolutely necessary. I think if they would talk the problem over with the foreman a little, they could often save shutting down.

MR. PURDY: I think this authority to shut down machines has to be handled very carefully.

The first important thought that comes to my mind is when you are talking about safety directors that the title or term has been rather badly misused at times. I think in a plant where there is a very competent safety director, he should have the authority because the management recognizes his value, his work, and his position in the company. Therefore, he need have no fear when that safety director orders a machine shut down,

Now let's go over to the small plant. I think we have to say something to someone occasionally in favor of management. Perhaps there are some managers here in this audience. They want to know the answers to some of these questions. They are probably fiddling around with some of those so-called safety directors who get in their hair.

When you give a man a title, he goes crazy at times and shuts down everything that can be shut down. Give him a bunch of red tags and he will really go to work; and the first thing you know you won't have any production.

Very often machines are shut down uselessly. Again you have to get back to your problem of engineering your job. It is not a question of somebody putting a knee against a safety device. We don't shut machines down for that purpose. We shut machines down when they are hazardous or in need of repair. If you have a device on there that was put on there originally and the machine device is not foolproof, that is another question.

The point we are talking about is: Should a safety director have the authority to shut down the machine when he sees that it is hazardous? I would say "yes," provided that the safety director has the knowledge and ability to determine the hazards of the machine. Many times you can set up some temporary protection or some temporary equipment so that production can go ahead. Here is where the state comes in. Just as soon as they find some temporary device, the question is, what is temporary?

I find these temporary setups in existence two or three months after they were effected. A temporary device, in my opinion, is something that is only to exist as long as it takes to make something permanent; then it must be removed. A lot of judgment has to be used in tearing down machines. Don't forget that one machine may affect a great many other machines. It may affect a line of assembly.

If you are going to start shutting down machines, be sure you know what you are going to do. It might be a good idea to consult the foreman, the superintendent, or the factory manager; and if you have done your job as a safety engineer and have sold them on safety, you will get cooperation.

You will have no worries in that respect if you have offered the proper spirit in the matter.



October 8, 1947

Presiding: C. A. DeMonck, Safety Director, Kelsey-Hayes Wheel Co.

### Safety Performance Improvement Through Management Training

By D. T. MOULD

Safety Director, General Motors Corporation

And E. G. BOWMAN

General Motors Institute

#### Mr. Mould:

The top management of General Motors Corporation has maintained one basic attitude toward the protection of its employees. This attitude has become a kind of philosophy, and it is that as long as one General Motors employee is hurt or is affected by an occupational disease our job in safety is not done.

We recognize that this is not an easy job. It is much bigger than any one person can hope to accomplish alone. It requires the combined efforts of each individual in the corporation.

Members of supervision need to stay alert to their responsibilities. They need to be constantly providing safe tools and equipment, safe working conditions, and safety education for the protection of the employees. It is also necessary to see that safety rules are established which are fair, and will protect the employee, and then make sure that they are used.

Probably we will never reach the place where we have no accidents or occupational diseases in our plants. It has been estimated that 88 per cent of our accidents are due to human failures. This means not only those things which people do and are referred to as "unsafe acts" but also to the failure of machines and equipment due to human failure either in producing these machines or in their usage.

The automobile industry as a whole, during the year 1939, had a Frequency of 6.95 and a Severity of .70. During this same year the General Motors Frequency was 3.72 and Severity was .41.

These figures show that in comparison to the automobile industry as a whole, we in General Motors had a good safety record.

The only reason these figures were low was because members of supervision throughout the corporation had been stepping up to the safety part of their job.

When General Motors made a total conversion to implements of war, all types of new equipment were needed. As this new equipment arrived at the many General Motors plants, it was found that in a good many instances adequate guarding had not been provided by the manufacturer. The materials required to properly safeguard this new equipment could not be obtained. We did not have a sufficient number of skilled people to make these protective devices and at the same time keep up with the total job to be done.

During this same period it was necessary for the members of management in General Motors to learn new methods of procuring.

Three hundred thousand new employees were hired. Many of these employees had never worked in any type of manufacturing plant.

It was necessary for these people to work long hours, including overtime work. Many found it necessary to become accustomed to shift work, which included the night shift.

It was necessary to deal with these situations with a large number of newly appointed supervisors. General Motors management found themselves in a position of not only trying to help these newly appointed supervisors, as well as the old members of supervision, acquire a knowledge of the new product, new equipment, new process, but also with the necessity of helping them properly train their employees.

From 1939 to 1942 the safety problem became steadily worse. In order to meet these problems, safety training programs were of

vital importance.

Some of the training jobs which were carried out were supervisory training for all members of supervision and training classes in the operation of machines and equipment for operators. New employees had the products explained to them at the time of hiring. Methods of job training programs were conducted for members of supervision so that they would be better able to train the employees.

By 1943, with approximately 450,000 employees on the payroll, through all types of training and educational programs, for both the operators and members of supervision, we were able to reduce the frequency and severity rates close to our 1939 position.

People started to become war-conscious to the extent that their every effort was toward helping to win the war. They all had the same incentive. They wanted to contribute their best toward the war effort and this meant working safely.

However, as the war progressed through 1944 our severity rate increased slightly, and, as we came through 1945 the curve increased very sharply.

It seemed that the employees had started to relax as there was some evidence of the European and Pacific campaigns coming to an end. In 1946 this curve increased further as we came into the reconversion period, reaching a frequency of 5.71 and a severity of .754.

Again we faced the situation of new products. This did not mean necessarily that the products were new to the manufacturing divisions, but in a great many instances they were new to the employees hired during the war years.

Again we faced the situation of having to use equipment which was not familiar to a large number of our employees.

We faced this same situation in manufacturing processes. These processes were not necessarily new to the old timers but were new to a large number of our employees. New supervisors needed to learn new methods of doing their job.

Along with these situations there was a great deal of unrest. The incentive to win the war was gone. Many men who had served in the armed forces were returning to their jobs. There was a great deal of unrest in labor. Everyone was concerned with the economy of our country. Large numbers of

employees seemed to want a change in scenery.

All of these factors had an effect on our safety record.

With the return from wartime operations to peacetime operations, it was felt that a stimulant should be put in the safety program to help members of supervision operate their departments in a safer manner.

As I visited the divisions of the corporation, members of top management were saying things like, "Our safety record looks pretty bad. We must do something about it." "We must reduce accidents." "We must help our supervisors step up to the safety part of their job." Members of top management knew that they must set up plans to meet this safety situation. They felt that management training would be a vital aid in carrying out these plans.

Since this need for management training was definitely in the picture corporation-wide, it was natural that we ask the assistance of General Motors Institute, central training agency for General Motors Corporation, to help in meeting this need.

E. G. Bowman of the design and development department at General Motors Institute, will give you the story of how a program was developed to meet this operating need and also tell the story of the training program itself.

#### Mr. Bowman:

In General Motors Corporation the philosophy underlying all management training is that the job of a training staff is to help the man carrying operating responsibilities to use training effectively as an aid in solving operating problems.

It is believed that training, to be effective, must help those members of supervision who are responsible for the operation end of the business. It must contribute toward helping them solve their operating problems. Training should not be done for training's sake alone.

In the development of any training program there are two kinds of questions that need to be answered.

1. What method of training will be most effective?

2. Where should the emphasis fall?

In defining the need for the program the Planning Committee reviewed the safety picture as presented to you by Mr. Mould and then said, what we want to come out



with is a program aimed at: 1. Getting the supervisor to accept responsibility for the people in his area; 2. Preventing accidents; 3. Having everyone in the organization carry his part in the total safety job.

They established the program objective, which was to help each supervisor gain a better understanding of the fundamentals of accident prevention and health maintenance and of his part in the organizational plan for safe plant operation, so that he accepts fully his responsibility for safety as an integral part of his job and continuously takes the necessary action.

This planning committee said, "We want a safety training program aimed directly at those members of supervision who have operating responsibilities, and we would like to have members of the Safety Department staff sit in the meetings as advisers."

In carrying out the third part of their job, the planning committee chose as members of the personnel of the design committee those people who the thought could contribute most to finding accurate answers to the two questions, "What method of training will be most effective?" and "Where should the emphasis fall?"

With this in mind and knowing that they would need individuals who were close enough to the operating part of the job to know its immediate needs, and still far enough away to be able to look at the training job in perspective, and also recognizing that they needed individuals who could contribute both content and method, they appointed six safety directors representing divisions of different sizes and six representatives of the institute training staff.

The six safety directors chosen were: Clyde Enoch, Chevrolet; Paul Sanger of Frigidaire; Bruce Gordon of Oldsmobile; M. J. McCarthy of Fisher Body; Fred Velson of Delco Remy and Dave Mould, Safety Director of the Corporation. The six representatives of the Institute training staff were members of the plant management training and design and development departments.

This group met together at General Motors Institute for a period of two days and the job of this committee was: set unit titles, set unit objectives, set unit specifications on content and method.

It was decided by this design committee that the program should consist of seven

units, and for each of these units they set the unit titles, objectives, unit specifications on content and method.

These were the men who made the blueprint of the program. This was the group of individuals who had to answer the two questions, "What method of training will be most effective?" and "Where should the emphasis fall?" During the meeting they said things like, "Cover this point." "Do not stress this point." "Approach this or that in this way." When these final specifications were set on content and method the job was turned over to writers who had been members of the design committee prepared leaders guides for instructions.

These men, using the specifications on content and method as set by the members of the design committee, wrote the first draft of the leader's guides. In order to make sure that the writers had followed the "blueprint" the leader's guides were sent to members of the design committee who reviewed the first draft.

This inspection was for the purpose of making sure that the model or first draft had been built according to specifications.

In order to determine whether or not the model or training program would do the job it was intended to do, it was necessary to take it to the proving ground. It was also important that it be tested with a typical group under actual operating conditions. This typical group needed to be made up of men at all levels of supervision and representing the various departments in a division. It was thought advisable to hold this initial run of the program in a division which was near the middle in the frequency and severity rating in the corporation.

With these factors in mind, it was decided to hold the initial run of the program at the Oldsmobile Division at Lansing, Michigan.

During the test, members of the design committee sat as observers in order to determine by observation whether or not the training program which had been developed according to the design specifications would reach its objective which was to "Help each supervisor gain a better understanding of the fundamentals of accident prevention and health maintenance and of his part in the organizational plan for safe plant operation, so that he accepts fully his responsibility for safety as an integral part of his

job and continuously takes the necessary action."

In order to take advantage of the test run experience, the program was then returned to members of the development team for revision.

When this revision had been completed we had an instructor's aid called a Leader's Guide for training supervision throughout General Motors Corporation with a training program called "Safety in General Motors." We also had a text by the same name, "Safety in General Motors" which was given to each member of the training groups.

The exciting thing about the approach used to develop this safety training program is that through the process of pooling experience it was possible to put in the "Safety in General Motors" training program many lifetimes of experience. It was possible to put in the hands of the instructor a Leader's Guide which was developed in the answer to the two questions, "What method of training will be most effective?" and "Where should the emphasis fall?" according to the experience of many individuals who were members of the Planning, Design and Development Groups.

This approach also gave the learner, members of supervision, an opportunity to benefit from the experience of those individuals who were close enough to the operation problem to recognize the need and still far enough from the job to view it in perspective.

The first of the seven units developed by this process was:

#### Unit I

Accident prevention and you; objective: to help each member of supervision more fully realize the importance of accident prevention and health maintenance and to stimulate his desire to do his part more effectively.

In this unit it is brought out that throughout the training program, safety is thought of as accident prevention and health maintenance. The point is also developed that:

Accidents Affect:

1. Employee.
2. Production.
3. Cost.
4. Community.

Accidents prevention and health maintenance are most important because of their effect on the employee. A good supervisor will want to be interested in his employees

as individuals and their welfare. This interest must be genuine.

He needs to think of them not as cogs in a production machine but as human beings who have feelings, likes and dislikes, fears, hopes, ambitions, and desires. All of them want to avoid injury not only for themselves but also because of the effect upon their families. If a member of supervision has this real interest in his people, he will not only want to, but will do everything he can to make his department a safe place in which to work.

The effect that accidents have on production is also of vital importance. Everyone knows that an injured person even though still able to work does not produce a normal day's work. At the time an accident happens, others working in the vicinity lose time and the chances are that more time is lost at the time of an accident than is ever recorded.

Whenever possible, the actual cost figures are explained to the members of the group. A point is also made concerning the intangible cost items. Actual cost figures are multiplied by four because it has been found that the intangible costs resulting from an accident are about four times the actual cost.

The effect that accidents have on the community in which the division is located is shown as being very important. Everyone knows what happens to the reputation of a manufacturing plant which continuously has a high percentage of accidents. Everyone has heard a manufacturing plant referred to as a "slaughter house." Because of the reputation which a plant establishes by the way in which it protects its employees, it is certainly true that accidents affect the feelings of the people in the community.

The members of the group are then shown by means of bar charts that industry has made much progress in protecting the worker.

These bar charts show the severity and frequency rating of all industry for the fifteen-year period between 1930 and 1945.

They also point out that General Motors has made progress in protecting the worker by showing graphically the frequency and severity rates for General Motors during the same fifteen year period.

It is brought out that members of supervision have contributed much to industry's advance in this safe guarding of the worker.

In order to show this, General Motors po-





sition in relation to other industries is presented.

The position of the particular division where the program is being presented is explained. To summarize this first session, General Motors philosophy towards safety is stated: "That as long as one G. M. employee is hurt or is affected by an occupational disease, our job is not done. Unless we improve our safety record each year over the previous year we have not met our full responsibility to the employee, community, and General Motors."

#### Unit II

The objective of the second unit of the program was to review with members of supervision the division's or plant's policies and procedures relating to accident prevention and health maintenance.

In 1935 Mr. C. E. Wilson spent more than three weeks visiting various General Motors Plants, reviewing with the supervisory organization and employees the job they had done on reducing accidents. He found that the plants that were having the best safety record had certain principles in common. From this survey six general principles were formalized by Mr. Wilson.

These six minimum standards in reality are the basic outline for the training program.

**1. INTEREST IN SAFETY ON THE PART OF TOP MANAGEMENT**

It is essential that the men who have the responsibility for the operation of the plant and the authority to change bad safety conditions—have a sympathetic attitude towards safety and recognize it as a Management responsibility.

**II. A DEFINITELY ESTABLISHED SAFETY ORGANIZATION THROUGH THE SUPERVISORY ORGANIZATION TO EACH INDIVIDUAL EMPLOYEE**

The General Manager should meet with the top supervisory staff periodically to review the safety situation; discuss major safety problems and make decisions for correction; formulate safety policies for mechanical safeguarding of equipment, good housekeeping, education, etc. Superintendents should meet with their foremen at least once a month to explain the general safety policies of the division as approved by top management. Foreman should talk to two employees daily regarding the safety policies and the safe practices necessary on their particular operation.

does necessary on their particular operation.

#### III. ADEQUATE AND CAPABLE FULL-TIME SAFETY PERSONNEL

Each plant should have a full-time capable man to supervise a continuing safety education program and assist the supervisory organization in maintaining safe working conditions in the plant. He should have a sufficient number of safety inspectors to cover all shifts.

#### IV. WRITTEN SAFETY PROCEDURE AND INSTRUCTIONS FOR EACH OCCUPATION

Safe practices and safety rules evolved by the experienced operators should be put in writing as safety instructions for each occupation so that the new operators can profit by the experience of others. These instructions should be kept up-to-date.

#### V. THOROUGH SAFETY INSTRUCTION OF NEW EMPLOYEES

New employees should be thoroughly instructed in the safe operation of the job before they start to work. Employees should be contacted frequently to make sure the safe practices are being followed.

#### VI. STIMULATION OF INTEREST IN SAFETY ON THE PART OF EVERY EMPLOYEE

The subject safety should be brought forcefully to the attention of the entire organization periodically through the medium of daily contacts with the employees, posters, safety exhibits, safety moving pictures, plant publications, etc. Safety can be "sold" to the employee group if they are contacted frequently regarding the safety of their particular operation.

#### Unit III

The third unit in the program is the job of supervision in accident prevention and health maintenance. The objective here is to help each member of supervision gain a better understanding of what he needs to do in making his department a safer place in which to work.

This session is primarily devoted to helping each member of the group determine exactly what his specific duties are in carrying out the safety part of his job.

For purposes of instruction, it is brought out that safety responsibilities carried out by

members of supervision come under the following general classifications: Employee relations, working conditions, machines, tools and equipment, and organization contacts.

These general classifications are used as a training device to help each member of supervision in thinking about his safety responsibilities.

A check sheet is filed out by each member of the group using each of these classifications as headings.

Under the heading of employee relations, responsibilities such as the following are listed:

1. Sees that all new or transferred employees are instructed on the safe operation on the job to which they are assigned.
2. Sees that people are properly placed according to ability.
3. Investigates or considers investigation to be made in cases where an employee is off work from an alleged injury.
4. Makes regular safety contacts with employees on the job.
5. Strives to instill pride in the department and plant safety record.
6. Encourages safety suggestions and the reporting of unsafe working conditions.
7. Accepts the safety part of his job as a human responsibility.
8. Practices safety rules and regulations himself.
9. Provides safe tools to work with.
10. Provides proper personal protective equipment.
11. Explains the purpose of safety devices.
12. Strives employee responsibility in regard to safety.
13. Encourages the use of the medical facilities.

Under the heading of working conditions members of the conference group list such responsibilities as:

1. Sees that good housekeeping is maintained.
2. Checks physical layout from the standpoint of safety.
3. Makes sure that he has the proper ventilation, heating and lighting in his department.
4. Knows the location of fire fighting equipment.

The responsibilities that are stated under the machines, tools and equipment are similar to these:

1. Constantly watches his safety hazards by

periodic inspections.

2. Follows up to see that machine hazards are corrected.

3. Issues orders for safety guards and personal protective equipment in his department, and follows up to see that these are completed and put into effect.

4. Checks the location of machines and equipment from the standpoint of safety.

5. Knows the basic operations of jobs in his department.

6. Analyzes the elements of an operation for safety hazards.

7. Keeps machines, tools and equipment in good repair.

In the area of organizational contacts such responsibilities as the following are listed by the members of supervision:

1. Gives organizational support to his safety program.
  2. Thoroughly understands and enforces policies, procedures, rules and regulations as adopted by his division.
  3. Takes an actual part in the writing of job safety instructions and sees that they are completed and put into effect.
  4. Promptly reports all accidents.
  5. Assists other supervisors by calling their attention to unsafe acts or conditions.
- These are only a few of the responsibilities which members of supervision recognize as their specific duties during the training program.

#### Unit IV

The fundamentals of accident prevention and health maintenance constitute the fourth unit in our program. The objective here is to give each member of supervision some tools and knowledge that he can use in making his department a safer place in which to work.

In order to help each supervisor develop certain skills and acquire knowledge about safety that he needs in making his department a safer place in which to work, it is brought out that the fundamentals of accident prevention and health maintenance are:

1. Determination of what constitutes hazards,
2. Ability to recognize hazards and find their causes,
3. Constructive action in eliminating hazards, and
4. The three major factors of safety control—engineering, education, and enforcement.

It is basic in any safety program to determine what constitutes a hazard. For purposes



of this training program a safety hazard is any unsafe act or mechanical or physical condition that could cause injury to, or jeopardize the health of, an employee.

Unsafe acts are thought of as potentially dangerous acts such as running, horse play, day dreaming, distracting other workers, and careless handling and storing of materials.

Mechanical and physical hazards are thought of as ineffectively guarded machinery, unguarded machinery, machines of unsafe design, defective tools, improperly pointed or stored materials, congested areas, unsafe building conditions, improper working conditions and unsafe apparel.

In order to constantly do an effective job in carrying out his safety responsibilities, the foreman needs some kind of systematic method in spotting safety hazards. A hazard check list has been found to be helpful in assisting members of supervision to do this. This hazard check list is divided into four areas: Overhead areas; machines, tools and equipment areas; the floor area surrounding the machine; and the employee himself.

Each member of the group makes an inspection of his own department listing the hazards he finds in each of these areas. He then takes the following steps to eliminate each of the hazards he finds:

1. Determines the cause of each hazard.
2. Takes the necessary action to eliminate the hazard.

3. Sets a definite date by which the condition is to be corrected and follows up to see that it is done.

The use of this hazard's check list results in a large number of safety hazards being eliminated during the training program. Not only is it a device which proves effective for training purposes, but it is also something that is a practical tool that can be used by each member of supervision on a continuing basis.

#### Unit V

The three major factors of safety control, namely, engineering, education, and enforcement are discussed at length in unit five; the methods of applying fundamentals of accident prevention and health maintenance. Here the idea is to help each member of the group to learn how to develop skill in working with employees and others in preventing accidents and maintaining health.

In the previous unit the members of the

group discuss the fundamentals of accident prevention and health maintenance. These fundamentals are:

1. Determination of what constitutes hazards.
2. Ability to recognize hazards and find their cause.
3. Constructive action in eliminating hazards.
4. Three major factors of safety control, engineering, education and enforcement.

In this session the members of the group are given an opportunity to develop skill in working with their employees as individuals and other members of the organization in the prevention of accidents and maintaining health.

Safety engineering may be classified as either preventive or corrective, preventive being suggestions made for safety to avoid hazards before machines or equipment are put to use. Corrective is to change or add safety factors to the machines and equipment which are already in operation.

The objectives of the engineering factors as applied to safety hazards means:

1. Avoid the hazard.
  2. Eliminate the hazard.
  3. Protect against the hazard.
- There are several principles which can be followed in reaching this objective. In avoiding the hazard there are such principles as:

1. Design and construct tools so that guards are not necessary.
  2. Provide mechanical feeding devices.
  3. Providing remote control mechanisms.
- The engineering objective—as applied to safety—of eliminating the hazard, is thought of as changing the design to incorporate the principles which apply to avoiding the hazard after the machine is in the plant and in actual use.

Among the several principles which can be followed in reaching the objective of protecting against the hazard are:

1. Providing mechanical devices that remove the hands or other parts of the body from the danger zone.
2. Design guards so that machines are not run unless guards are in place.
3. Provide enclosures, covers, etc.

Education as related to safety is the process of orienting the worker in the plant and the department, instructing him in the correct way to perform tasks, and enlisting his coop-

eration in avoiding and eliminating safety hazards.

It is felt that the most important phase of the supervisor's safety job is his daily contact with the individual worker. In a good many divisions this is done on a daily basis by a series of five-minute safety talks. In some divisions it is required that each member of supervision contact a certain number of employees and talk to them about safety each day. In some divisions this is done on a scheduled basis while on others it is carried out on an informal basis.

In order to help members of supervision become more effective in making these five-minute safety talks, the members of the group are given an opportunity to practice making five minute safety talks using the seven basic steps in selling: 1. Know the goods, 2. Know the customer, 3. Get attention, 4. Arouse interest, 5. Create desire, 6. Induce action and, 7. Maintain satisfaction.

Each of you will recognize that in these basic steps for selling safety there is nothing new. I think all of you will agree that these steps in selling have been used for years by men in selling products and in gaining acceptance to ideas.

The first two, (1) know the goods and (2) know the customer are those steps which a supervisor would use to prepare himself before making the safety selling contact.

Number (3) get attention, (4) arouse interest, (5) create desire, (6) induce action are the steps which are used in the actual presentation or in actually making the selling contact. Step number (7) is what we hope will happen after the safety selling contact has been made.

To "know the goods" in selling safety is to have the working knowledge of the purpose, the fundamental principles involved, and how these principles can be translated into specific applications. In other words, to know the goods means to know safety.

To "know the customer" in selling safety is to know people and to know each employee as an individual. The supervisor needs to know a lot about each individual employee, what his likes are, his dislikes, his family responsibilities, and hobbies.

To "get attention" is to have the employee direct his thinking toward the object of attention. This means to gain favorable attention not only to yourself as the speaker but also to the object which you want to talk

about. Getting attention as a selling step in this program means primarily attracting and holding attention to the particular phase of safety being discussed.

To "arouse interest" is to strike a responsible cord with the employee. Since every individual is interested in his own welfare, he will be responsive to those ideas or suggestions in which he can see something in it for himself or those close to him. Usually interest can be aroused by pointing out to the individual those benefits, advantages or gains which will be forthcoming as a result of doing what is expected of him. In safety this means such things as using proper guards provided, wearing safety goggles and obeying safety rules.

To "create desire" is to make the employee aware of unsatisfied wants or needs which are related to safety. This primarily consists of helping the individual recognize that his desires and wants can reasonably be satisfied by doing what is expected of him.

To "induce action" is to have the employee translate his desires into activities which tend to satisfy his needs or wants. This step consists fundamentally of recognizing thoroughly and completely what is expected of him as far as the safety part of his job is concerned.

To "maintain satisfaction" is to have the employee realize that a real need or want has been fulfilled. If this is done effectively, future selling jobs on safety will be easier.

Members of the group are given an opportunity to prepare and present five-minute safety talks based on the seven basic steps in selling. The third of the three E's is enforcement. Enforcement as related to safety is the control of groups of people working together under conditions essential to safe and efficient production.

It is brought out that the purpose of the enforcement principle is "to maintain an orderly performance of employees and eliminate all accidents." Enforcement is thought of as the control of groups of people so that they will follow safe practices. Control of groups of people is mainly dependent on follow-up assistance used after the educational principle has been put into effect.

#### Unit VI

Relationship with the safety department constitutes the sixth unit in the program. To help each member of supervision gain a better understanding of the functions of the



safety department as a service organization is the objective of this sixth unit.

During this session the general duties of the safety department in the particular division where the program is being presented are thoroughly covered.

These general duties usually are: 1. promote safety, 2. cooperate with medical department, 3. investigate all accidents, 4. supervise the general safety education program for new and old employees, 5. make daily plant safety inspections, 6. See that written safety procedures and instructions are provided for each job classification, 7. suggest changes in process if hazards are involved, 8. Specify or suggest types of safety equipment necessary for the job, and 9. assist members of supervision in developing a safety program for their own departments.

The safety department promotes safety by: 1. Contacting members of supervision, 2. Stimulating interest in safety education, 3. Safe guarding against accidents, and 4. Promotes good housekeeping.

The safety department cooperates with the medical department so that "danger spots" in the plant may be studied and efforts made toward accident prevention and control of organizational disease.

The safety department investigates each accident or near accident to: 1. Determine the cause, 2. Make recommendations for future prevention of accidents on this and similar operations, and 3. Maintain records for statistical purposes.

The safety department makes daily safety inspections for the purpose of detecting potential safety hazards and unsafe practices. Such hazards and unsafe practices are immediately reported to the member of supervision in charge of the department in which the hazard or unsafe work exists.

The safety department sees that written safety procedures and instructions are provided for each organization.

Local plant practice governs to a great extent what is set in connection with this function. This is usually carried out in cooperation with members of supervision who assist in writing the safety rules for the operations under his supervision.

The safety department suggests changes in procedures or processes if hazards are involved. It is not enough to be able to tell that a job or method of operation is dangerous. The safety director, or a member of his

department, should be able to point out what is causing the hazard and make recommendations to either eliminate the hazard or protect the employee against it.

The safety department specifies or suggests types of personal protective safety equipment necessary for the job. Usually a member of supervision is consulted by the safety department before such suggestions are made.

The safety department recommends the type of equipment to be worn or used, and where it is to be worn or used. It is then up to the member of supervision to see that it is used.

The safety department is a service department as we have seen during the coverage of its functions. It is a department for carrying out a staff function to help the members of supervision in the safety part of their job.

#### Unit VII

The last unit in our safety program might be called the human side of safety. Here the objective is to formalize the key points of the program, placing emphasis on the human relations side of accident prevention and health maintenance.

In this session the entire program is reviewed and Mr. Wilson's Six Minimum Standards are summarized. A strong emphasis is placed on the part that members of supervision play in the plant's safety program.

The approach used in the session is to retell the main points covered in the first six units. This story is told in the way a superintendent might explain a safety part of his job to a new member of supervision.

The final thought left with the group is that "mis-governing our employees is the most important task before us at all times." This is a statement made by General Knudsen at the time he was Executive Vice President of General Motors. This bit of philosophy along with C. E. Wilson's Six Minimum Standards has practically become the philosophy underlying General Motors Safety policies.

This is a story of the content of the program which was written by the members of the development team following the specifications set by the members of design committee.

Mr. Mould will tell you of how this safety training program is used to improve safety performance through management training. You will recall that during 1946 General

Motors set up definite management plans for revitalizing and re-emphasizing the safety program in the Corporation. These plans were based on the Minimum Standards for Safe Plant Operations.

You have heard an explanation of the approach used to develop a safety program, and also an explanation of the safety program itself, which was used to support, by training, the total management plan.

Mr. Mould: Starting in November of 1936 and up to the present time in 1947, the program has been presented in 17 Divisions of the Corporation. Approximately 7,800 members of supervision have had the advantage of attending these sessions. This means that approximately 210,000 employees of General Motors Corporation have been affected by this training program.

The program was conducted in conference type sessions so that each member of the group could benefit from the experiences of the others.

Some of the divisions where the program was presented have made definite improvements in their standing in relation to the other divisions of the corporation. Although most of the divisions did not make extremely large gains, nevertheless, in most instances, those divisions where training was conducted did show some improvement.

We cannot, of course, be sure of the full extent to which Management Training helped

us improve our safety performance in General Motors. However, we do know that carrying out Management's plans, of which the Management Training Program, "Safety in General Motors" was a part, helped us to improve our safety record.

At the end of the first six months of 1947 we had reduced our frequency to 4.06 and our severity to .421.

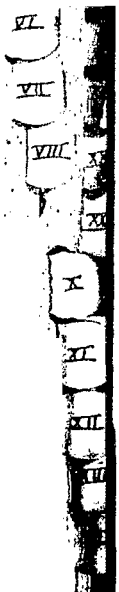
This, as you see, shows that at the end of the first six months we were very close to the 3.75 frequency of 1939. However, even though our number of accidents is still slightly more than 1939, you can see that our severity of .421 is far below the severity of 1939, which was .641. This is an all time record low for the total corporation.

In order to further reduce our frequency and severity standings we know that we must constantly stay on top of the Safety training job. We recognize that we will always be faced with new situations involving new products, new employees, new machines and equipment, newly appointed members of supervision, and new processes.

We know that we will never reach the place where we can say, "Our safety training job is completed."

Safety education must move forward with manufacturing.

We, in General Motors, are convinced that management training does play a vital part in improving our safety performance.



# *Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME VI  
CEMENT AND QUARRY SECTION

NATIONAL SAFETY COUNCIL, INC.  
20 NO. WACKER DRIVE - CHICAGO 6, ILL.



## Foreword

**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

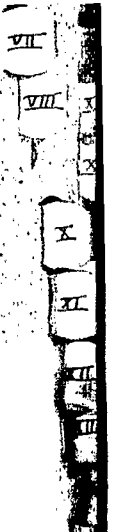
The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

**THE NATIONAL SAFETY COUNCIL**  
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# Injury Experience in the Cement and Quarry Industries in 1946

By FORREST T. MOYER

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The 1946 safety record of the cement and quarry industries, as measured by injury-frequency rates, was changed only slightly from 1945. The rate of occurrence of fatal injuries was reduced in 1946 but this improvement was offset by a slightly less favorable frequency of nonfatal injuries. The combined rate of fatal and nonfatal injuries was 55.42 per million man-hours in 1946 compared with 52.82 in 1945. The relatively unchanged position of the injury rates in the two years indicates in general that the safety programs of the cement and quarry producers recognized and coped with certain hazards that were of more than usual importance in 1946. Other major branches of the mineral industries—coal, metal, and nonmetal mining—were not as successful in accident prevention, and the safety record of these segments in 1946 receded from more favorable positions in 1945. Despite the comparatively better results, it should be pointed out that the cement and quarry producers merely held the same position in safety in 1946 as in 1945. The year-to-year improvement in accident prevention during the war years, when injury frequency was reduced from 55.75 in 1942 to 52.82 in 1945, was stopped in 1946.

The difficulties of wartime operations with the attendant hazards apparently were ended in the latter part of 1945 and were of little or no consequence in 1946. The supply of labor was ample, as judged by the sharply increased number of men working in the cement and quarry industries. Owing to the revival in construction after war restrictions were removed, demand for all quarry products was at high levels, and many operations were worked at or near capacity. The plants were active more days, and man-hours of work increased sharply in 1946. However, employee fatigue was not the problem it was during the war years because of the larger working force. Employment gained 26

per cent over 1945 to a total of 75,500 men working in the quarry industries during 1946. Another bugaboo of safe operations during the war—obsolete or worn-out machinery and equipment—had less and less effect on safety through 1946 as replacements were obtained.

Although the man-hours of exposure increased 25 per cent in 1946, the total of 50 fatalities for the year was three less than in 1945. The fatal injuries occurred at a rate of 0.42 per million man-hours compared with 0.47 in 1945. Fatalities inside the quarry represented 58 per cent of the total or slightly less than the average proportion noted during the past 5 years.

The total of 5,573 nonfatal injuries in the cement and quarry industries was 1,254 more than in 1945. As this increase was in greater proportion than the gain in man-hours of work, these nonfatal injuries occurred at a frequency of 55.11 in 1946—a less favorable rate than in 1945. Slightly more than half of these injuries were on operations inside the quarry, or approximately the same proportion as in the past five years. Comparison of the frequency rates of nonfatal injuries for the last two years indicates that accident-prevention work was more effective at outside works than inside the quarry.

Study of the available causes and other data on injuries in the quarry industries in 1946 reveals that a principal factor in the break or interruption of the generally improving trend in accident prevention was incomplete training of employees in safe job methods or work procedures. As has been pointed out, employment in the cement and quarry industries increased 26 per cent in 1946. In addition to the new and completely inexperienced men coming into the industries, this sharp expansion in labor force created a second group of employees who also needed instruction in safe work practices.

This latter group comprised the experienced employees who were promoted or shifted into new and relatively unfamiliar work or occupations.

The records indicate that the problem of training men in new jobs was not given proper attention because a high percentage of the injuries in 1946 happened to men with 6 or less months experience on the job. This apparent neglect could result from the constant pressure through 1946 to obtain production and it is conceivable that the training of men would receive a minimum of attention. Also the responsibility for training falls into that twilight zone between the safety engineer and the operating manager. Although sufficiently detailed data are not available it would seem logical to assume that the experienced employee shifted into new work would receive less attention and training than the completely inexperienced man entering the industries.

An analysis of 423 detailed descriptions of injuries received from quarries and nonmetal underground mines competing in the Bureau of Mines' National Safety Competition for 1946 reveals that 129 injuries or 31 per cent of the total happened to men with 6 months or less experience in these operations. It is noteworthy that 29 per cent of the 7 fatalities and 31 per cent of the 415 nonfatal injuries or approximately the same ratio occurred to men with less than 6 months experience in these operations. These percentages apply only to newly employed men entering the reporting plants. The data were not available in sufficient detail to determine the corresponding ratio that would apply to injuries affecting experienced men shifted into new occupations within the plants. This study included only injuries in the quarry or mine, the associated surface work, and the crusher. Injuries in cement mills and lime calcining plants are not reported in the Bureau's National Safety Competition.

The number of injuries included in the sample admittedly is small, but the results are confirmed by similar studies of data available on the cement and bituminous-coal industries. Classification of 10 fatal and 456 nonfatal injury descriptions in cement quarries and mills, published in the Accident Round Table by the Portland Cement Association, shows that 7 of the fatalities and 217 of the nonfatal injuries occurred to men with 6 months or less experience in the oc-

cupation at which they are injured. The injuries in the cement industry covered both quarry and mill operations and included these injuries affecting experienced men who were shifted into new work within the plant as well as new employees. It may be assumed that this difference in coverage of injuries in each study represents approximately the proportion of injuries which happened to experienced men moved into new occupations. In the cement industries study 48 per cent of the injuries occurred to the two groups of employees needing job training, whereas in the National Safety Competition study 31 per cent happened to new employees.

Somewhat similar results were obtained from an analysis of 2,547 detailed descriptions of injuries in 26 scattered coal mines. Of these, 588 injuries or 23 per cent of the total occurred to employees with 6 months or less experience in the occupation at which they were injured. Coverage of this study with regard to the two groups of employees needing instruction was the same as in the cement industry analysis. The higher proportion of injuries (48 per cent) to inexperienced workers in the cement industry compared with the corresponding 23 per cent in coal mining may be correlated with the difference in expansion of the labor force in 1946. In cement, the number of workers increased 24 per cent whereas the gain was only 5 per cent in coal.

It is apparent from the foregoing studies that training of employees in safe work practices was a problem of utmost importance in quarry safety in 1946. As employment gained sharply throughout the quarry industries, it seems reasonable to assume that the problem was present in each one. Injury experience in the industries, as measured by the accident rates, varied widely, some improving and others receding from the 1945 safety records. From this, it may be assumed further that the problem of job training was met with varying degrees of success in the different industries.

In the cement industry the rate of fatal and nonfatal injuries advanced nearly one point to 15.47 injuries per million man-hours of work in 1946. The imperative need for job training was recognized in this industry during the year and efforts were made to reduce the high proportion of injuries to inexperienced employees. Accident prevention in limestone quarrying and mining (ex-



cluding lime plants and associated quarries) suffered a severe setback, and the injury rate rose approximately 7 points over 1945 to 47.47 in 1946. This rate was higher than the average for the past 5 years and was nearly at the 1944 rate. The injury record in slate quarrying also receded in 1946, and the rate gained nearly 5 points to 54.82 injuries per million man-hours of work.

The remaining quarry industries—lime, marble, sandstone, granite, and traprock—showed varying degrees of improvement in their 1946 safety records. At lime plants, including the associated quarry work, the improvement was slight, and the 1946 rate of

48.98 injuries per million man-hours was only half a point better than in 1945. Injury experience at traprock operations was more favorable than in 1945 and the 1946 frequency was lowered one point to 48.15. At granite quarries the betterment in accident prevention was four points to a rate of 42.86 injuries per million man-hours of work in 1946. The marble and sandstone industries had the greatest improvement in safety of any of the quarry industries and in 1946 rates of 30.90 in marble and 47.40 in sandstone operations were respectively 15 and 10 points better than in 1945.

### Accident Prevention Through Planned Effort

By J. E. FARR

District Supervisor, Engineering Department  
The Employers' Group

After a building is built and fitted out the people put their implicit faith in the cement and stones and tiles that compose its structure. We all put our faith in the highways and the bridges and the dams that have become so important in our lives. It seems that in an industry upon which the lives and health and investments of so many depend, safety would be so much an integral part that there would be no such thing as an accident. A review of the records will show that this is not exactly the case, although you will see that the accident frequency for your industry is low as compared with other industries. However, your severity rate is high, and further study will disclose that many of the serious accidents you have are of a nonrecurrent nature.

If you were to pick up a typical list of accidents in your industry, you might find that in the first case a man fell into a quarry, and in the second case part of a quarry fell in on a group of men, and in the third case a man got a foreign body in his eye, and so on down through the list.

At first glance these cases may look as if they do not belong in any particular category. They are not all "slips." They are not all "struck by," they are not all "caught between," they are not "traffic accidents," they are not "burns."

Our big trouble is that we are not analyzing

these accidents for the main thing we want. These classifications mentioned have their place in our work, but fundamentally we prevent accidents by eliminating their causes and, therefore, what we really want to know about these accidents is their causes.

The cause of the first accident was not that the man "slipped" and fell into the quarry as it was stated on the accident report. More nearly the cause was the man's unsafe act that made it possible for him to slip and fall into the quarry. If we could find the cause for his act, we would have the real cause of the accident. When he climbed down without a life line on the steep ledge to retrieve an air drill bit, it is possible that he wanted to save a trip back to the tool room, or maybe he was afraid he would be hawled out for dropping the drill, or maybe it was his nature to take chances, or maybe he was trying to show off. It is obvious that safe practice was not a part of his nature. The true cause of this accident was whatever caused him to commit his unsafe act.

In the second case the cause of the accident was not that a loose ledge of rock fell from the quarry face. The falling of the rock was the accident. The cause of the accident was whatever permitted the rock to fall at an unexpected moment. Maybe it was due to a poor scaling job, or maybe the overburden

was not stripped back far enough and some loose rocks fell over the edge, or maybe, due to blasting operations, a crack developed in the stone and because of ineffective inspection service it was not found. It could have been prevented by some precaution.

Now let us look into the eye case. Why did it happen? We find that it was a little piece of stone, and that it flew into his eye from a sledge-hammering operation while he was passing by in his truck. The fact is that this man was not safety conscious. He didn't notice that the men using the sledges were wearing goggles. He never thought of getting hit in the eye by a chip of stone. He had his truck window open, and he was looking straight at those men beating on the rock ledge. In fact he was almost asking for this injury as well as asking for a driving accident, but he was so unconscious of safe practice that none of this ever entered his mind. His foreman had held a safety meeting and had told all of the men to be careful, but maybe this poor individual was short on imagination and had never seen enough illustrations to enable him to know what to expect, or maybe he knew that a person could get hit in the eye by a rock but never noticed the possibility of it happening to him at this time, or maybe he never heard of safety at all. Anyway he was not truly safety conscious and he committed an unsafe act that led to a serious eye injury.

Now that we have discussed a few accidents let us consider for a moment what an accident really is. The dictionary says that it is "an event that takes place without one's foresight or expectation, especially one of an afflictive or unfortunate character." In our work anything should be considered an accident if it is an unforeseen occurrence that interferes with the orderly progress of our activity. Some accidents involve injury, but many of them do not. In any case if our work is going to be prevention of accidents we can't afford to cloud the issue by getting off on a tangent concerning the degree of injury, and one thing we absolutely must not do is to get these two words confused. We must call an accident an accident, and an injury an injury.

If someone on our job breaks his back or is killed outright, we are likely to be swept away in the tide of investigation that follows, and everyone will be talking about the terrible accident that has happened. The fact is

that the accident itself may be just like a hundred others that have happened in which no one was seriously injured. Accidents can be classified by type, such as, "falls," "struck by," "caught between," etc. The word serious does not apply. Only injuries can be ranked into degrees of seriousness.

If we analyze the cases of workers being burned around cement kilns, we discover that the following happened. There will be a number of cases where the men were cleaning the back housing and a rush of hot dust poured out on their feet or a puff of hot dust blew out in their faces. There will be cases where the kiln backfired and caught someone near a clean out opening in the cooler housing under the kiln. There will even be cases where someone took hold of the hot end of a punch bar. When we complete our analysis we should have the causes, and that is the first fundamental of accident prevention work. This means that the reports should include the information we need.

Starting from here, with very little ingenuity we can classify these causes into two general classes, namely, unsafe conditions, and unsafe acts. Some will fall definitely in one of these classes, some in the other, and some will fall in a combination of the two.

When we find out what kind of injuries we are having and what kind of accidents are producing them, and what is causing these accidents, we are in position to take corrective action.

If we have the support of top management, unsafe conditions can be controlled.

Unsafe acts present a more difficult problem but they too can be controlled by supervision.

If you analyzed all of the accidents that occur, you would find that unsafe conditions had nothing to do with more than about 1/4 of them. Perhaps 1/4 of this 1/4 would be due to unsafe conditions resulting from someone's unsafe acts, so that actually only about 1/16 would be due purely to unsafe conditions. The remaining 3/16 would be due entirely to unsafe acts of persons.

It is obvious then that about 7/8 of our problem is the control of unsafe acts and, therefore, I shall devote the rest of my time to that subject.

I might say in passing that the control of human behavior being the problem it is, we need every assistance we can get. Above all we need visible proof that our management





is interested in safety and the best proof of this is prompt action on all recommendations concerning unsafe conditions. The attitude of top management exerts a strong influence all through an organization.

Assuming that we have full support of top management, we still have this difficult job of controlling human behavior and that is where the foremen and supervisors come in.

At no time during his connection with a company does a worker so willingly place himself under the influence and guidance of his foreman as he does during the first few days on his new job. That is the time to teach him the proper and safe method of doing his work. That is the time to teach him to respect the rules and regulations of the company. That is the time to notice if he is afflicted with some physical, mental or emotional deficiency. It helps for the foreman to look out for his new employee's welfare and let it be generally known that he expects the older employees to help the new man and not "horse around" and play practical jokes on him. It helps more than anything if he can make the new employee feel at ease.

To amplify what we have just said it might be well to notice that human faults that cause people to commit unsafe acts may be grouped under the following three major headings:

1. Lack of knowledge or skill.
2. Failure to follow instructions or rules.
3. Physical, mental or emotional deficiency.

The first fault implies ignorance. It does not mean however that the person has less than normal intelligence. It merely means that he is ignorant of the proper method of performing the particular job. This personal fault is very common among green and semi-skilled employees, and is often prevalent when a man experienced on one job, is changed to another. It may also extend to the normally skilled mechanic who has always performed his job in an unsafe manner. Corrective action for this personal fault lies in the field of instruction. It is accepted that one of the primary duties of an immediate supervisor is to teach his men how to do their jobs properly and safely to prevent injury and damage. The need for training has become recognized so widely that job training programs have been adopted as standard procedure by many companies in

their fight against waste due to accidents. The Training Division of the Engineering Department of the Companies I represent is presently offering a specialized foremen training service to its insureds and it is meeting with genuine enthusiasm and approval. Training is perhaps our most important corrective action against accidents.

The second type of personal fault applies to those stubborn and disobedient workmen who just don't want to do what they are supposed to do even though the instructions are clear and properly given. It may even extend to include persons who are reckless or inclined to engage in horseplay. These common faults come within the category of improper attitude, and corrective action required for improper attitudes is disciplinary rather than educational. You can't correct a man who is continually fooling and engaging in horseplay by teaching him over and over again that such things have no place in his work. Sooner or later you will have to employ the same methods used to enforce any other rules that are broken by certain individuals. Reasoning and appeal and setting good examples may eventually have to give way to some form of discipline. Warnings, lay offs, transfers, demotions and even discharge are forms of penalty often used but of course a good foreman will exhaust every resource of his personality before he resorts to penalties.

The third type of personal fault has to do with those unfortunate individuals who are apt to commit unsafe acts because of their physical, mental, or emotional characteristics. It includes men who walk into danger because their hearing is so poor they cannot hear sounds of warning, or because their eyesight is so poor they cannot see that equipment is moving. It also includes people afflicted with some emotional disturbance or nervous trait that may cause them to jump or fall or throw something under certain conditions common to the job. Corrective action for the control of these personal faults is principally a matter of placement and any foreman I can think of would take pride in being the first to notice a condition like this, and take steps to arrange for proper placement. In some plants physical examinations are made and placement is handled by the personnel department, but in plants where the foremen have this responsibility they certainly should have the authority to go with

it. This problem is usually one of the simpler ones.

Now in considering corrective action for these three general classes of human faults you probably noticed that one important feature was common to all three. That is, that the job invariably falls to the foreman. I wouldn't want to say that accident prevention is solely the responsibility of the foreman but it is obvious that his place in this work is very important and you will never go wrong if you center your safety activities around him. In the first place he should be carefully chosen. In the second place he should be thoroughly trained, and finally he should be backed up 100 per cent by top management so that he can take any of these corrective actions that we are talking about. He has to have time to instruct, and he must have authority to eliminate dare-devils and comedians, and cooperation in placing the physically and emotionally handicapped.

Those of you who are classified as safety specialists can help your foremen by showing them how accident prevention is an integral part of production and that accidents are

caused and that the causes are either unsafe conditions or unsafe acts. You should help them find these causes through analysis of the accidents that are reported, and by pointing out to them that their corrective tools are instruction, control measures, reassignment and leadership. You can relieve them of a lot of tedious statistical work and tell them of the many accidents that happen, so they will know what to expect. Supply them with literature and posters and above all get them to differentiate between an accident and an injury, and between the cause of an accident and the accident itself.

It is needless to say that every foreman in industry has enough pride in his job to do all that he can to prevent any of his men from being injured or his equipment from being broken or his products from being ruined.

These are some of the most effective ways he can go at it, and if your foremen are not here, take this message home to them, and in any case team up with them to find the unsafe conditions and find the unsafe acts and apply the proper corrective action.

### Understanding and Influencing Human Behavior (Excerpts from Talk)

By CLYDE R. POWELL

Personnel Manager, Endicott-Johnson Corporation

We make safety rules when we cannot do anything about a certain situation. However, in establishing safety rules, we must tell workers not only that we have rules, but why. Sometimes safety rules are just so many words. Employees think we are just being fuzzy. Why not tell workers why we have rules?

Thoughts control behavior by controlling ideas. Some people have the idea that accidents just have to happen. This is a negative idea which must be corrected. Another negative idea is that accidents have to come in threes—that if one accident happens, two more must follow. If enough people believe such a thing it can become a mental hazard.

You cannot talk people out of superstitions or ideas but you can do something about it. Next time you have an accident, correct the hazardous condition that caused the accident and then let people know you have done something about it. Control behavior and

control the idea. People's desire to remain faithful to their own idea is very important.

Sometimes you are put in a position of getting someone to do something that you cannot order him to do. If you make your opening remarks so that his reply will be "yes" he will continue to do "yes" because he doesn't want to reverse himself. You may call this salesmanship if you want to—but doesn't safety have to be sold? Again in connection with people's desire to remain consistent—workmen sometimes think safety precautions are "stays" but you must point out the inconsistency in behavior in taking chances. People won't think any more of you as a safety man than they do normally; if you go around in an apologetic way, you can expect to be kicked.

A safety man's work is that of saving money, for safety work is a special cost that goes into production. Your company is in



business to make money. Accidents are a special cost. The foreman who does not have time for safety is just being financially shortsighted. Some companies don't charge back accidents to the departments where they happen, but the company pays it whether the department does or not. You are responsible for cutting down expenses and for the safety of people in your shop. Do you have authority?

Why do you cut down on accidents, or do you go around in a wishy-washy way without any real way about stopping them?

Authority and responsibility go hand in hand. You must have responsibility—do you have authority? Don't abuse it—use it wisely. Make sure that you get authority. You can't hold men responsible, if you don't give them authority.

#### THURSDAY AFTERNOON SESSION October 9, 1947

### The New Employee's Introduction to Safety

By D. A. GASPER  
Sup'l., Canada Cement Co. Ltd.

Industry cannot expect the educational system to turn out tailor-made men for industry. Industry must help in shaping the pattern of its own requirements. The new worker whether a university graduate or an unskilled laborer should not stop his education when he enters industry. He is merely entering into another phase of his education.

There are many industries which have a course in instructions for new employees. Are we designing this course to enable the worker to safely combat the growing hazards of industry? What does the capable general do in the time of war? He studies the strategy, the defenses, the weapons, the strength and the vulnerability of the enemy. His own defense, his weapons and the training of his personnel are planned accordingly.

The course of instructions for new employees brings under the searchlight the whole industrial household. What is the use of starting the new employee correctly if we don't practice what we preach in the rest of the plant. Is the soil ready for the seed? Are the machines correct? Are the machines well guarded? Have we an efficient supervisory staff? Are they safety trained and safety minded? Does the whole plant exude the proper atmosphere and decorum necessary for the reception of the new man?

The first question concerning the new employee must be decided at the employment interview. Has he the necessary physical and mental equipment to do the job? Remember

that the structure of industry will remain forever weak if the wrong timber is secured at the labor market. Medical examination may weed out some of the undesirable, but before the man is employed he should also pass the inspection of the made plant executive. In many plants the superintendent in charge of operations interviews every new employee before he is entered on the payroll.

The wise employer should know the importance of quick action during the employee's first hour on the job. Occupational injuries strike at the weakest point. The new man entering industry after a period of unemployment is in a state of indecision and confusion. Under unfavorable conditions the first hour on the job adds worry and discontent to the confused mind. His morale is at the danger point. It is while groping feebly for a foothold on the bottom rung that the accident germ strikes its first blow. There is no other time in the worker's period on a job when he needs help more. There is no other time more favorable for the employer to win the goodwill, loyalty and confidence of the new recruit. Here is where the first blow should be struck against industrial accidents. Here is where the foundation is laid for employer-employee relations.

Let us ever be impressed with the fact that the industrial plant is something else besides a manufacturing unit. It is also a school where industrial trades are taught and safety is part of every trade. Here you should have

a teaching staff practical and capable. They are experts in their line: superintendents, personnel managers, assistant superintendents, foremen, supervisors and key-men. I am thinking of the story of the plant which used steam to drive the wheels of production. One day the big boiler refused to function. The plant engineers failed to find the remedy. An expert was called in. He gave three taps with a hammer and the great boiler started on its way. Later the expert sent in his bill for \$15000. The manager objected to this large amount and asked for a detail account. The expert replied with details: Three taps of the hammer \$400. For knowing where to tap, \$11800. Our teachers and our supervisors in industry must know where to tap.

Here is where the foreman should be the functioning part of management. But to do this they must have the necessary authority and proper training. The successful executive finds a way to tap and utilize the ingenuity and experience lying dormant in the ranks of his workers. He does not solve this problem by leaving his foremen suspended helplessly and unhappily between top management and the workers. Their experience, leadership, heavy cooperation and prestige with the workers are assets of the highest order. Without them the chain of leadership is broken at the most critical link. It has been repeatedly demonstrated that an efficient and skilled supervisory staff is ever reflected in a well trained body of workers. Their qualities and abilities form the essential basis of production efficiency and industrial safety.

The course of instructions in our Hull Plant did not flourish overnight. It developed and grew over a period of 16 years to suit our own industrial household. An accident frequency and severity was reduced and results finally blossomed into 12 no-accident years and finally culminated in 2000 days without an accident, our plant personnel felt that they had something worthwhile to cherish and foster.

It is our opinion that when top management supports safety, financially and every other conceivable way, the rest of the job must be done within the walls of the plant. This support is the go ahead signal for plant management. We at the Hull Plant are following that lead. Every new employee who enters our gate is introduced to the industry and to our plant policies by the superintendent in charge of production. Here is the syl-

labus of instructions that has been in operation these many years:

| Time    | Subject                                                                                                                                                 | Instructor                |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1st Day | What the company is doing for the employee. Employee and Employer relations. The employee's duty to the employer. The ground work of industrial safety. | Superintendent.           |
| 2nd Day | Introduction of the new man to his new environment. Instructions in the actual operations in the various departments.                                   | Assistant Superintendent. |
| 3rd Day | How to prevent occupational injury? What first aid is and where to get it.                                                                              | Inspector Safety          |
| 4th Day | Getting acquainted with the machine.                                                                                                                    | Foreman                   |
| 5th Day | Care of the machine. Care of the workman.                                                                                                               | Master Mechanic           |
| 6th Day | All things electrical. How to use them.                                                                                                                 | Electrical Foreman        |

This first lecture is conducted in the office of the Superintendent. The men are put at their ease, and in an informal manner they learn the methods and policies of their new employer. What the company is doing for the employee, such as sick benefits, stock plan, pension system, holidays, etc., as well as all the comforts and privileges without the dollar sign attached. Also the employee's duty to the employee, and the employee's loyalties and duties to his employer. We emphasize the following:

1. Cost of accidents and their effects on the worker both economical and humane.
2. How efficient labour and low production costs assist the worker and his family.
3. The promotion of a sense of responsibility among the employees for the success of the business.

Here is the summary of the safety message as it is given to this class: "Although we have supervisors and safety inspectors to look after the man and the machine, each worker who enters our plant has a factory of his own to



"What is this thing called industrial safety? It is not merely a mechanical venture surrounded by guards, rules and don'ts. Most of the business is the embodiment of human engineering in all its forms to acquire the necessary cooperative effort, to stimulate training and correct thinking and reduce accidents, by the removal of physical causes, by the elimination of human errors. In the factory, the farmer in the field, the miner in the pit, the motorist on the highway, the policeman on his beat, the teacher in the school, the housewife in the kitchen—all must in a sense of the word be safety engineers, because they are the custodians of the most important asset of the world—human bodies. One first requisite is to train the head to protect the body."

"Self preservation is the first law of nature. God gave to man five senses to enable him to enforce that divine law. With nature's love of system which is exemplified in the plan and system of the universe, it punishes by injury or death all those who violate that law. It is not natural to expect that any human from the kindergarten onward should be taught to respect this important precept. If workers appear at our gate after passing through the greatest institutions in the country, the home and the school, without being made conscious of this law, then industry must accept extra responsibilities for reasons that are both humane and economic."

"Let each employee from the plant manager to the humblest worker be impressed with the fact that approximately one third of his life is spent on the job, it's his industrial household. Surely that sanctuary where we find our way of life, happiness for ourselves and our family should have the interest of everyone. If it is to be our industrial home, let it be a happy one, safe, sanitary and clean. It should be a reflection of each worker. It is a reflection of the splendid product we produce. It should reflect leadership and quality. Safety is to-day calling for that

leadership in every branch of human activity."

This then is the message given at the Superintendent's Office. We find the new worker to be in a very cooperative and receptive mood when he leaves that room. He has been prepared for the course that lie ahead. During the rest of the week he attends one lecture a day from five other supervisors on subjects as already mentioned on our syllabus.

But all this merely constitutes his basic training. When he is called into the mill to run any kind of a machine he must take the job training until he knows the duties well enough to instruct another worker. He immediately becomes a member of the safety committee, and is given the same respect and the care of himself and fellow workers. He has to attend a series of the weekly safety meetings which include both supervisors and workers. He must be prepared to be called upon at any time to give his own personal knowledge of the job. This phase of our safety program applies to all workers in the mill. They are measured by their knowledge and ability. They get the opportunity at all times to give their own ideas and make suggestions. We have on our file some valuable information received from ordinary workers. This system elevates the status of the worker and makes him feel that he is a part of the company. It encourages thought and study as all want to make a good mark in their examination.

The humanitarian and economic value of all this training is apparent among our personnel. Our efforts have brought commendations from the community and an improvement in labour relations. It is sometimes dangerous to lay too much stress on accomplishments, there is too much work yet to be done. But employees are encouraged by recognition.

These new found abilities, loyalties, and the eagerness to play on our industrial team have given to our management a very high regard, and an everlasting respect for our industrial workers. Such development is bringing to industry a new found wealth, understanding, and team work. It is elevating the worker to his proper place on the industrial stage. It is enabling him to play a major role beside the material and the machine.



# *Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME VII

CHEMICAL SECTION

NATIONAL SAFETY COUNCIL, INC.  
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## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

THE NATIONAL SAFETY COUNCIL  
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35th National Safety Congress, 1947

MONDAY AFTERNOON SESSION

October 6, 1947

Presiding: H. F. GILBERT, Safety Director, American Cyanamid Company.

Opening Remarks

By H. F. GILBERT

Safety Director, American Cyanamid Company;  
Chairman, Chemical Section

Meetings of this type have been held by the Chemical Section for thirty-three years. That is a long time. It is a particularly long time for a group of volunteers to give unstintingly of their time to prepare papers, leave their offices and families and, in some cases, travel great distances to present their views on some specific phase of this great problem of accident prevention.

Of course, some of you are thinking, look at the fun we have: a chance to get away for a week; the banquet; the fun fest and the little private parties. But, gentlemen, if you look behind the scenes you will find small groups, scattered all over this country, holding committee meetings; planning the program, reviewing safety data sheets and instruction cards; assembling data for the *New Letter*, and carrying on any number of jobs all, mind you, in addition to their regular work at the plant or office.

To what may we attribute this loyalty or devotion? I believe to the leadership, guidance and inspiration of some of the truly great men in the safety movement. I refer specifically to such an outstanding individual as the Honorable John Roach, Deputy Commissioner of Labor from the State of New Jersey. That man had no selfish motive nor did he seek any personal gains by devoting his time and effort to the development of this Section. He had but one thought in his mind, the prevention of suffering, maiming and loss of life and limb.

Of course, John Roach was only one individual. This Section has been fortunate in having such men as Ira V. Kepner of Perina Salt, Arnie Armstrong of Eastman Kodak and so on down to our present day Advisory Committee consisting of such Past General Chairmen as F. W. Dennis, Hooker Electro Chemical, James J. Duggan, Carbide & Carbon, R. O. Keefer, Aluminum Company, Harold L. Miner, duPont Company, John

S. Shaw, Hercules Powder, Col. Reuel Stratton of The Travelers and a great many others.

As the result of this leadership and dynamic force your Section has been influential in the development of an industry which, if operated divorced from safety, would not only be most hazardous but conceivably might destroy itself. As it is, the chemical industry today proudly takes its place among the industrial groups having few accidents.

According to *Accident Facts* this Section has consistently maintained a frequency rate and severity rate well below the average for all industries. Nevertheless, we are still having accidents—all too many accidents—and as long as this situation exists, we in the Chemical Section have a job to do. These meetings are not the entire answer but the ideas picked up at these meetings coupled with the informal discussions at the Congress will go a long way toward accomplishing our objectives.

I believe these meetings will speak for themselves concerning part of the work done by the executive committee this year.

The *New Letter* which we have received each month is also a voluntary effort of the Committee.

Much hard work has been done on the *Safety Practice Pamphlets*.

A revision of the pamphlet on *Industrial Ventilation* has been completed and is in the hands of the printer.

*Safety Practice Pamphlet No. 16* on protective clothing has been revised.

*Safety Practice Pamphlet No. 64* on respiratory equipment has been reviewed.

*Safety Practice Pamphlet No. 71* on safe handling of chlorine is being revised.

A brand new pamphlet on electro plating is now being prepared.

Your attention is called to the Data Sheets and Instruction Cards now on display at

Chemical Section

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front of the room. If you haven't become acquainted with this material, I would advise you to do so.

The first draft of revisions of all existing Chemical Data Sheets has been prepared.

The new pamphlet on Chemical Waste

Disposal, although only an introduction to the subject, should be of tremendous value to the average safety man. You have all heard John Shaw and others point out that Chemical Waste Disposal is becoming a major problem to industry.

Safety in Lacquer Manufacture

By C. L. JONES

Safety Engineer, Hercules Powder Company

Lacquers have long been known and used, and have been made of many materials. However, when we speak of lacquers today, we are thinking primarily of those made of soluble nitrocellulose. There are other lacquers on the market, such as those made of ethyl cellulose, cellulose acetate, chlorinated rubber, and other materials, but the bulk of modern lacquers are made of nitrocellulose.

We of the Hercules Powder Company have attempted to ascertain the facts concerning the accidents which have occurred in the various nitrocellulose consuming industries, and to make this combined experience available to the consumers of nitrocellulose through a book, "Safety in Lacquer Plants," which is being distributed by Hercules Powder Company.

There is accumulated experience concerning the accidents which have occurred in the handling and use of nitrocellulose and flammable solvents.

Also, there is a fair notion of the probable consequences. Of course, no one knows whether a vapor-air explosion in any given plant is going to cause the destruction of that plant and result in a loss of life or whether results are going to be trivial. We do know that some of the accidents involving flammable solvents have caused serious property loss and heavy life loss. When such things occur, the financial loss is also heavy.

The risks in the lacquer manufacturing business are those connected with the storage, handling, and use of nitrocellulose, flammable solvents, and the finished product.

Let us first consider nitrocellulose: A very large quantity of nitrocellulose has been produced each year for many years. The accident experience in the manufacture and storage of this material has been extraordinarily good. I think this excellent experience has

been due to an early recognition of the various hazards existing and the adoption of safeguards which minimize the possibility of serious accidents.

The above refers to experience at the producing plant. In the consuming industries, the experience has been reasonably good, although there have been a few accidents. With a wider knowledge of the necessary and desirable safeguards, it is reasonable to believe that the experience in the future should continue to be good, and probably should improve.

I do not think anyone has the figures as to the exact number of accidents in the nitrocellulose consuming industries, but from our knowledge of these industries, we believe that the majority of the accidents which have occurred can be attributed to the ignition of a vapor-air mixture in some manner.

Another fact which it is advisable to keep in mind is that, as far as I know, relatively few accidents have occurred in connection with the finished product either in the plant of the lacquer manufacturer or in the plant of the lacquer user. However, I think there have been more accidents involving the use of the finished product by the lacquer consumer than in the manufacture of lacquer.

We will now mention some of the phases of design and operation which appear to be of the greatest importance in the prevention of accidents and injuries.

The material shipped to the users is always wetted. In most cases, with the soluble type, the wetting agent is ethyl alcohol, although material is occasionally shipped wetted with either isopropyl alcohol, butyl alcohol or water.

The material so wetted is classified by the Bureau of Explosives as a flammable liquid;

the hazard of the material is about that of the wetting agent.

The container generally used for the packaging of soluble nitrocellulose is I.C.C. 6-C, a full open head container, galvanized inside and out. The galvanized finish aids in preventing iron pick-up, and such a galvanized surface is nonsparking.

Hundreds of millions of pounds of soluble nitrocellulose have been shipped in such containers, these shipments going abroad as well as to consumers in the United States and Canada. Very few accidents have occurred in transportation.

This good transportation record proves that the material presents no great hazard when it is properly packaged and the packages are handled with reasonable care.

While soluble nitrocellulose is classified as a flammable liquid when wetted with 50 per cent or more of wetting agent, the material becomes more hazardous if permitted to dry out. Dry material can be ignited by frictional heat and burns far more rapidly than does the solvent vapor.

Several publications concerning the properties and use of nitrocellulose are available, and will be sent, on request, to interested persons. Some of those publications are:

Nitrocellulose Handbook  
Hercules Nitrocellulose—Properties and Uses

Safety in Lacquer Plants

The long, continued storage of barrels of nitrocellulose in the open and exposed to the sun's rays can cause deterioration of the quality of the material. During the winter months, ice and snow can accumulate on the barrels, making it difficult to handle them easily and safely.

Also, with open storage, foreign material, such as dirt, sand, chinders, gravel, etc., can get on the barrels. Unless the barrels are cleaned off, this material will be carried into the plant where it becomes a possible cause of accident—and it may get into and contaminate the product manufactured.

Another reason for storage under cover is to protect the barrels from sparks or heat if a grass, rubbish, or other fire should occur near the storage location.

The floor of the storage building, whether it is of frame or masonry construction, should be blind-nailed if steel nails are used. If the floor is exposed milled, then the fastenings should be of copper or brass.

It is desirable to have a good distance between the storage building and exposures such as main line railroad, highways, streets, etc. This clear space between the nitrocellulose storage building and the exposures mentioned should be of the order of 100'.

There are many existing installations of nitrocellulose storage buildings closer than 100' to the exposures mentioned, and such closer spacing is not considered too objectionable. However, should a fire originate in any of the process buildings or at other locations, the heat could affect the barrels, causing a rise in pressure and the blowing off of the lids, with the possibility of burning nitrocellulose being thrown about.

A sprinkler system is desirable, although not absolutely necessary if there is a spacing of 100' or more to the exposures mentioned. If on the other hand, the spacing is somewhat less than 100', it will be desirable to install sprinklers whether the building be of frame or masonry construction.

No other material should be stored in the nitrocellulose barrel storage. The question may arise whether it is safe or satisfactory to store film scrap in the nitrocellulose storage. Such storage is not recommended. It is suggested that film scrap be stored in a building reserved exclusively for this purpose. There are a few recorded incidents of film scrap taking fire in storage. For the same reason it is thought desirable to store nitrocellulose chips in a noncombustible room cut off from other storages by means of masonry or tile walls.

For handling the barrels of nitrocellulose from upper levels, it is recommended that a rope mat or other suitable landing surface be used.

This problem of the use of some mechanical device for tying and taking down the barrels exists at the producing plant, and the use of such power devices has been considered on a number of occasions. So far we have not found any mobile device which is "power" driven, considered safe for this work.

A hand-powered "lift" is considered safe for stacking and taking down barrels of nitrocellulose. The platforms on which the barrel rests should be made of nonsparking metal, such as brass or aluminum; or be covered with hardwood, using in either case non-ferrous fastenings. Also, the wheels should be made of brass, bronze, aluminum, or conductive plastic.

If the barrels are to be skidded from an upper to a lower level, a wood skid should be used. If the skids are shod on the end with metal, the shoe pieces should be made of nonferrous metal. In using such a skid, the barrel should always be under control and never be allowed to bounce or roll around.

For the movement of the barrels from the nitrocellulose storage to the nitrocellulose dissolving room, it is suggested that a concrete or other suitable walk pavement be placed, and that the barrels be transported from the nitrocellulose storage building to the nitrocellulose dissolver building on a hand truck. This truck could be one of the self-loading types with a "finger" or "grab" at the top—the latter to be made of nonsparking material, such as phosphor- or tin-bronze, being careful to select a nonsparking metal which has physical characteristics at least equal to those of the steel ordinarily used.

The trucks used for barrel handling also should be fitted with wheels of a nonsparking and conductive type. These may be brass, bronze, aluminum, conductive plastic. Rubber tired wheels should not be used unless of conductive rubber.

The barrels should not be rolled or slid on concrete, steel, gravel, cinders or other surfaces from which sparks may be struck.

The need for this precaution is illustrated by an accident which occurred several years ago at a plant of one of the lacquer manufacturers. Barrels were being skidded down a permanent concrete ramp having a grade of about 15°. Exactly what happened will never be known, but the contents of a steel barrel were fired—either from frictional heat being transmitted through the wall of the barrel; or the barrel was a "leaker" and a spark was struck. In any event, the material in the barrel started to burn and pressure was built up. The head was blown off after the barrel had reached the lower floor of the plant. Burning nitrocellulose was thrown about injuring two men, and the burns which they suffered caused death.

It had long been the practice of this particular plant to skid such barrels down the ramp, and prior to this accident no trouble had occurred.

Lights should not be required in the nitrocellulose storage building, if for any reason they are the entire installation should be explosion-proof, Class I, Group D, and the

installation should conform with Article 500 of the National Electrical Code.

Heat should not be required for the nitrocellulose storage. However, should heat be required, it is recommended that hot water at not more than fifteen pounds pressure, or steam at not more than five pounds pressure be used; the heating units should be hospital radiators or pipe coil radiators installed and protected as described later.

Large wall placards are available listing the various safeguards which should be observed in the storage, handling, and use of nitrocellulose, and copies will be sent on request.

As many plants solvent and diluent storage tanks are placed underground. The legal requirements or the regulations of the insurance company may compel the use of underground storage tanks.

In certain locations there may be some justification for burying tanks; for example, in highly congested areas. However, when room permits and ordinances and regulations allow, above-ground storage is, in our opinion, much to be preferred.

An above-ground vessel can be inspected daily, or as often as desired, and the condition of the shell, connections and fittings be kept under observation. The corrosion of the shell of an underground vessel and its failure or the failure of connections and fittings, can occur and a leak exist for a long time, possibly creating a hazardous condition before anything can be done about the matter. Furthermore, infiltration of ground water can occur, causing contamination of the product.

It may be argued that an above-ground tank is more hazardous than a buried vessel, but this is not thought to be the case if the vessel is properly designed and is fitted with the necessary safety devices, such as adequate relief, a vent protected by means of an approved flash arrester, and a rodding connection fitted with an approved rodding well. Such a vessel may be completely enveloped in flame for a long time without an explosion occurring; there may even be an explosive vapor-air mixture within the vessel while it is enveloped in flame, but nothing will happen except the burning of the vapor-air mixture at the discharge of the safety device. The vessel acts as a boiler; but instead of water being evaporated, a solvent vapor is driven off.





It is absolutely necessary that all of the tank connections be tight and the vent be of adequate size and be protected with an Underwriters' Laboratories' or Factory Mutual Laboratories' approved flash arrester. If the vent is so protected, an ignition of the vapor-air mixture can occur at the vent, but it is not likely that a serious accident will result.

Another very important feature is the method of introducing solvent into a vessel. It is not uncommon to find inlets ending a few inches inside the tank or vessel top. Such a design permits the incoming liquid to break up into particles which fall through space. In so doing, a static charge can be formed. I know of a number of instances where the ignition of vapor-air mixtures has occurred, and it was shown conclusively that static from "static spray" was the source of ignition. Probably there are not more of these accidents because the vapor is usually saturated, and therefore, above the explosive range. Occasionally, a flammable vapor-air mixture exists, a spark occurs, and the flammable mixture is ignited.

To minimize this static spark hazard, the inlet or fill pipe should be brought close to the inside bottom of the vessel.

It may not be practical in a number of cases to carry the fill pipe close to the inside bottom of a vessel. This is particularly true if mixers or dissolvers fitted with agitating equipment. In such cases, the inlet connection can be brought through the cover at a suitable location, and then bent so as to direct the flow of fluid along the inside wall of the vessel. With such a design, the stream is kept relatively solid, thereby avoiding the formation of a static spray.

The Manufacturing Chemists' Association's Manual, Sheet TC-4, "Unloading Inflammable Liquids from Tank Cars," describes and illustrates the procedure which should be followed in the unloading of tank cars containing solvents and diluents. Copies of this pamphlet may be obtained from the Manufacturing Chemists' Association, Washington, D. C.

It is not uncommon to observe very considerable leakage of solvents at the stuffing box of a solvent pump. This creates a dangerous condition on account of the formation of flammable vapor-air mixtures. This trouble can be largely overcome by the selection of a suitable device to replace the usual gland

packing. A large number of these devices are installed on pumps handling various solvents and diluents, and the record of performance is very good. It is not unusual to have a report as to the performance reading something like this: "No maintenance and no leakage for a year."

Most lacquer manufacturers have the problem of handling some solvents and diluents in drums. Also, in many plants, it is necessary to draw small quantities of solvents and diluents for use in some of the mixing and finishing operations.

For the bulk storage of such drums, it is recommended that a detached and reasonably well isolated drum rack be used. It is undesirable to store drums in the manufacturing building. If such drums are stored on an open sided drum rack, there will be good diffusion of the vapor if there should be leakage. This eliminates the formation of a large volume of an explosive vapor-air mixture.

A dispensing rack for the drums will be necessary at some suitable location in the manufacturing building. The rack can be made of wood or of metal, but the surface on which the drums rest ought to be made of nonsparking conductive material, say brass or copper, and should be grounded. The equipment used for handling the drums on to the rack, for example, the tong and the hand chain of the hoist, should also be made of a nonsparking metal.

The chief hazard probably occurs at the time of drawing solvents from the drum into cans or containers, due to the formation of a static charge as the fluid is dropped into the container. To prevent the formation of this static charge, the stream should be kept relatively solid as discussed previously for tanks and mixers. This can be accomplished satisfactorily by the use of a flexible nonsparking metallic hose. The container into which the fluid is drawn should be grounded, and also should rest on a grounded nonsparking surface, such as brass, aluminum, or copper.

The containers used for handling solvents should be made of a nonsparking material. It is not necessary to go to the expense of aluminum, brass or copper containers. Steel is satisfactory, if galvanized. An occasional check should be made and these containers should be repainted as necessary.

It is usually necessary to provide storage

facilities for resins, gums, pigments, other ingredients, containers, etc.

While the risks connected with such storages are usually minimal, it will be desirable to store such ingredients and containers in a separate and detached building for the following reasons: (1) Such a building should cost less than the building used for manufacturing. (2) If the manufacturing building is used for storage, it will be almost impossible to maintain the desired standard of housekeeping.

(3) In the event of a fire, and fire is usually most apt to occur with some of the manufacturing operations, there will be a greater quantity of combustible materials, thereby causing a more serious fire; furthermore, the extent or size of the loss will probably be larger.

Before bringing the barrels of nitrocellulose into the manufacturing building, the exterior surface of the barrels should be cleaned of any foreign material. If sand, cinders, or other hard material is brought into the operating building, there is the possibility that such contaminants may cause a spark and result in the firing of vapor or dried particles of nitrocellulose; furthermore, such contaminants may get into the product and affect its quality.

The number of barrels of nitrocellulose brought into or near the manufacturing building should be kept at a minimum, because the more material, the more serious the fire if such a thing should occur.

Barrels should not be opened until charging is ready to commence. In some cases where part barrels are used, the barrels should be brought in the building, the required quantity weighed out, the barrel properly closed, and returned to storage. This is not always practical, and in some cases it is necessary to keep the part barrels in the manufacturing building; however, they should be properly sealed, and it will be desirable to place them at a location where they can be protected by more than an ordinary concentration of sprinkler heads. In other words, supply one-half dozen part barrels with one-half dozen sprinkler heads, so that in the event of a fire, there would be the discharge of a lot of water, which should quickly control the fire.

The platform of the scale used for weighing either barrels or other containers being filled with nitrocellulose should have a non-

sparking surface. Also, the wheels of this scale, if it is a portable one, should be nonsparking and conductive. These measures are to minimize the struck spark and static hazard.

In addition to the nonsparking tools mentioned above, all other tools regularly used in the lacquer plant, such as wrenches, hammers, chisels, etc., should be made of nonsparking metal. While such tools are not as satisfactory as ones made of steel, they do a reasonably good job, and their use minimizes the struck spark hazard.

If nitrocellulose is spilled during the charging operation, it should be picked up at once and disposed of. If it is not contaminated, the simplest way to dispose of it is to put it in the dissolver. If contaminated, it ought to be placed in a pail or can containing water. At the end of that day or shift, such scrap nitrocellulose should be taken to a safe place for disposal. Probably the safest disposal is by burning in the open at a so-called burning ground. The water should be wrung out of the scrap nitrocellulose by hand, and the material placed on paper or other combustible, and the latter fired. Under no circumstance should nitrocellulose be burned in a boiler fire box or other confined location.

The hazard during the charging operation is such as to make it necessary that good exit conditions be provided for the operators. There should be sufficient room at the charging level so an operator can move away quickly and safely if a flash fire should occur. Men have been observed working from the surface of a portable platform or something similar. If a flash fire should occur while a man was adding material to the dissolver, he would have to jump or fall. If he jumps, he is apt to be seriously injured.

If there is a good working space around the charging level of dissolvers and good exit conditions from that charging level, then the exposed person can move rapidly and with safety, and the possibility of injury of any kind will be very much reduced.

Many lacquer manufacturers use hard resins, gums, etc. There is a considerable hazard of a dust-air explosion in grinding such materials and some of these explosions can be quite violent and with a great deal of flame. The grinding operation should be carried out in a separate structure, removed from other buildings or exposures, and provisions should be made for keeping the dust

concentration in the room below the flammable limit.

Grinding can probably be avoided entirely by the selection of the proper type of dissolving equipment. Equipment is available which will dissolve such hard materials in a reasonably short time. That is, broken material, say fine size and smaller, can be dissolved probably in an hour or less in certain types of equipment. The use of such dissolving equipment would eliminate the grinding, and thereby avoid an expenditure for such equipment.

To protect persons against the hazard of flash fires of any kind, several safeguards should be adopted and enforced. First, the clothing should be changed often, and before there is a heavy accumulation of flammable materials on them. There have been a number of cases of persons wearing dirty clothing having their garments catch on fire and burn very rapidly.

Second, all persons exposed should be fully clothed at all times, summer as well as winter. This means wearing a head covering, sleeves down and collar buttoned. Third, it will be desirable to supply all employees with flame-protected clothing. A great many persons have worn such clothing during the past few years. Many have been exposed to flash fires, and the wearing of this clothing has prevented many serious burn cases.

The flame-protected clothing may be obtained from a number of concerns located in various cities in the country. We have a list of laundries offering such services, and can supply you with it. Also, we can furnish a description of the method and advise regarding the chemicals recommended for the flame-proofing of clothing, if it should be decided to carry out this work.

Solvents and diluents are sometimes handled in open push cans and similar containers. As a matter of fact, this practice is rather widespread, but it ought to be avoided for several reasons; the wastage of solvent by evaporation, the increase in fire risk, and in some cases an added health hazard, because some of the solvents and diluents may be toxic. If practical, the method should be changed to a closed system.

If there is a continued use of the open type containers, several precautions need to be observed: (1), the scale on which the container is weighed should have a nonsparking platform; (2), the platform ought to be

grounded to a water pipe or other low resistance ground; (3), the solvent should be introduced into the vessel in a relatively solid stream; (4), the container should be kept covered with a light weight nonsparking covering; (5), the wheels of the scale ought to be of nonsparking and conductive material; (6), in dumping containers into the mixer, dissolver, or other vessel, the stream should be kept solid, so as to avoid static spray.

In many plants mixed thinner is made up and packaged in containers of various sizes, and much the same precautions should be observed as discussed above. One additional feature worth mentioning, is the use of a "slip" pipe which will bring the fluid flow down close to the bottom of the drum, whether it be filled through the side bung or end bung. This "slip" pipe should be made of a nonsparking metal such as copper, brass, or aluminum.

In many plants, nitrocellulose solution is pumped from the dissolver to the storage tanks or other locations, and a positive type pump is frequently used.

A few accidents have occurred in the pumping of such solutions. It is believed that a hard film forms in the pump stuffing box or in the space back of the impeller, and frictional heat causes decomposition of the film so rapidly that the relief valve doesn't function quickly enough, and the head of the pump is blown off. Such accidents can be almost entirely eliminated by the injection of a plasticizer into the pump stuffing box. This injection can be controlled automatically by the use of a pressure-type lubricator; thus, whenever the pump is operating, a small amount of plasticizer is injected at the required location. The same results can be accomplished by washing out the pump thoroughly after each handling, but it is probably cheaper and easier to use the plasticizer.

All electrical equipment in the lacquer plant zones where solvents, lacquers, and similar flammable materials are stored, handled, or used, should be explosion-proof, Class I, Group D; that is, motors, motor controls, circuit breakers, light fixtures, light circuit controls, etc., should be of this classification, and the installation should conform with Article 500 of the National Electrical Code.

It might be contended that it would be more economical to use conventional elec-

trical control equipment, and to locate such control equipment at a safe distance from the lacquer plant. Such a design is quite all right, and this plan has been followed in a number of instances; in some cases to decrease the cost, in other cases due to inability to secure explosion-proof equipment within a reasonable time.

It will be advisable to make up estimates both ways to determine which design is the most economical. However, it is suggested that such conventional control equipment be located at a reasonable distance from any potentially dangerous part of the lacquer plant. By reasonable distance, is meant that any "open" or conventional electrical control equipment should be about fifty feet from any solvent process operation which requires an explosion-proof classification. This distance could be greater, but it should not be less.

If it is decided to use conventional electrical control equipment in a separate room or building, it will be advisable to place the floor level of this building several feet higher than the floor of the lacquer building or other buildings wherein solvents and similar materials are processed or stored in order to keep the electrical control equipment above the level of a flammable vapor-air mixture, which might drift or flow from a spill of solvent in any of the plant buildings or rooms.

One of the most important features of an explosion-proof installation is the proper sealing off of all devices. The purpose of this sealing is to reduce the volume of flammable vapor-air mixture within the various parts of a system, which could be ignited at any time. If this is not done, the "pressure-wave" effect can cause the development of a pressure which may result in the rupture of one or more devices, thereby permitting the discharge of flame or high heat gases into operating or other hazardous areas.

All explosion-proof pieces "breathe;" that is, air or vapor-air mixtures enter all such devices, and can be, and doubtless are ignited many times. The "gap" or clearance at the flanged or threaded joint of all such devices is such as to act as a "flame snuffer," to prevent the discharge of burning or high heat gases into a room or building. There are records of several accidents occurring with explosion-proof electrical equipment which was improperly sealed.

When any explosion-proof electrical installation is to be made, an electrician or electrical contractor should be selected who knows the requirements of Article 500 of the National Electrical Code. If the work is to be done by contract, it is suggested that a wording about as follows be made a part of the specification: "All electrical equipment provided for Class I, Group D, locations; and the entire installation shall conform with Article 500 of the National Electrical Code."

In addition to the foregoing, all devices such as switches, breakers, starters, etc., should be grounded, using a conductor of a size suitable to ground any leakage currents and mechanically strong enough to stand up in service. A No. 6 copper wire or plain aluminum strapping  $\frac{1}{4}$ " by about 1" makes a good installation.

The resistance value of each ground should be determined by means of a "Megger" or other suitable instrument, and the resistance to ground should not be more than five ohms, and preferably one ohm or less.

No difficulty should be experienced in obtaining a ground value of five ohms or less if the ground connection is to a water pipe. If a metallic water pipe is not available, then the next best ground connection will probably be to put down several ground rods to moist earth or water.

At suitable intervals, say yearly, the value of each ground should again be determined by means of a "Megger" or other suitable instrument, and the values obtained compared with the readings obtained at the time of the original installation. If the values are found to be higher than five ohms, then new grounds should be made.

Probably the simplest, most effective and cheapest method of grounding is to attach a ground connection from each piece of equipment to the nearest sprinkler pipe, using a No. 6 or larger solid copper conductor.

If sprinkler piping or other water lines are not available, it will be advisable to run a ground bus through the building at a suitable location, making this ground bus a fairly large wire, and fastening it securely in place; and to attach the grounds from each individual piece of equipment to this bus.

The ground bus should be grounded to earth, at two points, at the ends, and preferably to water lines. If the latter are not available, then ground to driven ground rods,



having a resistance to earth of not more than five ohms, determining this value by means of a "Megger" or other suitable instrument.

Heat may be supplied by means of unit heaters driven by explosion-proof motors, hospital radiators, pipe coil radiators, or so-called "Radiant heat."

If pipe coil radiators are used, they should be mounted on forged steel supports. If hospital type radiators are used, the mounting should be similar. The purpose in using such mountings is to reduce the probability of fires, which could occur if wooden supports should be used.

The hospital radiators or the pipe coil radiators should be protected by guards, so that heat sensitive materials or their containers cannot be parked against or on the hot metal. The decomposition of heat sensitive material can occur if such materials are permitted to lie on the hot metal, or if containers of the material should be parked up against or on the hot metal.

It is probable that either the hospital radiators or the pipe coil radiators will be entirely satisfactory and possibly cheaper than the use of unit heaters. If steam lines are brought through building walls, partitions, or floors of combustible material, the pipes should be protected at such points from contact with wood or other combustible material. Long, continued contact of steam pipes at five pound pressure can cause charring of the wood, and may eventually result in a fire.

"Radiant heating" consists of the burying of wrought iron pipe, usually in a concrete slab, and circulation of hot water at about 100°F. to 110°F. through the pipes. An investigation of several of these "Radiant heating" installations was made, and some of them were several years old. All firms contacted who have installed such systems were enthusiastic about this type of heating installation.

The advantages claimed are: Absence of pipe and heating units in the building; and this design of heating plant produces a more even and satisfactory heat.

If a boiler plant is to be erected, this building should be located about 100' from the lacquer manufacturing building, the tank farm, its pump house, and the tank car unloading station, tank truck unloading station, or other solvent process units.

It will be desirable to place the floor of the boiler house at a higher elevation than

the lower floor of the lacquer plant or the other exposures mentioned. This is to prevent the "drift" of solvent vapors from reaching the boiler fires if a spill of any consequence should occur.

Humidification is one of the most practicable and economical means of combating static. Static electricity is usually a hazard during the fall, winter, and spring months in most sections of this country. During the summer, it is not a problem ordinarily. This is because enough atmospheric moisture is present to deposit a film of moisture on belts, floors, and other surfaces over which the static drains away to earth.

Actually, there may be just as much static or frictional electricity formed with any given operation or piece of work on a warm, humid day in July as on a cold, dry day in January. But on the latter day, the amount of moisture in the air is usually a great deal less. Any moisture film present is not sufficient to permit the static electricity to drain away rapidly; and finally charges build up on persons, belts, and other objects until an arcing voltage is reached.

It is known that a relative humidity of 60 percent is usually sufficient to provide a "conductive film" of moisture, over which the static can leak readily to earth. Furthermore, humidification is simple, cheap and effective, and in the production of most materials, causes no trouble. With some products and processes, however, a relative humidity of 60 percent may be objectionable.

Humidification may be accomplished by discharging steam or atomized water into the atmosphere. Steam is preferred as it is usually cleaner than water and in a better physical shape for use. In all cases, the amount of moisture required for the desired degree of humidification should be automatically controlled to produce the desired humidity by automatic shutting off and turning on of the jets. A number of concerns supply such equipment.

An important point to keep in mind in connection with humidification is the temperature of walls or other surfaces. Surfaces at condensing temperatures cause pools of water to collect, which are objectionable from appearance, housekeeping and safety standpoints. If there are such "cold" surfaces, they should be insulated to keep them above condensing temperature.

If a warm air heating system is used, the

system can be designed to supply condition 1 air of the desired humidity.

Plant transportation, other than that of fluids, will generally be by means of hand trucks, which may be of several types; powered trucks of the usual type and lift or fork trucks, which may be powered by either gasoline or electric motors, the latter using storage batteries.

No one of the "powered" vehicles of the designs currently available are safe for use within or close to a solvent process building, such as a lacquer manufacturing building, solvent storage, etc.

Fires involving gasoline engine powered motor trucks are not uncommon. The engine, the ignition system, and the exhaust are sources of ignition, if such vehicles are operated in an area or zone where there is a flammable vapor-air mixture.

The storage-battery powered vehicle likewise has several sources of ignition—the motor which is usually of the commutating type, the control switch, the battery terminals, etc. If the plant size is such as to require "power" transportation, it will be advisable to set up regulations, which will prohibit such vehicles from going beyond certain prescribed limits.

Also, if gasoline powered vehicles are used about the plant, it will be advisable to equip the vehicles with the following safety features:

The gasoline tank fill pipe should be fitted with a safety cover. The carburetor air intake should be fitted with a flash-back arrester. Many motor vehicle fires are due to flame flashing back through the carburetor. The device mentioned above is to prevent such a thing occurring.

The end of the exhaust pipe should be fitted with a spark arrester, and a spark arresting muffler, which may be obtained from several firms.

In addition, the vehicle should be fitted with an automatic CO<sub>2</sub> extinguisher system. Such a system, which operates both automatically and manually, floods the engine compartment and the zone around the gasoline tank with CO<sub>2</sub>.

It is necessary to prepare a design of such a protection system for each make or type of vehicle; at least one concern in the fire protection field now has had a good deal of experience in preparing such designs and in installing the equipment.

In addition to the automatic CO<sub>2</sub> extin-

guishing system, each vehicle should carry a four pound CO<sub>2</sub> or dry powder or other suitable extinguisher.

The fueling of such vehicles should be carried out at a detached and safe location; and a regulation should be adopted and enforced, which prohibits the filling of the fuel tank when the vehicle is loaded.

The battery-powered vehicles do not require the automatic CO<sub>2</sub> protection system; however, each such vehicle should have installed on it a four pound CO<sub>2</sub> or a dry powder or other suitable extinguisher.

To date, so far as known, no manufacturer has produced a vehicle which can be classed as explosion-proof, although at least one make incorporates a number of features which reduce the hazards to a certain extent. However, not all of the sparking sources are safeguarded, and unless all of the known sources are safe-guarded, the unit cannot be considered safe for use in or near a solvent process building.

It will be desirable to make the wheels of all hand trucks of a nonsparking and conductive material. The use of such nonsparking and conductive wheels is to guard against the struck spark hazard, and to drain to earth any static charge which may tend to build up on the container or package being transported.

The use of rubber wheels, or any other insulating material, should be avoided, as such materials will prevent the flow of static to earth. However, wheels made of conductive rubber are permissible and satisfactory.

A lacquer plant should be protected by means of an automatic sprinkler system for the protection it affords and also for the economies it brings about in insurance rates. It is not unusual for the insurance carrier to grant reductions of 50 percent and more for the installation of an approved sprinkler system. This means that in many instances the premium saving will pay for the sprinkler system in a few years.

It is believed that a sealed head, thermostatically controlled sprinkler system will afford adequate protection in conjunction with other protection which should be provided. Some may question the advisability of water sprinkler protection in a lacquer plant, but it is believed its advantage far outweighs the disadvantage. The chief disadvantage is the possible flow of burning material on the water.

If a sealed head system is used, the heads which open up would be those exposed to fire. It is true that many of the solvents and diluents are not miscible with water; however, the water discharged from the sprinkler heads acts to beat out a fire. Remember the water is not being discharged in a solid stream, but is broken up into fine particles; in this form, it tends to mechanically beat down a fire.

In addition to the sprinkler system, equipment such as nitrocellulose dissolvers, resin dissolvers, nitrocellulose solution storage tanks, lacquer mixers and resin storage tanks, and similar equipment should be fitted with fixed CO<sub>2</sub> protection. This means that a battery of CO<sub>2</sub> cylinders or other source of CO<sub>2</sub> is piped to the equipment mentioned. Each such piece of equipment is fitted with one or more horns or inlets. In the event of a fire, the CO<sub>2</sub> is discharged from its source of supply either by manual operation or automatic control, into the vessels, thereby quickly reducing oxygen content to a point below the combustible range.

A number of lacquer manufacturers have installed such equipment, and the systems have been called on to function in a number of instances. The performance has been excellent; in many cases, fires have been extinguished with very little damage or loss.

In addition to the above protection, there should be a number of CO<sub>2</sub> or dry powder first-aid fire extinguishers. The size and number required will vary with the plant, however, it is probable that the 30 pound unit is a desirable size.

If there is a large storage of solvents and diluents on the plant, it will probably be desirable to provide other protection such as a supply of foam powder, a foam generator, and possibly a 750 pound CO<sub>2</sub> wheeled type extinguisher or the 350 pound dry powder extinguisher.

A study of the plant needs to be made and decision reached as to the indicated size and kind of first-aid extinguishers; however, for the sake of simplicity only one kind and make of extinguishers should be ordered and installed.

All persons who may be called on to use such equipment should be trained in its use. Fires should be built at a safe and suitable location, and the employees of the plant should be trained to put out these fires with the first-aid fire equipment installed on the plant. It is not enough to buy and install the equipment; it is important to have people trained to use the equipment. Such training will pay good dividends.

It is also desirable that there be several fire hydrants near the lacquer plant. These may be fire department hydrants and outside the limits of the plant property. If they are conveniently located, this should be entirely satisfactory; however, in some cases the hydrants are installed on the plant property, and certain members of the plant organization are trained to use the fire hose.

If the hydrants are on the plant property, it will be desirable to install a standard mill yard type of hose house over each hydrant, and then equip each of these houses with at least 150' of Underwriters' Laboratories' approved 3/4" CRL hose and 1 1/4" x 90" play pipes. The standard mill yard hose house is illustrated in National Board of Fire Underwriters' Pamphlet No. 25. The hydrants, hose houses, and the P. I. valve controlling the sprinkler system should not be closer than 50' to any building.

In the foregoing we have discussed a number of the features and items having to do with safety in the manufacture of lacquer. It may seem to some that there is a multitude of details. However, we haven't touched on all of the items which should receive consideration, but only those which appear to be worth mentioning at this time. Some of the items not mentioned may be equally important, and it should not be assumed that we have mentioned or covered all matters of importance.

The point which we wish to emphasize is this—That safety in the manufacture of lacquer can be achieved by paying attention to the many necessary details; and that, so far as I know, is the only way by which accidents can be prevented in any line of production.

## Laboratory Hazards

(Panel Discussion)

Discussion Leader: JOHN S. SHAW, Director of Safety, Hercules Powder Co., Inc.

### Participants:

E. G. MEYER, Director, Industrial Hygiene Laboratories, Employers' Mutual Liability Insurance Company of Wisconsin  
JOHN J. HOFFMAN, Safety Director, Monsanto Chemical Company  
HAROLD R. HOYLE, Safety Engineer, The Dow Chemical Company  
DR. BRUCE LONGTIN, Illinois Institute of Technology

CHAIRMAN SHAW: The chemical engineer starting in the laboratory gets his first impression of safety, and the laboratory is his training ground, the vestibule of his whole career. It is most important, and when we set a laboratory in good order and keep it as a model of safety, we have started the young chemical engineer out on the right foot. When he goes into the plant he will never forget what he learned in the laboratory.

I couldn't avoid making that comment, because it is a pet theory with me.

DR. MEYER: Relating to safety in laboratories, it is my experience that many of the technical people are so familiar with the problems and the chemicals used that they do not believe that they need to take the same safety precautions that the untrained men or the men in the plant need to take. For example, they feel they know how to handle chemicals well enough so that they do not need eye protection, and therefore oftentimes we have serious eye accidents. Or they feel that they can perhaps heat a flammable solvent over a naked flame, knowing just how little or how much to heat it without getting it too hot and without having a fire. Well, that's a poor practice, because the flask may be poor and it may break, and again we have a serious fire.

I used to be with the Bureau of Mines in the development of gas masks. Many laboratories are not equipped with a proper type of gas mask. For example, laboratories handle compressed gases such as chlorine, sulfur dioxide and many other toxic gases. You can handle them for years at a time, and if you have no breaks in the line and your connections are tight, you can get along very well

without the proper type of respiratory protection.

On the other hand, I believe when connections are being made—especially, for example, in the paper mills, where carload lots of chlorine gas are being used—it is a good precaution to have a chlorine mask ready, have it right around your neck ready to use in case it is necessary.

MR. HOFFMAN: It seems to me we may possibly not have gone as far on follow-through with laboratories and the people who work with them as we should have. As John said in his opening remarks, that is the very opening of the careers of the people with whom we have to work.

A young chemist comes into our plant. He is confronted in his laboratory with every hazard. I can't think of a hazard that occurs in a laboratory on a minor scale. The things that he learns in the laboratory and the habits that he develops are directly responsible for the actions that he follows through when he goes out into the plant and begins to take over a producing unit.

I think we have a big job in doing work with these men in these preparatory years.

MR. HOYLE: It seems to me we are fortunate in laboratories as far as our safety problems are concerned, because these men are well acquainted with the properties and materials they are working with. For that reason our problem is mostly one of making them safety conscious, you might say, or at least getting them to the point where they will think about doing things safely. It seems that that is a part of the problem that doesn't get covered as well as it might in their previous technical training schooling.

DR. LONGTIN: I have been asked to take part in this panel as representing the college teaching laboratories, the place where the student often has his first acquaintance with chemistry and chemicals. I think that is one of the most important places, because he too often learns to be careless about his chemicals at that point.

Concerning hazards in the laboratory, I think the worst hazard, at least in the teaching laboratory, is the laboratory instructor who has not had training in safety procedures and has no appreciation of them.

MR. LUCKY (Allen B. Wristley Co.): I would like to ask under what conditions you consider goggles should be worn in the laboratory.

DR. MEITER: Naturally, there are two methods of eye protection to be used in the laboratory. Either you can have the operation which may produce an eye hazard behind a permanent screen, or you can wear personal protective goggles or face shields. I certainly believe that they should be worn when pouring corrosive liquids, because you never know when splashes might result and introduce serious eye injury.

Then, again, certainly they should always be worn when heating a liquid which might burst the flask.

Coming back to college safety, I am just wondering whether that would not be the place to introduce eye protection. For instance, one of the first freshman experiments in general chemistry is the generation of hydrogen. All of us who have either studied chemistry or taught chemistry know that you can wrap the flask in a towel and perhaps, if everything goes right, be fairly safe. But I certainly would like to see some type of eye protection, whether it be goggles or face shields, as part of the laboratory equipment, such as flasks, test tubes, and so on, and I would like to have our college representative here say a word about that.

DR. LONGTIN: In practice, where that is done in the sophomore organic laboratory, the goggles soon become dirty and the student pays no attention to them after that and will not use them. In the freshman laboratory I think that problem would be even greater, because you do not have the opportunity to watch the students in the freshman laboratory. On the other hand, I don't know myself as many serious needs for it in the freshman laboratory as in the advanced types.

MR. BELL (Policraft Chemical Works): I have this question. The new chemist coming to the laboratory, while he is taught a great deal about the chemical character of the drugs with which he works, usually knows nothing as to the toxicology of those drugs. Would it not be good practice for any research program to include a study of the toxicology of the materials being used?

CHAIRMAN SHAW: I think the answer is obviously yes, in capital letters.

I believe you could take a vote on the answer here, and I think 60 per cent of the

hands would go up. I may be very wrong.

MR. BELL: One further question on the same subject. So often it happens that in research work by-products are produced of which little or nothing is known. Should you in such a case stop the research, or should you risk that exposure?

MR. HOYLE: Probably the best answer is that where materials may be made inadvertently, or as by-products, the whole thing should be treated as though it were extremely hazardous, and take all precautions. It is better still to assume that almost anything can happen until you prove otherwise.

CHAIRMAN SHAW: It must be assumed that the chemist preparing his research project will have worked out all of his reactions and will know what compounds are going to be formed. I can't conceive of his starting until he does. In that case he should know what is going to be formed and whether or not it is toxic or explosive or flammable or what 'not. In our research projects such a study is made of every new project being developed before the work proceeds, and if necessary, if we find a bombproof necessary, we will build a bombproof. Just as Dr. Hoyle says, we will take extreme precautions before starting.

MR. JOHN WALLER (E. I. duPont): I have been waiting for this chance for a long time. I would like to address this question to Dr. Longtin.

Inasmuch as colleges are the training grounds for such things as good behavior as well as chemistry and engineering, and things like that, wouldn't it be wise to start, in the interests of safety, this program of wearing goggles and eye protection back in the freshman course, just to get people used to the safe way of doing things?

DR. LONGTIN: I think that would be well if it would accomplish its purpose, but if it leads the student to have complete disregard for the wearing of goggles, because he sees that he is doing it when it is not necessary, then I don't think it would be very effective. It would teach the students then not to use them, rather than to use them.

MR. SEETEK (Commonwealth Edison): Has any experience been covered in precautionary measures where there is a fuming off of perchloric acids in hoods? Do you gentlemen take any precautionary measures in trying to avert any explosions?

DR. MEITER: Rather recently I heard Dr.

G. Frederick Smith, President of one of the concerns who manufacture perchloric acid, talk before the Milwaukee Section of the American Chemical Society, and if I recall correctly he said you must be very careful and not use perchloric acid in a hood which may have condensed organic material. So if you use perchloric acid in the laboratory you should use that hood for that purpose only, because there is always a possibility of organic material subliming in the hood, and as far as I know, explosions have resulted from that source.

MR. SEETEK: Will ordinary sparks set off the explosion of the condensed perchloric acid? Say you are igniting something over a Bunsen burner and you do have sparks that go off from the hood. Will that ignite the perchloric acid?

DR. MEITER: The question is, will sparks ignite a mixture where, say, organic material has condensed in the hood and you have perchloric acid? Presumably there might be many sources of ignition, and I think there are also many unknown factors in perchloric acid. In other words, it is impossible to predict when and how it does explode, so that I still believe it would be wise to use the precaution where you would use only perchloric acid in the hood and not have it mixed with other materials, because most of the perchloric acid explosions have usually resulted from unknown organic material getting in where it was not otherwise suspected.

MR. SEETEK: You mean all laboratories should have a single hood where they do all their fuming off of perchloric acid?

DR. MEITER: That would be desirable. I presume there are many metallurgical laboratories where perchloric is used on a large scale and organic materials are not used. I presume it would be all right there. But where you have the possibility of using organic materials there is always the possibility of explosion.

MR. SEETEK: Has anything been done on cleaning out the hoods that had been used for perchloric acid?

DR. MEITER: That I cannot answer.

CHAIRMAN SHAW: The last question was, has anything been done about cleaning out the hoods where there may be a deposit of organic materials? Not every laboratory, or not every room, has two hoods. Who knows about the decontaminating of the hoods—the fumes, and so forth?

MR. OLSON (Oldbury Electric Chemical Company): There is a data sheet in MCA—Manufacturing Chemists' Association—on the use of perchloric acid, which has recently been put out. It is quite thorough in its coverage on both laboratories and other places.

In answer to your question now, I have seen a sheet put out on the construction of hoods for perchloric acid, in which they were so made that they could be flushed out with water, equipped with sprays to wash them down.

MR. HOFFMANN: On at least one occasion we have had to flush hoods with water in our laboratories. I would hesitate to say whether that's a good or a standard practice with something that is as unstable as perchloric acid. It worked once, anyway.

MR. JOHN TOZIER (Eastman Kodak Company): What is the best method of handling solvents that are stored in bottles or safety cans in the laboratories—handling and storing?

MR. HOFFMANN: I think there are as many answers as there are people in the room. I don't believe I would care to see too many solvents stored in bottles, but rather in the standard solvent can with the suitable grounding arrangement to throw off static discharged as the material is poured from the can.

Bulk storage would probably be best in an isolated vault, away from the immediate vicinity of the laboratory itself.

CHAIRMAN SHAW: I presume the isolated vault would be vented?

MR. HOFFMAN: Certainly.

MR. DAVIS (C.I.L., Toronto): The last speaker answered the question perfectly. If you cannot ground your contents, store them in a storage container.

CHAIRMAN SHAW: That storage container should have a flash arrester, something like the double screens?

MR. DAVIS: Absolutely.

MR. CANE: I think that in a laboratory the greatest question that comes up is the original layout. How much training does a chemist get in laboratory layout? I believe that if the chemist in his early training were to learn more about the mechanical equipment that he has in his laboratory you could eliminate a great amount of hazard in the laboratory.

What I mean is this. A chemist going through school understands a great deal of

the dangers in the chemicals that he is handling, but I have seen many times that the layout of a laboratory is unsafe.

What has been done toward teaching this to the chemist? In time he may be in a position to construct a laboratory or have a say in the construction of a laboratory.

**CHAIRMAN SHAW:** Mr. Cane, your question calls more for action than an answer. The training of chemical engineers in the design and setup of laboratories is under way and is making good progress now. It has taken about fifteen years to get the action going, and it is really making good progress.

Unfortunately, a lot of our chemists go into old laboratories to start with, which are badly arranged and badly designed. They accept them as being standard, and you have to untrain them and then train them over again when you build new laboratories.

**MR. DEVLIN (Monsanto Chemical Co.):** Occasionally I will find when I go into a laboratory (I am a safety engineer), people using, for instance, fluorine. Might it be possible for this body to go on record asking the manufacturers of materials such as that to send a copy of the latest bulletin along at the time the material is shipped from their plant?

**CHAIRMAN SHAW:** I think a great many chemical companies are doing that.

**MR. DEVLIN:** If they send them to the safety director of the company using the material, or to a chemist that is doing a project with it, much of the danger would be eliminated.

**CHAIRMAN SHAW:** The safety director must reach out and get the material of all the chemical companies and supply his company. Find out what literature they publish; be up on it. You can't wait for it to come to you.

In the same way you have to be familiar with what the boys in the laboratory are about to do so that you may supply the literature they may need.

**MR. HOFFMANN:** I happen to know what Bob Devlin's problem is. It is a problem which many of us have had in the past, and have now. It is a problem to keep up with the research work that goes on in our laboratories, to keep up with the information which we need in order to do a worthwhile job in laboratories.

As John and Bob both mentioned, many of the companies producing these materials

also produce technical data that is sent along with the materials which they sell to the various companies. The Manufacturing Chemists' Association is doing a pretty good job in developing that kind of information. It is available to the safety engineers and to people that handle these things.

**CHAIRMAN SHAW:** Harold Miner, Director of Safety of duPont: You sell a lot of chemicals all over the world. Do you not ship instructions, precautionary instructions with your various chemicals which might be dangerous or poisonous or what not?

**MR. MINER:** Generally speaking, yes, and I am sure that all the reputable chemical manufacturers send such information with any unusual chemicals which they ship out. We had an experience just the other day where some of our chemicals were involved. The first thing I did when I heard about it was to get the group together to make sure that the information given to the user covered all of the known characteristics of the compound. I found that it did and sent them a detailed data sheet. I feel that all reputable manufacturers do.

**MR. McCUTCHEON:** We have talked around the point for five minutes, and we still haven't got right to Devlin's question, which I think is a good one. As I see it, his question is this. Granted that all these companies put out this information, he wants to be sure that he gets it. Now, as he says, it is the chemist over in the corner of the laboratory that's using it, and he may have a lot of territory to cover and he may not get to that corner of the laboratory until the chemist has it, along with the information that the manufacturer has sent out, but he may disregard the information and go ahead with his experiment.

It has occurred to me that this is a fine opportunity for the safety department to work with the purchasing department. One word to the purchasing department, and you have information at any time when a new chemical is ordered. Certainly no requisitions, no orders go out of your factory unless through the purchasing department. If you tell the purchasing department what chemicals you do have information on, it is a very simple job to check over that list whenever they see a strange requisition coming through. Then you are on the mailing list, so to speak, for information covering that chemical.

**MR. DEVLIN:** We put a fellow in the hospital at seven o'clock one night after he had been handling something which got into the plant without the purchasing department notifying me that it was in. Since then there has been a sound rule put in that every requisition that goes through the purchasing department has to come to me so that I have a record of it and can follow along the information.

**MR. MINER:** The problem is more basic than the purchasing department and the safety director, and what have you. It comes right down to the responsibility of the laboratory director or management or supervision. It is the laboratory director's responsibility for the safety of his men, whether they are chemists or helpers or what not. He is going to make sure that clear down to the man who is supervising the chemist using this material, they have full information of the characteristics of the material. Unless you do that, you can have your requisition sent to the safety director, you can have the safety director contact your purchasing department and all the other departments, and still you won't get the information out to the men.

I just wanted to drive that home. The same thing is true about other types of exposures for the prevention of other types of personal injuries. Until you have that assumption of responsibility by management and supervision clear down to the man that is working in the ditch, so that he is properly supervised, properly trained, properly educated, properly protected, and uses the proper protective equipment when he is doing certain things, you will never prevent personal injuries. But when you are organized that way and there is that assumption of responsibility for employees' safety by management and by management staff, you can prevent personal injuries. I don't care whether it applies to a chemist using some new chemical or trying out some new process, or digging a ditch, the problem is exactly the same.

**CHAIRMAN SHAW:** Let us not drift too far from the laboratory. Harold gave you an outline which carries clean out to the outer fence of the whole plant, which is good, but this subject is "Safety in the Laboratory." So let's keep thinking "laboratory" in our procedure here.

**MR. D. McGILLICUDDY (Rainer, Inc.):** We have been discussing the hazards involved when we have college trained men in our

laboratories, both control and research, which we recognize. However, I would like to ask Mr. Hoyle for some observations on training or safety educational work being done with our high school graduates, or people doing the menial work in the laboratories, of which we have roughly fifty per cent in that category. Incidentally, that is where we find our accidents occurring.

**MR. HOYLE:** I think what we hope to accomplish is to get the technical supervisor of the laboratory to assume his responsibility for the training of those men, and we hope to help him in doing that by having committees set up whereby each technical man supervising these high school graduates and non-technical employees, will take some time during each week or each month, depending on the setup in the laboratory, to meet with those men and discuss the hazards of their job as they go along.

In our laboratories I think it works out very well by having them get together before they start a new problem, outlining to them not only the work that they are going to do, but how to do it safely. In other words, we hope to work the job instruction and safety instruction in together.

**MR. HANNING (National Laboratories):** In the average chemical laboratory you have a certain amount of chemicals that are reasonably steady, that you can more or less use over and over again. But in the research laboratory you can practically go through the book and pick out every chemical that is manufactured, and you attempt to store it and have it available in the event you might want it. The basic problem there is the proper way to store those chemicals when you have an infinite variety of chemical properties and characteristics to cope with. Of course, you can break them down into their basic characteristics and roughly get them into that category from the fire prevention viewpoint, but I would like to know of any general experience as to the proper storage of large amounts of chemicals infinitely diverse in their properties.

**DR. LONGTIN:** I wanted to add a question to that. I would like to find out whether he means large quantities of individual chemicals, or just large number of chemicals in small quantity?

**DR. MEYER:** Right off-hand I can only think of a few dangerous chemicals that should not be stored with the others, such

as metallic sodium and the other metals of that type, and also such dangerous articles as phosphorus. Those should never be stored with the others, because you never know when a container of metallic sodium, will spill and the liquid evaporate and the metallic sodium catch fire. The same will hold true for phosphorus.

CHAIRMAN SHAW: I once found concentrated nitric acid stored on shelves in Winchester bottles immediately above a can of turpentine. It seemed to me there we had the making of fireworks. We changed all that. We went to outside storage and put conflicting chemicals separately and stored them safely, so that if anything fractured, broke or spilled, there would be no fire or explosion. Avoid putting conflicting chemicals together.

Now, as to your storehouse for your chemicals, I suppose if you want to have a large line you would have to have a library, an alphabetical storage.

MR. WISSWESSER (Wilson Products): Going back to this training ground in the school laboratories, you, Mr. Shaw, and several panel members emphasized the importance of that training ground, and you wrote a very good article on it in the Journal of Chemical Education on our hazardous chemical laboratories, which I think should be widely distributed.

Three rules that existed when I taught in a laboratory of the chemical engineering department at Cooper Union deserves mention:

First, instructors or professors in charge of the laboratory were told that they were personally legally responsible for any accident or injury that occurred in their laboratory class.

Second, students had to wear some kind of eye protection all the time they were working around the laboratory bench. They would raise the goggles when they were weighing or writing down their notes, but they had to have either personal prescription glasses or they could purchase various styles of goggles that the supply room had, or they could go to the Five and Ten if they liked and buy anything at all. After the second or third lab period they were chased out if they didn't have protective equipment over their eyes. We emphasize that nobody gets any more than two eyes per life.

Third, any unauthorized experimenting brought on immediate expulsion from the course.

CHAIRMAN SHAW: Any more questions? MR. ALSPAUGH (Monsanto Chemical): After redistilling solvents to be sure that they are absolutely clean; how can they be stored so that they will be safe and not be then contaminated?

If you store them in glass, you have the chance of breakage. I would like to have the opinion or the experience of other people.

CHAIRMAN SHAW: Is this in the laboratory?

MR. ALSPAUGH: Right.

MR. COBB: We have that problem every day, that of very pure solvents that we have to keep free of contamination. For very small quantities, a pint or so, the glass bottle is standard. If you have a lot of these, they should be kept in a separate room under plenty of fire protection. With larger quantities the stainless steel drum has worked very well. We find that a great many chemicals can be kept in a stainless steel drum and not pick up an appreciable amount of contamination. In intermediate quantities, we have had reasonable success with stainless steel safety cans, in every case, however, filling the can or drum right up to the top, not allowing any air space.

MR. WALTERS (E. I. duPont): We have in organic research the problem of storing things such as that, that might pick up peroxides as well as the metal to act in the form of a catalyst. My suggestion is to store them in bottles, but to have a separate container around them. Put the bottle in a can that will receive that material if it breaks.

MR. COBB: I should have mentioned that. That's excellent. Good standard practice is to set those bottles in enameled or rubber trays that will catch anything if the bottle breaks.

Another point is when you have a material that will pick up oxides, then a reducing agent in many cases can be used in those to keep them from forming your unstable peroxides.

CHAIRMAN SHAW: Anti-freeze, rust inhibitors, something like that.

MR. BELDUSEN (B. F. Goodrich Chemicals): I would like to ask if anyone has had any experience in the handling of ketene. What extraordinary precautions do you take? I am given to understand that it is about twenty times more toxic than hydrogen cyanide.

CHAIRMAN SHAW: Who knows about this chemical?

MR. ISENBERG (Tennessee Eastman): Our experience with ketene is that you don't have much trouble keeping people away from it. Ketene will take care of that.

CHAIRMAN SHAW: Well, you wouldn't use it indoors, would you, if it's twenty times as poisonous as hydrogen cyanide?

MR. HOFFMANN: What is this ketene? Can you give us any idea of what the chemical formulation of this stuff is, or what it is used for? I don't recall ever having heard of it. We have a bad actor or two in our list which I thought was comparable to hydrogen cyanide, but if ketene is worse, I would like to know about it.

MR. ISENBERG: If it had more desirable properties, it would make a good war gas.

MR. HOFFMANN: Speaking from a safety philosophical angle, I can't imagine any kind of a compound that can't be successfully handled if you know what it's going to do. Years ago we were told that we couldn't handle certain things successfully; they were considered to be bad actors and they were frowned on and people were scared of them. These same things are being handled today

successfully in large quantities, because we have learned to recognize that things will cause trouble and we have learned to guard against those troubles.

I think we can handle hydrogen cyanide because we know what it can do; we can handle benzol because we know what we have to do to prevent the hazards of benzol. This ketene stuff may be a very fine war gas if it had certain qualities. We know it's a bad actor. Certainly we should be able to determine what type of respiration is needed, what kind of skin protection. If we don't know I think we had better darn well quick find out. But if there are some known properties, if we know it's a bad actor, it can probably be handled successfully if all the precautions required for a bad acting chemical are followed.

CHAIRMAN SHAW: Somebody said, when you are going to do a job and you don't know what the hazards are, take the extreme precautions. Then you can relax and take off some of the precautions as you find such action justified. It seems to me your procedure with this one should be the same as you would do in your own research. You have to get some animals, guinea pigs, to get some laboratory work done.

## WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: ALLEN L. COBB, Supervisor of Safety and Fire Prevention, Eastman Kodak Company.

### Unstable Compounds

By DR. L. J. ROLL

Eastman Kodak Company

The dirt-gardener classifies a weed as a "plant out of place." I should like to make an analogy and say that an unstable compound is one that reacts at the wrong time or place. The reactivity which makes a compound unstable is generally the property which we like to use in synthesizing new products. A compound which is too stable is practically useless in organic synthesis, because it cannot be used in reactions. The problem of preventing untimely reactions is therefore a matter of keeping the material within prescribed limits of temperature, pres-

sure, and humidity, and out of contact with certain other substances. The "know-how" includes a knowledge of the safe limits of the physical conditions and the types of contacting materials to be avoided. This knowledge is gained from the recorded experiments and experiences of chemists since chemistry began. Unfortunately some of this has to be relearned quite painfully.

Perhaps I can best tell some methods of control by describing what we do in the Synthetic Chemistry Department, which is part of the Research Division of Eastman Kodak

Company. Each one of 50 chemists averages more than two reactions daily involving the use of two or more chemicals. This is more than 25,000 different reactions annually. Naturally this has given considerable opportunity to observe and control the reaction of chemicals. For obvious reasons, mostly commercial, we have limited ourselves to starting materials and final products which are stable under ordinary conditions of storage. Our chemists, however, prepare and use any unstable intermediate which may be necessary for the final product.

Before any chemicals are stored in our stock room, they are tested by a chemist for identity and quality. If there is any question about either, the lot remains in the receiving room or out-of-doors until the matter is decided. After the testing laboratory has given its approval, the chemical is stored in one of ten rooms in the stock room building. Each room is protected by self-closing fire doors, sprinklers, and explosion-type sash. The steel shelving is perforated for better sprinkler protection.

In addition, there are several special storage rooms, such as a hot room for low-melting solids, a cold room for very volatile materials, a special room for medicinals, a locked room for known explosives such as picric acid, T.N.T., trinitroresorcinol, etc., a room for dusty materials such as carbon, lime, etc., and a reinforced concrete-walled room for a few solvents. The bulk of the solvents, including all the organic liquids which are stored in 50-gal. drums, are on racks out-of-doors.

The chief function of the stock room is the distribution of chemicals to the chemists for manufacturing purposes, to Kodak Park for use in photographic goods and in research, and to outside customers. Orders are filled from stock bottles by men provided with goggles, gloves, overalls, and jackets. Each bottle or other container for the customer is provided with exactly the same label as that on the stock container. In no instance are the stock room clerks allowed to mix chemicals.

An additional function of the stock room is the grinding and sifting of a large number of chemicals. The equipment is very simple, consisting of Quaker mills and vibrating sieves, since each part must be thoroughly cleaned and dried after each operation. The work is done in a reinforced concrete-walled

room which is well ventilated. The house-keeping in this room is of a high order to avoid the accumulation of chemical dusts.

The entire Synthetic Chemistry Department has the benefit of the general supervision of the Kodak Park Safety Department. This includes semi-annual inspections of our department with recommendations for safe practices, general safety lectures and demonstrations to the new employees, distribution of safety information, and investigation and reports of accidents. In addition, we have periodic factory inspection by underwriters, N. Y. State labor representatives and boiler inspectors. The Kodak Park Medical Department makes semi-annual blood and urine tests on all the chemists, plus special tests on chemists during the time they are working on certain type of compounds, such as benzene and carbon tetrachloride.

The manufacturing laboratories are designed for one to five chemists. Each room has two or more exits, each fitted with a fire alarm button, shower, gas shut-off valve, and carbon dioxide fire extinguisher. Other items of safety equipment, including larger extinguishers, more showers, blankets, gas masks, are located in strategic spots around the department. Each chemist is furnished overalls—smocks are not desirable because the loose folds catch in equipment, most of which is on the floor—jackets with long sleeves, goggles, gloves, and in certain cases, shoes. The clothing is washed daily. The goggles, which are a special type of tempered glass, must be worn during working hours. Most of these are precautions for the unexpected reaction or for accidents due to mechanical failure. The protection provided for the personnel might be considered as a control measure to prevent reactive chemicals from contacting other substances, namely human skin.

Some specific examples might be cited to show possible general control measures that can be applied by the chemist. Nitration and sulfonation reactions are generally carried out at predetermined temperatures. If, for some reason, the temperature exceeds the upper limit, the reaction rate may increase to such an extent that it becomes violent. More cooling during the initial temperature rise is indicated. This may be done by adding crushed dry ice directly to the acid mixture. Dry ice acts best as a rapid coolant in strong acid solution, or in organic solvents. Water is one of the most convenient mate-

rials for the control of reactions by dilution. Some nitrations and sulfonations can be carried out safely at higher temperatures with dilute acids. A more striking example of the moderating effect of water is the so-called Skraup reaction used for the preparation of quinoline. A mixture of aniline, nitrobenzene, glycerol, iron-sulfate, and sulfuric acid is heated to 140°C to initiate a reaction which is extremely vigorous. This violence can be reduced by adding a small amount of water to the mixture before heating. In a similar manner, hydrazine, which is one of the constituents of rocket fuels, can be used in less violent reactions in the laboratory by diluting with water.

All dye-chemists realize the extreme instability of diazonium compounds which are intermediates in the preparation of azo dyes. These are nearly always made in water solution and converted into dyes while they still are in the aqueous solution. Those unstable diazo intermediates which may be isolated are not allowed to become dry.

In the same manner, the metallic acetylides which are used extensively in the acetylene chemistry recently practiced in Germany, are stabilized with water.

When zinc dust is used for reduction, and in the presence of organic material, it readily oxidizes on exposure to air. The heat generated is sufficient to ignite the mass. Prompt dilution with water is a simple method of control. The ultimate disposal of this sludge consists in burning or spreading in thin layers to allow the heat to dissipate harmlessly.

There are some instances, however, where the presence of water may introduce a hazard. A mixture of sodium nitrite and sodium bisulfite is relatively inactive in the dry state. The addition of water will induce a reaction with the evolution of so much heat that organic material present, such as paper, will

ignite and water will be converted to steam.

Metallic sodium is handled safely in large quantities in closed systems. In the pilot-plant scale, using from one to fifty pounds of sodium, it is sometimes difficult to prepare the metal in a fine state of division without the collection of moisture. We have used an ordinary meat slicer to make thin slices very rapidly from 2½ lb. cakes.

Oftentimes chemicals are unstable because of the impurities they contain. Ethers such as diethyl ether, dioxane, etc., are quite likely to contain peroxides if stored in the presence of air. These peroxides explode violently if heated. The best method of control is to test all lots of ethers for peroxides by suitable chemical means. If present, they should be destroyed with alkali or ferrous sulfate before the ether is heated.

Crude organic nitro compounds or oximes nearly always contain higher analogs which are more unstable at high temperatures than the original compound. When distilling these materials, the volume of residue should not be allowed to become too small, in order to avoid a possible vigorous decomposition reaction. We are careful about admitting air to hot residues from distillations.

Some materials are stabilized by the addition of an impurity. Certain chlorinated hydrocarbons decompose slowly under normal storage conditions by the splitting out of hydrogen chloride gas. In closed containers, the resulting pressure increase constitutes a hazard. The addition of a small percentage of ethyl alcohol, or better an amine, such as diphenylamine will inhibit such decomposition. Large quantities of the latter chemical were used in stabilizing military explosives.

The foregoing examples are typical of the knowledge and practice of a chemist in handling so-called unstable compounds. The best solution I can offer on how to handle unstable materials is to employ a competent chemist.



October 8, 1947

## Joint Session with Marine Section

Presiding: CAPT. ROY L. RANEY, Asst. Chief, Office of Merchant Marine Safety, U. S. Coast Guard

Lessons Learned from the Texas City Disaster  
I. Marine Phases

By WILLIAM T. BUTLER

Chief, Hazard Prevention Section, Merchant Vessel Inspection Service,  
United States Coast Guard

In both the assignment and acceptance of the title of this paper, "Lessons Learned from the Texas City Disaster," it is now believed that more care should have been exercised inasmuch as one might question statements that any lessons have been learned. A truer descriptive name would be "Lessons that Can Be Learned from the Texas City Disaster."

The Texas City Disaster was a terrible casualty and all the more so because with ordinary care it could have been avoided, and, furthermore, after the fire was discovered, proper fire-extinguishing procedure would have probably prevented the explosion. To you ladies and gentlemen, members of the National Safety Council interested in prevention of accidents, the foregoing statement is indeed a familiar one. It is equivalent to the sorrowful one—"I did not know the gun was loaded."

That you may understand the sequence of events leading up to and through the occurrence of April 16, 1947, permit me to digress long enough to state the circumstances:

Prior to April 16 the French SS GRANDCAMP, moored at Pier "O" in the port of Texas City, Texas, had been loaded with approximately 3,341 tons of ammonium nitrate fertilizer, about 1,459 tons in No. 2 lower hold, and 882 tons in No. 4 lower hold. This loading began April 11. Prior to April 11 the American SS HIGH FLYER had received a cargo of ammonium nitrate fertilizer at the same Pier "O" totaling 961 tons of ammonium nitrate fertilizer.

After receiving this cargo the SS HIGH FLYER was moved from Pier "O" to the slip alongside Pier "A." This pier "A"

slip was about 600 to 800 feet south of Pier "O." This change of berths was made to permit the SS GRANDCAMP to moor at Pier "O" and the SS HIGH FLYER to take on additional cargo, consisting principally of "knock-down" railroad box cars.

On April 15 the longshoremen knocked off loading the SS GRANDCAMP at 5:00 p.m. and secured the hatches. At 8:00 a.m. on the 16th the No. 4 hatch was opened prior to resumption of loading. No smoke or fire was visible at that time. About 8:10 a.m. eight stevedores (two crews) entered No. 4 lower hold. A draft of bags of fertilizer was sitting on top of the cargo and in the square of the hatch, where it had been left the night before when work stopped. One crew of four men began to stow these bags in their proper location in the hold. The other crew of four men sat down to await the next draft from the topside.

About 8:30 a.m. stevedores noticed smoke issuing at the top of the stowage. The smoke was at the side of the ship and was coming up in a free space formed by the frames of the vessel and the shell and cargo battens. Attempts were made to extinguish the fire with drinking water and hand fire extinguishers. Apparently the fire seemed to subside but shortly more smoke was noticed between other frame spaces, both forward and aft of the original location. A ship's fire hose was lowered into the hold but the first mate ordered no water be used, stating it would damage the cargo.

The fire, which apparently was occurring low down in the stowage of the fertilizer, appeared to be spreading with much more smoke issuing. Orders were issued for per-

sonnel to evacuate the hold. With all personnel safely on deck, orders were issued to blank off the ventilators, put the hatch covers in place, cover them with the hatch tarpaulin, and batten down the hatch. In the meantime an alarm was sounded, exact method undetermined, and twenty-seven volunteers of the Texas City Fire Department responded with their equipment. Following the sealing of the hatch and ventilators the ship's steam smothering system, fitted in holds of ships for fire-extinguishing purposes, was turned on. Pressure generated by the products of decomposition ripped a corner of the tarpaulin and blew off a few of the individual hatch covers, and judging by the pressure exerted and the amount of smoke issuing from the hold, it can be assumed the fire was spreading and increasing in intensity at a very rapid rate.

On the SS HIGH FLYER, moored in the slip alongside Pier "A," the master of the vessel, taking cognizance of the fact that the SS GRANDCAMP was involved in a fire with smoke being carried by the wind, directly across his vessel, issued orders to cease further loading, batten down the hatches, assume fire stations, and wet down tarpaulins and other exposed combustible material on board his vessel. This apparently was done in a satisfactory manner.

Upon arrival on the pier alongside the SS GRANDCAMP, the local fire department put forth its best efforts to aid in the extinguishment of the fire. The crew of the SS GRANDCAMP had been ordered ashore, so it is assumed that very little, if any, aid was received by the local fire department from the crew of the vessel.

At approximately 9:15 a.m. the cargo in No. 4 hold on the SS GRANDCAMP detonated.

Within 500 feet of the SS GRANDCAMP to the northward were certain buildings of the Monsanto Chemical Company plant. This plant manufactures styrene and the process of manufacture involves the use of petroleum products of high volatility. The buildings of the chemical plant nearest the SS GRANDCAMP offered surface exposures to the blast and the immediate damage inflicted on these buildings gives an indication of the tremendous pressures evolved.

The machine shop, the warehouse, and the office buildings bore the brunt of the ex-

plosive wave. The storage tanks, the piping and the fractionation towers suffered severe damage from the blast and were punctured and ruptured by missiles consisting of fragments of the vessel. Naturally these storage tanks and pipe lines carrying flammable liquids, when ruptured, released vapor possessing a very low ignition point, and such vapor, either by the influence of the heated missiles, or mechanical sparks caused by rupture or tearing effects, ignited. It appears that some low order explosions occurred in accumulations of such vapor and the escape from storage tanks continued to burn for some days thereafter. It is believed that the principal loss of life in the Monsanto Chemical plant occurred immediately following, and as a result of the detonation of the cargo on the SS GRANDCAMP. The low order explosions and subsequent fire did not materially add to the damage outside the Monsanto plant caused by the initial detonation.

At the time of the detonation of the SS GRANDCAMP, the SS HIGH FLYER sustained considerable damage. Hatch covers were blown off the cargo hatches; some apparently being blown overboard, others landed on the deck, while others dropped into the hold. Light structural parts of houses above deck were distorted. Doors were jammed in open or shut position, interior division bulkheads were warped, furniture was displaced, steam lines were started, mooring lines were parted, and the vessel was forcibly driven sideways across the slip until it fouled the SS WILSON B. KEENE, which was moored to Pier "B" on the opposite side of the slip. The master of the vessel, severely injured, muttered his crew and found that others of the crew were also injured. He issued orders to take care of the injured, have their wounds dressed or take them ashore, and otherwise endeavored to organize his vessel. After one hour of such emergency work he issued instructions for his crew to leave the ship and retire to a safe location ashore.

After leaving the SS GRANDCAMP, the crew, with the exception of seven members, remained on the dock, watching the fire department fight the fire. The seven members mentioned walked around the opposite side of the warehouse and proceeded to a lunch room about 100 feet inshore of the head of the slip; ostensibly to purchase cig-

arettes. When the explosion occurred all persons on the dock or the ship; including the entire twenty-seven volunteer firemen, were killed, with the exception of three or four persons who were standing about at the land end of the pier.

The residential area of Texas City suffered considerable structural damage from the effect of the blast. All glass within a radius of a mile was shattered. The roofs and walls of many buildings and homes were caved in or dangerously distorted.

The scene was one of chaos. As quickly as possible officials endeavored to organize relief. With fire department personnel killed and all equipment demolished, no immediate effort could be made to combat the fire in the port area. Minutes from the SS GRANDCAMP plowed oil storage tanks, thus spreading the flammable vapors, thus spreading and compounding the hazard in the area. It was evident that no emergency plan or disaster plan existed and it appears that early efforts to organize relief proceeded slowly and without organized direction. Nearby cities, of their own volition, went to the aid of the stricken people. The Army and the Coast Guard immediately organized and dispatched all possible men and equipment for relief. The Red Cross appeared in an almost miraculous short space of time and rendered yeoman service. The Texas Rangers responded and were a tremendous asset in setting up order in the area.

Without benefit of any organized fire-fighting force or equipment, the heroic efforts of individuals entering the devastated area and rescuing those still alive are deserving of great praise. The entire waterfront area from the Monsanto Chemical plant on the north through warehouses "O," "A" and "B" was a fire. The contents of the various wrecked warehouses furnished material for the conflagration. At 6:00 p.m. an enlisted man of the Coast Guard, accompanied by several other members of a searching party, boarded the SS HIGH FLYER and discovered that a cargo of 1,050 tons of sulfur was a fire in No. 2 hold of that ship. One incident emphasizing the lack of organized disaster efforts was the attempt of Lykes Brothers Steamship Company to get several representatives down to its vessel, the SS HIGH FLYER, to see what could be done about moving

the vessel. These representatives came from Galveston by automobile, and when reaching the stricken area they were denied further progress by the hastily aligned guards, with the explanation that persons were not permitted to proceed into the devastated area. Upon an appeal by telephone from the Vice-President of the Texas City Terminal Company at 8:00 p.m. that evening, Lykes Brothers organized a mission which proceeded to Texas City from Galveston on board two towboats in an effort to move the SS HIGH FLYER.

It appears that the custom in that port was to use the ship's anchor when moving a vessel and after such mooring the anchor of the SS HIGH FLYER was left down. The mission, before attempting to move the SS HIGH FLYER, burned the anchor chain to free the vessel. A crew of several port captains and other personnel boarded the SS HIGH FLYER and attempted to aid in moving the vessel. The two tugs, after much effort, were unable to move the SS HIGH FLYER, and at approximately 1:00 a.m., April 17, the effort was abandoned.

At 1:15 a.m. the ammonium nitrate fertilizer cargo on board the SS HIGH FLYER detonated. In addition to destroying the SS HIGH FLYER, the after hold, the engine room, and the No. 3 hold of the SS WILSON B. KEENE were also destroyed. Missiles from the explosion spread fire over the remaining area of the waterfront south of Pier "A," wrecked the grain elevator at the head of the slip, seriously damaged three warehouses, set fire to oil storage tanks, and to above ground oil pipe lines in the area to the south and southwest. Fire-extinguishment efforts on the part of fire-fighting crews of the oil storage companies and refineries succeeded in limiting the amount of damage in these installations, although the fires continued to burn for several days thereafter. Other oil refineries in Texas, upon hearing of the disaster at Texas City, dispatched trained fire fighters and equipment to assist in combating the danger. Fires continued to burn at a progressively diminishing rate for about four days.

The most reliable figure of loss of life was set at 468, plus over 100 missing. It is estimated that more than 3,000 were injured. Property damage and contingent losses are estimated at \$67,000,000.00.

The hazards of ammonium nitrate fertilizer, which is basically ammonium nitrate, as it consists of 99% ammonium nitrate, had been evaluated by several competent agencies. It was not believed that any set of circumstances encountered in transportation of this substance could result in an mass detonation. There have been outstanding experiences in land storage of ammonium nitrate and ammonium nitrate fertilizer being involved in fires, and in no instance did such involvement end in an mass detonation or even low-order explosion. Regulations governing their transportation on board vessels, in effect since 1941, state:

"Under conditions of exposure to temperatures above 60° F. rapid decomposition and ignition may occur with evolution of heat. Under exposure to severe shock detonation is possible, although not probable under conditions of transportation."

Needless to say, the experience on board the SS GRANDCAMP, the SS HIGH FLYER, and later the SS OCEAN LIBERTY at Brest, France gave positive proof that it is possible to cause mass detonate ammonium nitrate fertilizer. However, it appears definitely established that this is accomplished in cargo on board vessels only by effecting a change in the chemical stability of the fertilizer by means of fire and by confining the substance in a fairly tight compartment while it is involved in the fire, and by having a sufficient mass of the fertilizer present.

When the fertilizer became involved in a fire on the SS GRANDCAMP, three grievous errors were made: (1) by not using water in volume to extinguish the fire in its early stages; (2) by blanking off the ventilators and closing the hatch with its wooden covers and tarpaulins; and (3) increasing the temperature of the cargo by the introduction of steam into the tightly closed hold of the vessel, thereby accelerating the decomposition of the ammonium nitrate fertilizer and hastening the detonation. This same set of errors was made on the SS OCEAN LIBERTY at Brest, France when fire was discovered on that vessel. This fire, in my opinion, fire occurred in cargo stored in the tween deck hold and heat was transmitted through the tween deck at sufficient temperature to cause ignition of paper bag containers of ammonium nitrate fertilizer in the hold below.

The above described errors were not factors in the explosion on board the SS HIGH

FLYER. The ammonium nitrate was stowed in lower hold No. 3 on this vessel. In lower hold No. 2, adjacent to hold No. 3, there were stowed 1,050 tons of bulk sulfur. We know there was fire in the bulk sulfur at 6:00 p.m. and we also know that there was fire in the nitrate cargo at 11:00 p.m. It is believed that admixture with sulfur hastened the detonation. Tests so far conducted confirm this.

As for "Lessons that may be Learned from this Casualty"

(1) ADVANCE DISSEMINATION OF INFORMATION—Manufacturers of substances or articles defined by regulations as dangerous should disseminate complete information, in advance of shipment, as to the hazard associated with their products. Shippers of such articles should advise carriers of this hazard at the time they book space. Carriers should inform their personnel of this hazard and of action to be taken in an emergency.

Alert manufacturers, ascertain any and all potential hazards associated with their products and provide the information to interested persons upon request. This procedure may be improved upon by disseminating the information through trade papers or otherwise making it generally available without waiting for persons to request it. Shippers (whether they be the manufacturers or freight forwarders) are required by Dangerous Cargo Regulations to advise the carriers of the hazard associated with the shipments being offered. Carriers are morally obligated to inform their personnel of hazards associated with the substances being carried. Admiralty law courts, both in England and in this country, have held that the carrier is responsible for knowing all of the precautions to be taken in the transportation of dangerous articles of commerce.

The Coast Guard Board of Investigation of the Texas City disaster found that hardly without exception all persons associated with the shipment, the storage and the transportation of the ammonium nitrate fertilizer showed a lack of information regarding its hazard, or provisions of regulations governing its transportation.

The action of the officers of the French SS GRANDCAMP in their attempts to control and extinguish this fire was exactly wrong in closing the hatches, blanking off the ventilators, and ordering that water in



volume not be applied to the fire. More or less the same procedure was followed in the casualty involving the SS OCEAN LIBERTY at Brest, France.

(4) **SUITABILITY OF EQUIPMENT AND FACILITY**—Equipment used in transportation and facilities used in handling and storage should be suitable for the purpose.

Railroad equipment, and the ship which is used for transportation of dangerous cargo should be of proper design and maintained in such condition as to afford safety in this transportation.

(5) **SKILLED SUPERVISING PERSONNEL**—The carrier should supervise the handling, storage, and stowage of the dangerous articles while in his custody.

Managers, foremen, stevedores, freight booking agents, and ships' officers should possess complete information about the hazard associated with the cargo they are carrying, thus qualifying them to supervise the handling, storage, stowage, and transportation of the material.

(6) **PORT FACILITIES**—Port facilities should be of a design and be maintained to fit the needs of the activities being conducted.

This goes beyond the mere design of the facility. With the exception of certain port facilities for handling oil and others for handling coal, grain, ore and like bulk commodities, vessels using run of the port facilities often find themselves in locations which compound the normal hazard. Several ports in this country have been laid out, apparently without too much regard for safety in operation. Water areas are small, piers and wharves are built so close there is no extra room for maneuvering vessels. The same facilities that are used for general cargo are also used for transfer of flammable liquid cargoes in bulk, residential areas are close up to the working areas of the port, towing vessels are not present or immediately available, manufacturing plants are also operating in the immediate vicinity of the piers, proper fire-prevention plans, fire-alarm systems, and fire-extinguishing equipment with trained personnel are lacking, thus creating an excessive hazard. One such port is alert to this hazard, and in all fairness it must be stated, it is doing its best to counteract the danger inherent in its operation.

By bitter experience residents of cities in this country have learned to protect their investments and their comfort by the adoption of zoning ordinances. Admitting the zoning ordinance is not a 100 per cent solution, it, nevertheless, does provide a vehicle to accomplish its ends. The development of the ports of this country has generally been a competitive matter. Many of the large ports began, a number of years ago, to correct this by instituting orderly procedures and plans, and in some instances this has entailed an expensive operation in overcoming the earlier mistakes and providing for orderly safe development in the future. There are other ports, however, that have never attempted any such self-policing, with the result that the simplest operation in these ports is fraught with danger. The cure in this instance lies with the state or municipal authority.

(5) **DISASTER PLAN**—The local authority in each port should prepare a disaster plan which could be put into effect in an emergency, thus preventing excess damage and needless loss of life when an emergency arises.

(6) **TRANSPORTATION OF DANGEROUS ARTICLES**—Some local authorities have a cure which will prevent any casualty occurring in their ports. This cure is simple. They are prohibiting the transportation of any dangerous article through ports within their jurisdiction.

This is an effective cure but it is not an intelligent approach to the problem. There are more than 1,000 named articles of a dangerous nature moving in commerce every day. These articles are required for the preservation of life, for protecting the health of the people, for preservation of foodstuffs, and for other creature comforts, not to mention articles needed for the security of the country. The economy of this country is intimately bound up with the availability of many of the so-called dangerous substances. The proper approach to this problem is to find ways and means of expediting this transportation, surrounding such transportation by safeguards which if observed will insure that no casualty occurs. A cooperative approach to this problem on the part of industry, carriers, port authorities, vessel owners, and state and federal governments can accomplish this end. However, the approach must

be cooperative, honest, and the enforcement real.

(7) **EDUCATING PERSONNEL**—All personnel likely to be involved in the handling or transportation of dangerous articles should be educated to the hazards associated with this transportation, and also to the proper action to be taken in an emergency.

One of the deficiencies existing at present is the fact that while much information is available with reference to inherent hazard, it is not always available in such form that the persons concerned are cognizant of it. An agency charged with the duty of correlating all correct pertinent information with reference to the hazard involved, and by liaison contact making this information available, in advance, to persons likely to need such information, would eliminate the situation of lack of knowledge of rule or correct procedure. Perhaps the first reaction is this should be a government function, but let us stop and consider whether industry and carriers alike could not provide a better medium for such a purpose.

The progress made in "safety-first work" for personnel received its greatest impetus when industry decided to put its own house in order. Perhaps that would be the best approach to this problem. Without such a program it is a certainty that casualties such as that at Texas City and other outside of my particular field will continue to occur, and when they do occur, we are very liable to find ourselves operating under legislation or regulations promulgated under the stress of emotion. This is not a good approach to a solution of the problem.

(8) **A FINAL CAUTION**—Casualties such as that occurring at Texas City are shocking to the sympathies of the American people. Newspapers are prone to devote considerable attention with exaggerated descriptions, eye witness stories, and opinions not always founded on facts. This is not said with any critical intent. It is a normal, natural reaction, and certainly the newspapers cannot stop to evaluate the accuracy, especially of statements made by persons supposedly having a knowledge of the subject. In this connection I am reminded of an editorial appearing in "Chemical Engineering" in May 1947, which, after

expressing sympathy for the people of Texas City, goes on to say:

"Our sympathies in much lesser measure, also go out to those oracles from Atlantic City and elsewhere who over-night became experts on the explosibility of ammonium nitrate. Over the radio and in the syndicated columns came many weird announcements. Sadly, we were reminded of our own rather immature outgivings of more than 25 years ago when following the great Oppau explosion in September 1921, we penned an editorial entitled "Facts and Fancies About Ammonium Nitrate." We think we learned a lesson. Certainly the resulting series of conferences with federal and state officials, insurance inspectors and explosives manufacturers taught us that solid facts are better than fleeting fancies as a foundation for editorial comment."

It was heartening to read this under the stress of similar experience following Texas City. However, the misinformation about ammonium nitrate fertilizer, and circumstances of these explosions that have been published are regretted.

The Commandant of the Coast Guard recommended to the Secretary of the Treasury that in view of the known facts, up to that time ascertained, it appeared that further technical research was necessary with reference to ascertaining all of the hazard in connection with the transportation of ammonium nitrate fertilizer. The Secretary of the Treasury concurred with the recommendation and invited certain agencies to designate representatives to such a committee. Acceptances were received from the Departments of Treasury, War, Navy, Interior, Agriculture, and Commerce, the Interstate Commerce Commission, the Maritime Commission, and the Bureau of Explosives of the Association of American Railroads. The State Department also named an observer inasmuch as this department has a collateral interest in the shipment of ammonium nitrate fertilizer for the relief of devastated countries. This committee has been meeting in frequent sessions since July 7, 1947 and has published Part I of its report which deals principally with the transportation of this product on board vessels. Parts II and III of its report will be published shortly. Part II encompasses land transportation and storage. Part III will contain

results of physical and chemical tests of ammonium nitrate fertilizer, with comparative tests of commercial ammonium nitrate. It is the committee's objective to provide factual

information in connection with this substance and make recommendations to increase its safety in manufacture, packaging, land transportation, handling, storage, and use.

## Lessons Learned From the Texas City Disaster

### II. Chemical Plant Phases

By J. J. HOFFMAN

Safety Director, Monsanto Chemical Company

Being a safety engineer I believe that I can foresee the things you would like discussed and the information that you would like to take back to your plants. I am sure that since the Texas City disaster you have asked yourself, as we have:

What could have been done to prevent the blast?

What could have been done to lessen the terrific destruction of such a blast and the resulting fires and chaos?

Could the plant buildings have been designed differently or located in a different pattern?

Could the installation of sprinkler systems and foam systems have been designed more efficiently?

Was the fire fighting apparatus efficient; and if not, what additional equipment was needed?

Was there an adequate supply of emergency equipment—gas masks, fire blankets, asbestos suits, gloves, etc?

Were the fire and emergency crews adequate and were they efficiently trained?

How do people react in the face of such a catastrophe?

What rescue and recovery procedures were set up after the blast, and how did they function?

How about a permanent disaster organization?

These and many other questions of like nature had to be answered as we progressed with the reconstruction of our Texas City Plant. Let us take them one at a time and discuss them in the light of the knowledge we gained at Texas City. The question of "What could have been done to prevent the blast" will be discussed by Mr. Butler of the Coast Guard so I'll not attempt to go into

this but will rather confine myself to the Monsanto phase of the situation.

First "Could the buildings have been designed more efficiently or located in a different pattern so that the destruction would have been reduced or eliminated?"

In every area of the country engineering principles are applied so as to control existing local exposures. In some areas earthquakes have to be considered—in other areas, cyclones or tornados. At Texas City the plant was designed to withstand the force of hurricanes. In 1943 it went through a hurricane during which the wind velocity reached some 136 miles per hour. Under this terrific force the plant did not suffer in the slightest, the only damage being a paint loss due to the abrasive action of the wind and sand on the exposed steel work. So change of design does not seem to have been indicated; the buildings and equipment withstood the forces for which they were designed.

Locating the buildings in a different pattern would not have helped the situation. There was no area of the plant that was free from the destructive force of the blast.

Second "Could the sprinkler and foam systems have been improved upon? Bear in mind that this plant was built in 1942-43 and that the most modern, efficient systems available were installed. Whether or not they would have functioned in accordance with their specifications is not known. They had no chance to operate. All service lines and power were immediately cut off by the blast, and the systems themselves blown apart.

"Was the fire fighting apparatus adequate?"

Again the equipment at this plant was of the most modern design; and we feel that it was entirely adequate, as it had functioned successfully in the past. The apparatus had no opportunity to prove its usefulness be-

cause it was blown apart and rendered completely inoperative.

By the same token supplies of emergency equipment, gas masks, fire blankets, asbestos suits, gloves, etc. were destroyed and buried or rendered useless by the initial force of the blast.

"Were the fire crews and emergency crews adequate? Were they efficiently trained?"

In our opinion the fire and emergency crews at this plant were the finest in the country. They had absolutely no chance to prove their worth for the most part, because practically all of them were either killed or so severely injured that they could not function after the initial blast.

So much for the situation as it appeared before and immediately after the blast. Nothing either of a mechanical or of a human nature had an opportunity to function in a normal way; and, accordingly, we are unable to place our finger on much that can be changed or corrected in the light of the experience we gained at that time.

"How do people act in the face of such a catastrophe?"

From my observation the morning following the blast I can truthfully say that I have never seen such heroic self-sacrifice on the part of people. Everyone was anxious to do something to help—in many cases those who wanted to help were suffering from severe injuries and needed help themselves. Nevertheless they spent long hours helping people who were less fortunate than themselves. Briefly the situation seemed to be that no matter which way a person looked it was not hard to find someone who needed help and in a great many cases needed it worse than they themselves did. During the time that I spent at Texas City I saw literally no cases of hysteria. Excitement, yes, but after the first day there was a unified singleness of purpose that was wonderful to see and be a part of.

"What rescue and recovery procedures were set up and how did they function?"

Immediately after the blast the area began to be patrolled by the Department of Public Safety of the State of Texas. This organization permitted no one but authorized persons to enter the area. Crews of voluntary workers searched the area for the bodies of

those who were killed or injured. In our own plant voluntary crews made up of men who worked for Monsanto and outside volunteers under the guidance of Monsanto men searched our plant. As the bodies of victims were located identification was placed on them and they were sent to the morgue for embalming and identification. In so far as the function of these search crews was concerned they did a marvelous job, literally moving the plant by hand, almost brick by brick.

In so far as the identification of personnel was concerned, the Bureau of Identification of the Department of Public Safety of Texas did a marvelous job. The men who staffed this identification bureau were thoroughly familiar with what they were trying to do and left no avenues unopened in their efforts to identify everybody located in the disaster area.

Since the disaster the question has been asked of us a number of times, "What do you propose to do about the establishment of a permanent disaster organization?"

We have given this question a great deal of consideration and are of the opinion that the establishment of such an organization is important. However, in the organization of such a function a number of things have to be taken into consideration. The first and most important of which is the question—who shall staff the permanent disaster group? In attempting to answer this I wish to state that in my opinion the exclusive use of local plant personnel is not good policy. Under disaster conditions there is every possibility that your disaster group will be completely torn apart. The organization's leaders and its members may very likely be rendered inoperative.

For this reason I believe that an emergency organization should be set up on a company-wide basis. In other words I mean that individuals from various plants should be selected and given authority to proceed immediately to the scene of a disaster. Primarily these men should be selected for the qualities they have which are useful in such conditions. Beyond all other qualifications they should be the type of individual who works best without immediate direction and is capable of making his own decisions rapidly and following through on them.

## THURSDAY AFTERNOON SESSION

October 9, 1947

Presiding: CAPT. ROY L. RANEY, Asst. Chief, Office of Merchant Marine Safety, U. S. Coast Guard.

## Lead and Acid Problems in the Storage Battery Industry

By J. E. MATFIELD

Works Manager, Cleveland Plant, Willard Storage Battery Co.

Battery manufacturers employ a variety of processes and production equipment in making their end product, and obviously this influences the particular means each uses in establishing safe working conditions. It is not my purpose today to go into all these variations. Rather, I want to discuss with you some of the important safety and health problems that confront the battery industry.

In the lead-acid storage battery industry, there are at least three basic chemicals which are always used, namely, lead and various oxides of lead, sulphuric acid of varying concentrations, and sodium hydroxide, more commonly called caustic soda. Lead and its oxides are heavy materials. The handling of such weights becomes quite a safety problem in itself.

The finished battery will usually weigh from 40 to 50 lbs. or more, depending upon the size, with some larger types weighing from 100 to 2,000 lbs. The handling of a product of this weight immediately associates itself with sprained wrists, back strains, finger injuries, hernias and foot injuries. To avoid such injuries, manual handling should be avoided.

Table tops may be greased so that the worker can slide the batteries into position, and conveyors may be installed to carry the assembled parts and completed batteries through the various departments to their final destination, the shipping department. One fundamental rule to prevent injuries is to avoid lifting a battery. Slide it, convey it, or use mechanical equipment to move it. If at all possible, don't manually pick it up.

Conveyor tops should be level with dollies or pallet tops so that sliding and not lifting is necessary or possible. Whether it be a finished battery or a pig of lead, our experience shows that back strains and other accidents of this nature are much more frequent when an object is picked up manually than

when a means of sliding or conveying it is provided.

The handling of pig lead from the box car to stock and then to the casting departments involves the same hazards and, in general, can be avoided if mechanical equipment is available to do the work. The use of fork lift trucks to convey the lead pigs on pallets, dollies or as stacked pigs from one place to another is recommended. Pig lead should be stacked in piles with the end pig in each row laid flat on its top to avoid being tipped over.

There is still work to be done in making the handling of pig lead safer. The shape of the pig does not lend itself to safe piling or safe handling. Although the initial cost for moulds would be high, lead could be cast in thick, square sheets with several alternate bars and indentations. This would enable the piler to lock the pieces into each other and make for safer piling and handling.

Another source of danger is the feeding of lead into the melting kettles. To insure safety, the lead should be dry and an inclined plane used to feed the pig into the kettle so that the operator can stand back at a safe distance. Metal foot guards should always be used by men manually handling pig lead.

The handling of drums of oxide, generally weighing from 400 up to 1,000 lbs., presents similar problems. Elevating trucks and conveyors should be used as much as possible to transport the drums, and mechanical dumpers should be designed and installed to eliminate as far as possible the manual handling of this very heavy material.

Another important phase in the handling of lead which I believe properly belongs in a safety category, is the problem of the health of a worker who continually handles oxides of lead. It is well known that under certain conditions the human body will absorb sufficient quantities of lead, primarily through the respiratory tract, to cause the individual

worker to become sick. The control of these conditions, therefore, is of paramount importance. The U. S. Public Health Service in its various publications, has stated that 1.5 milligrams of lead per 10 cubic meters of air is the maximum amount of lead that a worker can breathe over prolonged periods of time and avoid harmful absorption of lead into the body. It is important to remember that quite definite limits of safe exposure have been established.

There are two ways in which any plant can proceed when it is known that certain concentrations of lead dust exist which may possibly injure a man's health if he continues to work in the area. One method is to attempt to cover up the problem by not admitting that the industry has a health problem and hence continue as best one can in treating the lead absorption cases as though they were other ailments. The other approach, which I believe is preferable by far, is to admit that there is a health problem that must be dealt with, if the exposed workers are to continue to enjoy good health.

At the time a worker is employed, I believe it is the best policy to tell him frankly that he is gaining employment in a factory where a health problem exists and to seek his cooperation in abiding by the rules and regulations that have been established to control lead absorption by the workers within the plant. Throughout the plant it is well to continue to impress upon the workers by means such as posters that at all times when they are handling lead oxides, they must be careful and not do anything which will raise the lead oxide dust into the air where it can be breathed and absorbed into the body.

It is well to remember that if a competent medical man makes a frequent, periodic check of a lead worker's physical condition, he can usually detect, quite early, any signs of absorption of lead within the body. If the case is detected before the absorption has been too great, steps may be taken which will restore the worker to good health and in no way interfere with his normal work activity.

The fundamental problem is to prevent lead dust from getting into the air. To meet this, engineers are needed to design, install, and continue searching for better methods of keeping the dust out of the air.

For example, where lead dust collects or is dropped on the floor, a grill floor with fresh flowing water underneath to catch the lead

dust oftentimes is very effective. Of course, the structure of this grill floor and its supports must be such that it will safely carry the heavy weight passing over it. On most working operations, a grill floor must be supplemented with various exhaust systems by which lead dust is withdrawn in such a manner that a worker will not be exposed to the dust he or adjacent workers have made.

There are many arguments among engineers as to whether the exhaust should be up-draft or down-draft. I do not believe it is possible to say that one or the other is best for all cases. For some operations a combination of both up and down draft may be best.

Another important part of the program of preventing workers from absorbing lead dust is the use of some method for determining the amount of lead dust in the air. There are several methods available, including the electrostatic collector, the impinger, and the slide count. In my opinion, the only way the amount of dust in the air can be definitely known is to make routine checks by one or more of the above mentioned methods. Oftentimes, from visual appearance one would be certain there could be no appreciable quantity of lead dust in the air, but this should not be the sole test. I have personally been fooled so many times by a visual inspection and what later test results showed of a given area of operation that I have lost faith in my former belief that anyone can visually tell whether there is an appreciable amount of lead dust in the atmosphere.

In the last 15 years I have seen battery operations in a large number of plants, and I have found the conditions varying between extremes of almost no protection from lead dust for the worker to protection as complete as it seems possible to imagine. I would like particularly to stress with those representatives of the lead-consuming industries who may be in the audience that the health problem of your workers needs every bit of support you can possibly give it. Additional safety precautions beyond those used on a given working operation are also needed. These safety precautions to prevent lead absorption should include good rest rooms and clean lunch room facilities, as well as a means for workers to bathe themselves before leaving the premises. Many states have health codes which cover their particular area, but these codes within themselves vary so widely that

it is well for you to look at your own code, so that your state's minimum code requirements are met, and then go as much further as is possible in the controlling of lead dust within your plant.

The handling of sulphuric acid within a battery plant is a particular safety problem which in many respects is common to many chemical industries. If one uses acid in sufficient quantities to permit the purchase of such acid in tank car loads, then it immediately becomes necessary that pumping and distribution facilities be set up to distribute that acid to the various places within the plant.

Pumping equipment and acid storage tanks, as well as distribution lines must be kept in the best possible mechanical condition at all times. Acid tanks should be high enough from the floor to prevent anyone falling in. If this is not possible, the tanks should be equipped with good guard rails. Various mechanical and air mixing devices have been used to mix acid. These are all good, in that handling acid by hand is eliminated.

Many times it is not possible to use a carboy of acid, so it is purchased in carboys, which usually contain from 10 to 15 gallons of acid, and which present other problems. There is always danger of splashes in pouring acid from a carboy. Carboy inclinators are frequently used and offer many safety advantages. Compressed air is also used for the emptying of carboys or tanks of acid, and this, too, has many advantages although it would limit the use of acid to places where compressed air was available.

In our large battery plant at Cleveland, acid is handled by means of pumps and acid supply lines, so many of the problems of handling acid present in smaller plants are eliminated. The supply lines, however, do present many problems. Occasional leaks occur, and acid may drip on expensive mechanical equipment or on a worker who may be standing under the particular line. It is im-

portant, therefore, in the initial layout of a battery plant that supply lines be routed, preferably underground if a suitable tunnel is available, so that at no time will they pass over production areas. It is necessary to frequently check supply lines to see if they are in sound condition and good repair. Whether one is using lead, glass, or plastic pipes, periodic checks on the physical condition of these lines is certainly recommended.

Sodium hydroxide, more commonly called caustic soda, is used by practically all battery manufacturers who treat their own battery separators. It is necessary to treat the piece of wood to be used as a battery separator with caustic soda so that it will make satisfactory insulation material for use in a battery. Caustic soda may be obtained in tank cars as a concentrated liquid solution, or in drums either in the flake or solid form. The concentrated liquid is one of the most hazardous materials that the battery industry faces. A burn from caustic solution is usually more damaging than burns from sulphuric acid. A small splash of liquid caustic into the eye may easily result in loss of eyesight or permanent impairment of the vision. Those workers who must handle caustic should have definite requirements laid down by their superiors to the effect that protective goggles or face shields must always be used when handling or working around caustic soda. Strict compliance should be a known condition of continued employment. A 1 per cent solution of acetic acid should always be readily available to immediately neutralize the caustic soda if it comes in contact with any portion of the body.

I believe it is safer to handle liquid caustic when the proper pumping and pipe line distribution system is used. If it is necessary in certain instances to use the flake or solid caustic soda, added precautions must be taken so that chips or particles of the caustic soda do not get into the worker's clothing and hence expose a portion of his body to the direct action of the chemical.

### Prevention of Air Pollution

By WILLIAM R. BRADLEY

Industrial Hygienist, American Cyanamid Company

The assignment of this topic have requested that the field of smoke abatement be elim-

inated from this discussion. I would further limit the discussion to the problems pertain-

ing more exclusively to the chemical process field, for consideration of the Chemical Section of the 35th National Safety Congress.

When thinking of atmospheric pollution, the alarmist seeks to create the mental image of clouds of dust rolling through plant workrooms or pouring from chimneys and stacks to spread over the plant site and surrounding neighborhood. He would have us believe that at times certain invisible gases might suddenly come upon people to produce all manner of disturbances, even to serious illness or death. Then, too, he points to the visible gases, such as the oxides of nitrogen, discharging from vent stacks and to chemical fogs which may in undiluted state be carried by the wind to enter the environment of unsuspecting people.

An example of this misguided psychology occurs in a recent article which appeared in *Chemical and Engineering News*, issue of September 29, 1947, under the title, "Smoke, Dust, Fumes and Their Fellow Travelers." The author confesses the entire problem by such statements as this, "Fumes become especially troublesome in damp weather when they will descend on the surrounding territory and in some cases give the neighbors colds and respiratory distress."

I was not aware that the etiology of the common cold had been discovered.

Some unfortunate newspaper publicity has occurred and gives rise to complaints due to the presentation of half truths or the drawing of erroneous conclusions. Surely we can combat such misinformation and lower terminology by consolidating our research and study and accomplishments in solving our own problems, and making resultant information, through publications, available to all others who may have similar problems.

Inasmuch as contaminants do exist and some property damage has occurred, the trend of thinking in various civic bodies is to place rather exacting requirements upon industry for pollution control. Therefore, any alarmist propaganda based upon misinterpretation of unknown facts must be dispelled. We must seek, by the use of fact-finding techniques, that data which will give us an opportunity to make a true evaluation of each pollution problem. We must replace uncertainty with understanding in the public interpretation of air contaminants, their cause, their effect, and their control.

Some of our more pressing problems re-

quire a program of research in order to intelligently apply the tools of control that are available to us. This period of research is likewise necessary in order to find an economic approach to such a problem where any control of which we are yet aware would be prohibitive from the standpoint of cost, or where control may even be impossible.

The field of prevention, particularly in this narrow aspect of air pollution in the chemical industry, is an interrelated one calling for the combined efforts of those in plant safety, medical, industrial hygiene, engineering, production, process control, technical and research groups. Generally, industrial management appreciates its opportunity and is active in its obligation to employees and to the community in which they live.

Today more is being done in this country toward maintaining the health and well being of employees and toward maintaining a wholesome community environment by attacking air contaminant problems than in any other country in the world. Although we have only scratched the surface, we do lead the world in bringing technical information to bear toward control of these situations.

Perhaps we should not criticize ourselves as being too negligent in the past for, although we may have realized the existence of air pollution problems, in many instances we certainly did not know how to cope with them. Today, however, we are to the challenge of learning how to apply intelligent control measures. The maintenance of certain contaminants, from the viewpoint of health maintenance, is being called to our attention by publications in the field of industrial toxicology.

Air contaminants at a concentration where their existence becomes serious usually occur within buildings as a direct part of employee environment. The most successful control has been the application of mechanical exhaust ventilation locally at the point of origin. Ventilation hoods at kettle manholes, over charge hoppers, enclosing filters, and at dusty product handling stations are becoming a recognized part of the chemical production scene.

Air pollution outside buildings, about the plant site, or in neighboring communities is generally a nuisance problem. Most of us have been called upon to deal with neighborhood complaints, whether they concern the odors arising from plant effluent settling

basins or those odors from chemicals discharged at will into rivers and streams, or the gases and vapors that are said to steal over the community in the dead of night and awake people from their slumber. Complaints arise that acid mists and fogs and dusts produce damage to foliage and to livestock. Property damage varies from the rusting of screens and downspouts on the neighbor's house . . . to dust particles that settle on the laundry, hung out in the sun to dry.

We recognize this two-fold problem of atmospheric contamination in the chemical industry. Regardless of what industry presents an air pollution problem, it mainly is chemical in nature and therefore a chemical approach to the solution becomes important. We are not negligent in our responsibility. We are taking the initiative in bringing undesirable conditions to attention and in active programs for their elimination.

Although considerable accomplishment has resulted, we approach these problems with a humble attitude, for actually we know very little concerning the many phenomena which appear to be a part of our abatement problems. Certainly during the past few years we have only begun to apply intelligent, sound and economical solutions and, indeed, some problems have not been solved at all. They have only been somewhat abated. A small amount of major research on control phases has been supported by industry, and points the way to much needed further study.

Let us then approach the problem of control with this humble viewpoint and attempt to become aware of what our chemical contaminant problems really are and of what tools are available for their control. We will find that there is a great opportunity for individual initiative. Those who will be responsible for changing the industrial air contaminant scene of tomorrow are today's workers who have ideas. They will become tomorrow's heroes when we have an accounting of our accomplishments.

My one challenge is that we who are charged with responsibility for resolving air pollution problems make a concerted and immediate drive to apply now the little knowledge we have in solving the majority of our problems as best we can with the tools available.

Many of you already have remarkable accomplishments, but I think we all feel that it is only a beginning. In the first place, I

would suggest the establishment of a complete environmental survey program examining and listing every chemical process where there may be an existing or even potential opportunity of creating an air contaminant. Perhaps the first hint will come from the workmen themselves. Or the hazard may be uncovered by the safety department on their routine investigations. The industrial hygienist can be called upon to aid in uncovering possible sources of pollution and to provide factual information concerning their nature and concentration.

Medical departments can evaluate this data to show if the problem is of potential health significance, or whether it is strictly a nuisance one. The engineer is another member of this team to unite in the discussion and planning of intelligent control. Plant technical, production and research men, the process design engineer, supervisory personnel—all can give advice and assistance in this program. These problems are not in the province of any one group, for it appears that only by bringing these many fields of science together can intelligent progress be made.

Solving existing problems is only half the battle, for the control program likewise is two-fold. The second phase is one of prevention, where this entire group sits down together in a study of flow sheets and process design to make sure that, when installed, a proposed new process will not constitute an air pollution problem. I believe that with this correction and prevention program in action, some future grievance committee meetings may well become gatherings for harmonious progress, good will and mutual respect.

What then are some of our problems and why did they arise? Perhaps any one of us can point to an example in our own plants where a large vessel has been installed in which to conduct a chemical reaction and make a certain product. When the process was in the blueprint stage, the main concern may have been for maintaining elaborate temperature control to produce a quality product with considerable money spent for measuring and recording instruments. Little concern was given to the manner in which raw materials were to enter the vessel, or to what would happen to the reaction by-products. Possibly the only way to get some of the ingredients into the vessel was to shovel or pour them in through a manhole

at the top. This may have caused the operator to become covered with an irritant dust, he may have been subject to chemical spills, or to the inhalation of reaction vapors which poured out of the manhole and into the workroom.

It is only after the process has been in operation that those who established it come to realize that the mechanics of the operation have resulted in a contaminant problem. When the operator can no longer get close to the vessel even to read the temperature recording instruments, then there is a hurry-up call for the maintenance group to come in and put a ventline on the vessel.

If the reaction gases exceed the capacity of the ventline, a common practice is to install a steam jet to increase the exhaust. This apparently is done without consideration of what may happen. Perhaps the nature of the reaction gases is such that the steam produces a weak acid mist which then becomes an outdoor contaminant. The acid mist may contribute to a rusting problem—always expensive. It may unite with ammonia vapors from a nearby process to produce a nuisance fog, settling about the place site and carrying downward to a neighboring community. Finally, we come to realize that such gases need scrubbing and absorption, but considerable money has been spent and considerable discomfort experienced over a situation that could have been controlled at the blueprint stage by a committee representing the above-mentioned groups united together in a program of air pollution prevention.

What are the tools now available to us in the solution of air pollution problems? Nitric, sulfuric, hydrochloric and other acid mists, acid gases, and ammonia mists and gases are being scrubbed or absorbed in towers of various design where the efficiency of scrubbing depends on the ability to make contact with the offending agent. But a few scrubbing towers where a thin trickle of water cannot hope to make contact with all the gas and vapor that pass through serve in name only. We are learning to improve scrubbing tower designs and to locate them outside buildings to avoid leaks within workplace areas.

In the July 1947 issue of *Industrial and Engineering Chemistry*, there is reported a research study of gas absorption and humidification using a cyclone design spray tower. This excellent study by Johnstone and Silcox

of the University of Illinois was done on sulfur dioxide using tangential gas flow and multiple spray nozzle treatment. In such studies as these, performance becomes a matter of factual data rather than a trial and error proposition.

Volatile organic vapors frequently can be passed through condensation equipment for salvage rather than be discharged through ventlines in undiluted form. In some instances, wet gases can be reacted with an available chemical to form a salvageable and usable product.

Equipment manufacturers likewise are making studies of performance characteristics on their designs in the field of dust collection, wet washing and scrubbing gases, mists and vapors. The research departments of the American Blower Corporation in Detroit, Michigan, the American Air Filter Company in Louisville, Kentucky, and other companies are making reliable efficiency tests on their collectors, using samples of various dusts submitted by customers and potential customers. These studies, of course, assist in collector design perfection.

A new unit dust collector, soon to be announced as commercially available is reported to trap particles as small as five microns in diameter. A study made by the New York State Department of Labor, Division of Industrial Hygiene, showed the comparative performance for specific dusts using the equipment of various manufacturers. These studies are useful in guiding us to better solutions of our problems. If 90 per cent of the problem can be solved by installing the best available equipment in light of our present knowledge, it would seem advantageous to do that much as quickly as possible, and then devote our efforts to the perfection of techniques.

One odor problem of nuisance value that gave rise to complaints occurred from the anticipated burning of process wastes. This problem is now being solved by putting these and other wastes into a water slurry and entering them into a spray dryer. It is done at considerable cost, yet it is entirely worth while, for it solves the former disposal problem and provides a salvageable by-product. Spray drying equipment is a useful production tool, and there appears no reason why the same theory cannot be successfully applied to certain other pollution problems.

I recall one plant where spray towers were



set up to handle an irritant gas as well as an irritant solid in finely divided form. The spray tower could not cope with the large volume of contaminant, and a fan mounted on the top of the tower forcibly ejected these substances into the plant atmosphere. A change in the method of condensing before these materials entered the tower reduced the magnitude of the problem to a point where efficient scrubbing proved successful. This is but another instance where a process change resulted in greater recovery of the product.

Some one has said that progress is made when principles in one field are applied to problems in another. We are aware of the advance made in fighting certain types of fire using a fog nozzle instead of a spray nozzle or a solid stream of water. One plant had a wet scrubbing problem involving particulate matter and an acid mist. There was also a salvage problem of economic import, in addition to an existing neighborhood nuisance. They simply obtained some fog nozzles and installed them in their tower in replacement of spray nozzles. Whereas formerly visible mists escaped the tower, there now resulted a successful capture of the offending agent.

The use of high stacks emitting high temperature gases has done away with an objectionable concentration of sulfur dioxide at some smelters. A report made at the Industrial Hygiene Foundation meeting in November 1944 discussed the construction of a 600-foot stack. Sulfur dioxide measurements for several miles around showed this control to be successful. At this height prevailing winds gave satisfactory dilution. When SO<sub>2</sub> gas was discharged at lower levels, it fell to the ground to attack vegetation, sometimes several miles from the plants.

In the control of dusts, a number of tools are available for our use. Bag collectors have their application, and so do the cyclones or air separators. These may be followed by wet collectors to trap particles that passed the dry collectors. If irritant or nuisance materials still pass the wet scrubber, then there is available the electrostatic precipitation principle which is effective against particles even below one micron in diameter. Each tool at our disposal therefore is effective against a certain range of particle sizes.

One of the newest tools which is available to the field of air pollution prevention is contributed by the physicists. This tool is

known as ultrasonics where air vibrations produced by a turbine are at such a magnitude that agglomeration of dust or mist particles, particularly aerosols, becomes possible. It is reported that the frequency of vibration is somewhat selective for a specific problem, and high efficiency agglomeration is reported to occur with particles in a lower micron range. Agglomeration makes large particles out of small ones and, when this has been accomplished, the resultant particle has been built up to a size, between 50 and 90 microns, that can be successfully captured in a cyclone. The air turbine producing high intensity sound can be mounted at the top of a chamber into which the contaminant is introduced. Agglomeration occurs as the contaminant rises to the top to pass into cyclone collectors. The projected uses for this tool are thrilling to contemplate, and of particular interest are the reports of its low cost.

Experience to date appears to indicate that a minimum dust loading of one grain per cubic foot is necessary. Also that the collection efficiency of an ultrasonic unit increases with decreasing particle size. Applications are contemplated for the hard-to-capture dusts and fumes, and for other heretofore unsolved problems.

Vapors escape from packing glands on pumps or on agitator shafts. The newer developments in packing materials, such as "Teflon", have proved successful against many solvents.

A typical chemical process is pan drying. This may present a vapor problem if the wet cake contains solvents or a dust problem within the plant when dryer trays are dumped. For these reasons, various types of tray loading and dumping stations are on the engineers' drawing boards, and some are actually in use.

We are competing today for recognition as providing safe and healthful workplace environments in and about our various plants and plant communities. While many air contaminant problems are at hand to challenge us, we find a number of tools now available for our use and newer ones forthcoming; there only remains for us to do now what we are capable of doing and what obviously needs to be done in the prevention of air pollution.

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# Transactions

## 35TH NATIONAL SAFETY CONGRESS



VOLUME VIII

COAL MINING SECTION

NATIONAL SAFETY COUNCIL, INC.  
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## Foreword

**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

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#### Local Mining Section

#### MONDAY AFTERNOON SESSION

October 6, 1947

General Chairman: JOHN T. RYAN, JR., Mine Safety Appliance Co.

#### Instructing and Training New Employees in Safety

By WALTER H. STEEN

Manager, Industrial Relations  
United States Coal and Coke Company

The coal industry has, during the past twenty-five years, undergone a revolutionary metamorphosis in that we have passed from an era in which almost every operation incident to the mining of coal was performed by hand into the machine age of the coal industry. We are now approaching a relatively high degree of mechanization and have every reason to anticipate a continued increase in the intensity of that process. The tempo of coal production must continue to increase if we are to stay in the competitive market, and yet we all are ready to agree that this very desirable situation cannot be realized unless it can be accomplished with increased safety to both men and equipment. To assist us in increasing worker efficiency the manufacturing companies and their employers have developed machines, the ingenuity of which is scarcely short of startling. We in the industry have insisted that these machines be made as safe as humanly possible, but appear to have forgotten that mass production and the substitution of mechanical devices for manual labor make it all the more imperative that our employees understand and apply the operating rules and principles that are in keeping with the safe operation of the equipment.

There is, I am sure, in the minds of some of us the question: "What is the answer to the problem?" Certainly one in my position cannot be expected to have a panacea or cure-all, but in looking for assistance in that connection we might do well to first examine what has been done in the past. We cannot begin this examination without recognizing that with the advent of mechanical mining we did intensify our supervision but there still remains varying periods on every shift when every employee is required to continue at work without his regularly accepted supervisor's presence. In the past, we have used posters and advertising of almost every kind,

bonus or material payment for safe operation, established safety rules or operating standards which in some cases represent the collective thinking of large numbers of very able operating and engineering personnel after having studied thousands of accidents. Our legislatures have passed various and sundry laws among which is a law in more than one state requiring a miner's "certificate of competency" as a prerequisite to employment. In the absence of such a certificate, the applicant is required to work a given period under the tutelage of an experienced miner. To the foregoing can be added other efforts too numerous to mention but the sum total adds up to a job that has not been too satisfactory. One very definite reason that the job has not been wholly sufficient is because all too often the safety training of the new employee has been limited to a little speech on safety on the day of induction by a representative of the personnel or safety departments, and consists of an explanation of the company's safety program and the providing of a book of safety rules. Such an approach is without question inadequate in that it puts the safe practice performance up to the employee, expecting him to be capable of finding the hazards after he has read the rule book and then be able to recognize what would constitute safe and unsafe practice. We must recognize then that the training of a new employee is a process that may take a few weeks, a few months or even years, depending, of course, upon the ability and nature of the employee and the person or persons giving the training. That the induction conference on safety can be made of value we will not labor, in fact, every effort should be expended to take full advantage of this opportunity when the new employee is in a receptive mood to forcibly impress upon him that his employer is interested only in safe work and safe workers. Still the induction

safety conference is and must be only the very beginning, and, more important, so recognized by all concerned. It would seem then that our past practices, while they have been of material assistance, have not produced that high degree of safety efficiency that we so fervently desire.

It has been suggested that we install a training department so that upon receipt of a personnel requisition we will be in a position to supply the finished product immediately. Such a procedure is fraught with disadvantages too numerous to warrant discussion here so that the question as to who will give this vitally necessary training seems to be entirely in order. This person is the first line supervisor—the foreman. He is in closer, more frequent contact with the worker than any other person in the organization.

It follows then that if the foreman directs the work of others, he should direct the safe work of others so that the safety training of his new employees is one of his prime responsibilities. If that statement be factual, and I see no way whereby it can effectively be refuted, then it becomes incumbent on the higher echelons of management to provide the foreman with the tools necessary to the satisfactory fulfillment of his obligations.

To restate, we must assist him to become a better instructor in the future than he has been in the past. It has been said that instructors and trainers are born and not made, but that is fallacious thinking, for although some persons seem to have more natural ability in that connection than do others, it is a skill in which proficiency can be increased through study, understanding and practice. The best instructor is not necessarily the one with the most education nor the most experience, for it is quite common to find persons with an imposing command of knowledge regarding a particular field and yet not have developed ability to transmit such information to others. All teaching can be improved with proper guidance and understanding. It appears then that organized effort in assisting our foremen to become better instructors is our first logical step in solving a most perplexing problem. This assistance to our foremen and their subsequent training of new employees in safety is not a matter of choice. All employees, supervisory or otherwise, receive training every day. Some are trained by exposure in which they absorb a few safe and several unsafe work habits. Others are trained by direction in which

only safe work practices are demonstrated. The coal industry can ill afford not to train its new employees by direction.

In industry we have established production control, cost control, and ways and means whereby we control almost every phase of the operation. It behooves us now to give some thought to "training control," which simply means that training will be recognized by management as an integral part of the overall production picture and will be given its rightful place in industry. Then appropriations would be made, competent personnel would be employed, conferences would be held in which reports would be made, schedules would be established, plans would be made and discussed by all concerned. Much has been said and probably more has been written about job-instruction or training. It is a process requiring no secret formulae or patent rights. Its one requirement is that it be acquired and used in a form most applicable to the particular need. It is a process that should be given the same general treatment that we give to any of our major problems that confront the coal industry.

Without appearing to be presumptuous, we are agreed that the safety training of new employees is a "must" on our coal mine agenda. Does it not seem logical then that we should begin with the best possible person to be trained? Is not the time propitious for us to begin thinking and doing research in the selection and placement of individuals in appropriate jobs? Certainly much needs to be done in the development of suitable tests of aptitude, achievement, and skill, the analysis of interview techniques and the utilization of job specifications but with all of the information that is available in other industries together with the experience of the armed forces during the recent war, we should be able to draw conclusions that would be of material assistance in this connection. Certainly our efforts would lack perfection but they would be another effort pointed toward that goal of production without accidents.

Any attempt to evaluate a training program would find us dealing with some intangibles and it would be indeed difficult to measure in dollars and cents its true value. We would not have any unusual difficulty in tabulating the fewer accidents with the attendant lame and blind and the fewer white crosses in our cemeteries whose correct epi-

graph would be: "He didn't know." Certainly it is our most fervent desire to remove these off-color brush marks from the industrial picture, and while our aim is motivated by humanitarian considerations, we are mindful

of the attendant increased productivity, higher standard of living, and the happier, more healthful and more satisfied working force that can result from "Instructing and Training New Employees in Safety."

## Psychological Aspects of Accident Prevention

By H. J. SLOMAN

Coal Mine Inspection Division, U.S. Bureau of Mines

Industry, including coal mining, has come to the realization that to prevent accidents the human element must be given more consideration than was customary in the past. In formulating safety rules and regulations and in the enactment of laws governing mining, enforcement too often is emphasized rather than the means of gaining willing compliance. The purpose of this paper is to focus attention upon the human side of accident prevention, and the approach to this important and much-discussed subject will deviate somewhat from the usual discussions. An attempt will be made to give, in simple language with commonplace illustrations, the psychological aspects of accident prevention.

Psychology was originally the study of the human soul, an abstract subject; later, it became a study of the human mind and finally a study of human consciousness and behavior. Psychology is considered to be a branch of biology, in that it deals with mental processes largely affected by biological influences; it is the study of human nature—why people think and act the way they do, to use a slang expression—"what makes people tick."

Psychology, as has been noted, includes a knowledge of the phenomenon of consciousness. Consciousness may be defined as a mental awareness to a situation (stimulus). Carrying this to the field of safety and accident prevention the term "safety consciousness" is used to denote an awareness to danger and a desire to do something about it.

The highest degree of safety consciousness will be developed when a situation will bring forth the proper response promptly with little or no mental or physical effort, and without variation.

Examples of safety consciousness and the proper response to the stimulus for coal-mine situations are as follows:

1. A motorman leaves his locomotive cab

to replenish the sand supply or for any other reason. He turns his controller handle to the off position, places the reversing lever in neutral position, sets the brakes securely, and removes the pole from the trolley wire.

2. A miner upon arrival at his working place at the beginning of the shift looks for the fire boss' mark, tests the roof, and sets safety posts or such other timber as necessary. He tests the roof frequently during the shift. When any other person visits his place, he steps whatever he is doing and tests the roof. When a mine car is brought to his place, he sets brakes or springs and otherwise blocks the car to prevent accidental movement.

3. A brakeman always attaches a trip light to the rear end of a trip. He does not jump off moving trips to run ahead to throw switches or open doors. He does not couple cars that are in motion, especially from the inside of a curve, and he always wears snug-fitting clothing.

The foregoing are examples of safety consciousness which, if developed to the highest degree, becomes a compelling force. The stimulus of each situation should bring forth the safe response to such an extent that it becomes as automatic as the bell caused Pavlov's dog to water at the mouth even though he saw no meat.

Human beings are creatures of habit, and once a habit is learned it is very difficult to overcome it. An old adage says "it's hard to teach an old dog new tricks"; it really means that habits are difficult to change. Many of us engage in quite harmless habits that are difficult to change. Most of us, upon rising in the morning, take a while to emerge from a sleepy condition, and the physical motions we go through become largely automatic with little thought and through the "force of habit." Each habit shows an almost automatic procedure that is followed day after day with-

out apparent thought. If, however, one attempts to vary the procedure, a relatively simple act may become difficult; hence a habit, even a simple one, usually is hard to break.

Bad habits, such as unsafe practices, are fully as difficult to change as the harmless habits mentioned. The difficulty in overcoming it, first, that the old bad habit must be "unlearned" and, second, that a new good habit must be learned to take the place of the old bad habit. Repair shops at some coal mines are notorious examples of poor housekeeping. A poorly maintained repair shop is one where, upon entering, a person is confronted with various machine parts, tools, nuts, bolts, washers, chains, etc., strewn about a dirty, oily floor and on work benches. Probably attention is drawn to a partly dismantled mining machine or locomotive from under which a mechanic emerges in coveralls so greasy or oil-soaked that if he came near a source of ignition he would become a human torch. Such shops usually have a grinding wheel without available goggles or an eye-shield. Other machines in the shop, such as a lathe, drill press, shear, and power hack saw, quite often are belt-driven from line-shafting without guards for the belts. Ask the mechanic to find a certain size nut, bolt, rivet, tap or die and then watch the procedure in finding what is wanted. In such a shop it is not only difficult to do good work, but the probability is that the repair work itself is done in a slipshod manner. Repairs are usually made as quickly as possible to return a machine to the mine. The whole atmosphere is not conducive to good workmanship. As to habits in attempting to get one of these shops cleaned up, the work will be put off as long as possible and even if the shop is cleaned and placed in an orderly condition, it will be very difficult to keep it so until a new habit is formed. The condition of some mine shops is not exaggerated in this example, and it has been found to be a very difficult task to convert bad to good housekeeping.

A safety-conscious mine organization does not permit the bad habit of poor housekeeping to develop partly because of the known difficulty of displacing the bad habit with a good habit. Poor housekeeping is bad practice and is very likely to result in shop accidents, but even worse than this are the commonly slipshod, makeshift repairs on machines sent into a mine from such a shop.

Makeshift repairs are false economy, as they often result in break-downs, loss of production, and accidents involving personal injuries; slipshod electrical repairs on underground machines have caused numerous mine explosions and fires. Such a shop as described should constitute an intolerable condition to one who is safety conscious; the response to such a stimulus (situation) would be to clean up immediately and restore order. The question of completing repairs could not enter into the mind of one so constituted until the shop was in a satisfactory condition; the thought of good workmanship could not be reconciled to a disarrayed, untidy shop.

A logical question is—how are good safety habits encouraged? It is a psychological fact that human beings develop habits to satisfy some urge or desire although the satisfaction thereof may at times be obscure. The person, himself, may not know the exact nature of satisfaction he derives from a habit, such as biting finger nails; nevertheless, some desire is satisfied.

To promote an accident-prevention program among mine employees, it is necessary to have such a program seem desirable to the employee. For example, if a foreman speaks of accident prevention because he wants the mine to have a good safety record, the response may be negative. Some of the employees may harbor a personal dislike for the foreman and feel that a good safety record would be a "leather in the cap" of the foreman; therefore, such employees may be indifferent to the safety program or openly hostile to it.

The most satisfactory method of promoting accident prevention is to personalize the program. Notwithstanding educational efforts in explaining the reasons for certain safety rules and regulations, it has been difficult in some instances to gain compliance. At a certain safety meeting, not connected with mining, a speaker described the difficulty his company was having in enforcing some safety rules during their wartime activities. This company engaged in greatly expanded shop work, and, due to the manpower shortage, was required to augment its working force with a great many female employees. A rule prohibiting "running" was not at all effective when the "whistle blew" at the end of a shift. A great many women were employed on the second floor of a shop; the time clock was at one end of the shop and, after "punching

the clock," there was a short passageway with two 45-degree turns leading to a stairway. At the end of each shift, there was a mad scramble to get out and, in the general pushing and confusion, some of the girls had been severely injured, particularly from falls on the stairway. Signs and cartoons depicting this dangerous situation, pleading, and exhorting the workers snuffed virtually nothing to stop the practice. Finally, when all other efforts had failed, the bad situation was corrected by installing full-length mirrors at each 45-degree turn in the passageway. The person who arrived at this solution was well aware that no woman could pass two full-length mirrors without at least pausing to survey herself.

Another example involving the fair sex was related concerning a large number of female employees in a machine shop. The company had purchased and offered to sell protective caps at cost to the employees. Very few of the girls would wear these caps, perhaps because they felt the caps did not enhance their particular types of beauty. Some very bad accidents had occurred, particularly in operating drill presses, in which some of the girls were virtually scalped. These bad accidents were given wide publicity by photographs, safety talks to groups and individuals by the safety director and plant nurse, and bulletins and cartoons were posted in conspicuous places, all to no avail. The hair-entangling accidents continued without abatement. Something had to be done so the safety director entered into justifiable collusion with the plant nurse in which the latter initiated a "whispering campaign" intimating that the shop atmosphere contained certain unseen vapors quite deleterious to hair tints and permanent waves and that the protective caps in the company supply room were "just the thing" as safeguards against this contingency. Almost instantaneously the supply of protective caps was enhanced by the unprecedented demand not only from the shop workers but also by the female office employees in an adjoining building.

Incidentally it was intimated that subterfuge should be resorted to in the promotion of an accident-prevention program. However, under some circumstances, the end may justify the means when all other methods fail.

Human beings possess various means of appeal and all do not react uniformly to the same method of approach. The program must

satisfy a human desire or be presented in such a manner that it seems personally desirable. Each individual must be studied by his foreman who should select the proper means of "selling" an accident-prevention program. Persons are encouraged to follow safe work habits by such means as:

1. Fear of injury and the physical pain connected therewith.
2. Love of home and family and the desire to avoid hardship to loved ones.
3. Fear of loss of earning power and economic disaster accompanying injury.
4. Pride in accomplishment—the satisfaction of doing a job well.
5. Loyalty to his foreman and the knowledge that recognition in the form of promotion may result from being a safe worker. This may be termed the urge or desire for personal gain.
6. The spirit of contest—the workman's desire to see his mine outstanding in safety record. This is more often the official's desire or urge rather than the workman's.
7. Encouragement of suggestion—the workman is consulted as to his ideas on safety problems.

The foregoing are examples of how workmen may be appealed to in promoting a safety program. The best safety effort will not emerge from the paper stage unless the persons who must practice the principles are convinced that the program is good and desirable for them and that their adherence to the program is justifiable.

At some mines the accident-prevention program "gets off on the wrong foot" with new employees. A man is hired for a job in the mine and is given a physical examination, in many instances, to determine whether he will be a good physical risk for the company. The man knows that the physical examination is not primarily for his benefit. After the hiring routine is completed, the superintendent or mine foreman may ask the man if he is acquainted with the State mining law. The man will probably answer in the affirmative and the questioner, more often than not, will not make an effort to determine whether the man actually does know the law pertaining to his job. If the company has a published booklet of safety rules, the official may give a copy to the man with the admonition that he ought to read it. The man puts the booklet into his pocket and



that is often the last thought he gives to it. The foreman next proceeds with the man to the place where he is to work and, with a few perfunctory remarks, the workman is left to his own devices. Such procedure, which is not unusual, is not conducive to developing a safe, efficient workman.

The more acceptable method of developing a safe workman is for the official to explain the State mining law to the workman, at least so far as the law applies to his job. The company safety rules should be explained in a clear-cut, friendly manner and the reasons for such rules, meanwhile stressing the fact that such laws and rules are for the benefit of the man to a far greater extent than for the company. The official or some good, loyal workman should spend considerable time with the new workman at his working place, and the workman should not be left to his own devices until he has become familiar with his new surroundings. The workman may have had years of experience in his particular work, but there is a strangeness about every new job; the extra time spent with the new employee makes him feel that the company is interested in him. A person is interested usually in others who appear to have an interest in him. The psychologists call this "inflating his ego"; it may be called appealing to his vanity. Call it what you may, the extra time spent gives the new workman a feeling of importance, and he is more likely to be a safe, efficient workman with the procedure outlined.

A phase of human relations which many companies disregard is an interview at the termination of employment of a workman. This is often termed a severance or an exit interview. Such an interview should be conducted by a tactful individual, preferably one trained in personnel work and human relations. The purpose of the interview should be to determine, if possible, the true reasons why the man leaves the company's employ, and the questioning, if conducted on a friendly basis, may disclose many facts closely allied with accident prevention and efficient production. In general, the workman's supervisor is not the proper person to conduct the exit interview; many workmen leave a company with some real or imaginary grievance and, in many instances, bad feeling has developed between the foreman and the workman. It would be useless for the foreman to attempt the exit interview because in many

instances the workman would refuse to be interviewed. A trained personnel man would have to be alert for "colored testimony" in the interview because a disgruntled employee may tend to exaggerate or even make absolutely false statements. On the other hand, the foreman may be "sore" because the man is leaving the mine and his statements may not be strictly factual. It is, therefore, important that the interviewer investigate statements affecting the operation and safety of a mine before arriving at any conclusions. Some employers sever their connection with a company because of reasons such as accepting a better job, lack of opportunity for advancement, transportation difficulties to and from their homes, and other reasons which cause no resentment or ill feeling between them and the officials; many such employees are reemployed later. Exit interviews with employees who are severing their connections under favorable circumstances or at least "without nursing a grudge" are more likely to give satisfactory results than with employees who leave the company's employ under unfavorable circumstances. It is important to know, if possible, why a disgruntled employee has become dissatisfied and, if it is the employer's fault, the situation should be corrected to prevent recurrence.

The success of an accident-prevention program is dependent very largely upon the degree of cooperation obtained from the employees. The various safety rules and regulations should be explained to the employees. Repetition is usually necessary; it is utilized in virtually all educational processes. Remember how as a child you learned the multiplication table; it was continual drill and repetition. The reasons for safety rules should be explained to the employees as they are much more likely to cooperate if they know why they are asked to comply with the rules. Suggestions for improvement in accident-prevention methods should be solicited because it manifests to the employee that his opinion and judgment are valued; it is one means of giving recognition to his intelligence. Safety suggestions by employees should be instituted where they have practical value, and the suggestions adopted should bring some reward or tangible recognition to the employee. Such recognition should be publicized—"giving credit where credit is due" because cooperation in accident prevention is more likely to be gained if the employee is

encouraged to feel that he is of some importance to the organization. Without employee cooperation, any accident-prevention program is doomed to failure.

The foregoing discussion should illustrate that man is not a machine, and all men do not react uniformly to certain situations. From a psychological point of view man is a creature of habit and behavior, some of which is predictable and some unpredictable. Furthermore, man is a creature of emotions such

as jealousy, prejudice, hate, love, fear, and he has certain biological urges or desires which circumscribe his actions or behavior. The ultimate goal in accident prevention is to so condition a workman's thinking in an unsafe situation that he is subject to an irresistible force to correct the situation without delay. Above all, the workman must be convinced that an accident-prevention program is worthy of his support and that it will contribute to his life, liberty, and pursuit of happiness.

## Safety Plan of District 29, United Mine Workers of America

By C. E. JONES

United Mine Workers of America

Soon after the establishment of District 29, United Mine Workers of America, it became apparent to President George J. Titler that something must be done to lessen the accidents, both fatal and non-fatal, in the mines of the District. Between 1942 and 1945, we had 1277 fatal injuries in the coal mines in the State of West Virginia.

On July 1, 1945, Mr. Titler assigned me to make a study of the Federal mine inspection reports on the mines of District 29. This study revealed that a large majority of these mines were in a very bad condition so far as safety was concerned. (There were about 65 per cent of these mines that were not being fire-bombed.)

When we received the report of the West Virginia Department of Mines for the year of 1945, we learned that there had been 269 fatal accidents and 14,007 lost-time injuries for that year. During the first two weeks of 1946, we had 57 fatal accidents in the State of West Virginia.

On January 16, 1946, Mr. Titler established a Safety Department in District 29, and appointed C. E. Jones, Safety Director, whose duties were to organize a cooperative safety program for the entire district. Notices were sent out to all local unions and safety committeemen were appointed at each mine in District 29. (The 1941 agreement made provision for safety committeemen at each mine, but the qualifications as specified in the agreement were such that it was almost impossible to get qualified men to serve on the committee.)

Our objective in the beginning of this safety program was to build up a spirit of understanding and cooperation; first, between the safety committee and the mine management; second, to have the safety committee pass along this spirit to the members of the local union to the extent that all men working at each mine would feel that he had a part in the safety program.

The Safety Director received and studied the Federal inspection report on each mine, mailed a copy of the report to the chairman of the safety committee of his respective mine together with a letter calling the committee's attention to the most dangerous conditions contained in the report; instructing the committee to study the entire report and then discuss the conditions with the mine management and insist that the management take steps to remove the dangers as quickly as possible. It was not long until we began to receive the cooperation of the mine owners on this program.

The National Bituminous Wage Agreement between the United States Government and the United Mine Workers of America, signed by Secretary of the Interior, J. A. Krug, and President John L. Lewis of the United Mine Workers of America provided for a Federal Mine Safety Code issued by the Director of the United States Bureau of Mines. This Code became effective July 29, 1946. We were ready in District 29 to start operating our safety department according to the provisions of the Federal Mine Safety Code.

All safety committeemen were instructed to discuss the Federal inspection report on their respective mine with the mine management and insist that all violations be corrected as quickly as possible and in case of disagreement with the mine management to refer the matter to the Safety Director. I, as Safety Director, took the complaints of the safety committee up with the mine owners and was successful in getting the majority of them settled. Some I had to refer to the Coal Mines Administrator for adjustment.

Taking advantage of everything that would prevent accidents and further the efforts of the safety plan, and knowing that a miner trained in first-aid stood six times better chance of not being injured, we decided to add first-aid training to our safety program. I discussed this matter with the supervising engineer of the Bureau of Mines and the Chief of the West Virginia Dept. of Mines and was assured of their cooperation.

Meetings of the local union officers and committeemen were called in each of the four fields of District 29 and a first-aid training program was adopted. The plan was for each local union to select a number of its members to take first-aid instructors' training to be given by a representative of the Bureau of Mines and the West Virginia Dept. of Mines. After these men were qualified instructors, they would train the other members of the local union. This part of the safety program was started in October 1946 and is well under way at the present time. (There have been several hundred instructors trained and they in turn have trained several thousand miners.) The mine owners cooperated with us in this training by furnishing first-aid material and meeting places. This first-aid training program was established on a voluntary basis and a permanent foundation. The first-aid training program provides for first-aid contests between the local union groups each year.

At the beginning of the year of 1947, the volume of work became so large in the safety department that it became necessary to establish safety councils in each of the four fields in District 29. This was accomplished by calling meetings of the officers and committeemen of the local unions in each field and setting up a safety council by electing the officers from the delegates from all local unions. The officers of these councils consist

of a president, vice-president, secretary-treasurer and the following committees: Arrangement and Finance Committee; composed of a representative from each local union in the respective field; Publicity Committee; composed of six men elected in the council meeting; Entertainment Committee; composed of six men elected by the council; and a Special Safety Committee appointed by the President of the Council to work with a special committee appointed by the mine owners to make special plans and rules to reduce accidents. These safety councils have adopted a plan to give each member of each local union an opportunity to become a member of the Council by signing a pledge that he will work safely.

Knowing that our safety committeemen would be confronted with problems that would require some technical knowledge of coal mining, I made arrangements with the Bureau of Mines to provide a 30 hour course in accident prevention. This training was done by Federal Coal Mines Inspectors and consisted of training in the use of the flame safety lamp, the anemometer, and the provisions of the Federal Mine Safety Code.

We keep a file on all lost-time accidents that happen in the mines of District 29. We have a special form for our safety committee to report lost-time accidents on. If we have a fatal accident, our safety committeemen accompany the state inspectors in making the investigation and the accident is advertised by the committee among the men at the mine as much as possible to the extent that we may avoid a similar accident in the future. Some of our plans for the future are:

1. A permanent first-aid training program.
2. A first-aid team in each local union.
3. Closer compliance with the provisions of the Federal Mine Safety Code.
4. Discussion in local union meetings of accidents and their prevention.
5. Safety rules drawn up and agreed to by the mine management and the safety committees.
6. An agreed standard of face-timbering.
7. The essential elimination of contributing factors to accidents.

## Supervision as Applied to Safety

By JAMES H. FORGIE

Safety Engineer, American Rolling Mill Company

Accident prevention is primarily the responsibility of management, and since the supervisor represents management it is important that he has full knowledge of his company's policy regarding the preservation of life and limb. That policy must place safety in first position for consideration, and no person or expediency should be permitted to relegate it to a secondary or unimportant consideration.

There is no mystery about safety—accidents are caused—they do not just happen. It is not the mining of coal that injures and kills people, but rather how it is mined. If we as supervisors would but gear or adjust ourselves to conditions, accidents would be greatly reduced.

The statistics for the month of July in the State of West Virginia shows that 26 fatalities occurred in industry during that period. Twenty-one were charged to the mining industry. This is an indictment of all persons engaged in the mining of coal—management and employee alike. There is need for an aroused interest that will create a desire on the part of all of us to really face the facts and put an end to the unnecessary killing and crippling of coal miners. As any program must have the co-operation of the employees, the interest and support of the officials of the United Mine Workers is also needed in this work.

Management must take the lead in preventing accidents, and can best do this by an enunciation of policy. The American Rolling Mill Company has always followed this written policy: (1) Safety, (2) Quality and (3) Production.

As an indication of our intent and sincerity, I quote from an address made to a large group of Supervisors and Employees of our Middletown, Ohio plant by Mr. Calvia Verity, Executive Vice-President and General Manager of the company on the occasion of the presentation of the Iron man safety trophy to the group having the best safety record during the past year.

(a) "Accidents are the results of mistakes and it is management's job to prevent mistakes".

(b) "Supervision must take the lead in preventing accidents—this leadership cannot come from any other source".

(c) "The foreman who does not plan, inspect, and check practices and equipment is the one who is not your friend, and I personally don't care how much you mutter at him. He is not living up to his responsibility to you, and he is not a good manager".

With such definite statements of viewpoint coming from our Executive Vice-President and General Manager who is responsible for the company's safety program and for the maintenance of same on the highest possible standard, there can be absolutely no excuse for indifference on the part of any supervisor.

While our safety records have improved a great deal over the past few years there is still a great deal of room for improvement. As long as there is one accident, that is one too many.

Now accident prevention does not consist of rules or laws, but rather of methods and practices. From this angle it can readily be seen that the all important job of safety is teaching the proper job methods, and it must be recognized here that no teacher (supervisor) can teach something that he or she does not know or believe in. We must reflect in our attitude, an enthusiasm born of belief. Safety is the every day application of practices and methods which we have learned must be observed in our every day tasks so that we can have productivity with due regard and respect for the health and welfare of our employees.

The supervisor must know the things to look for. He must be taught to see and must be able to recognize job hazards and know the proper means of correction. This indicates the need for training the supervisor for safety, and I am sure we can all feel that such training has been badly neglected in the light of the many responsibilities imposed on the supervisors.

My own company has done a great deal along that line and there still remains much to be done. At the present time we are seriously considering a plan of assigning supervisors; one at a time, to the Safety Depart-

ment where a two weeks schedule will be planned to embrace training in all phases of our organization and operations, which will include:

- (a) Accident reports. Why made—and by whom.
- (b) Medical reports. Value and necessity of same.
- (c) State, Federal; compensation and company reports of injuries.
- (d) State mining laws; provisions of same.
- (e) Federal Safety Code; provisions of same.
- (f) Accident investigations. Lost time and no injury accidents.
- (g) Timekeeping records; importance of same.
- (h) Purchasing department services.
- (i) Engineering department services.
- (j) Employment department services and duties.
- (k) Personal relations department functions.
- (l) Preparation plant—marketing of coal.
- (m) Mine inspection—things to look for and why.
- (n) Mine inspection reports, and to whom made.
- (o) Maintenance. Department functions and responsibilities.

In order to apply supervision to safety he should also be well informed on the following matters:

1. Details of all jobs or operation knowledge.
2. How to apply his job knowledge effectively in the training of new or inexperienced employees.
3. Visual method of training Foreman demonstrating by actually doing.
4. Employees' responsibility.
5. Proper and necessary safety equipment and use of same.
6. Job and machinery hazards.
7. Job methods or practices.
8. First aid and mine rescue.
9. Value of prompt application of corrective measures.

In the training of his men the supervisor must learn and know that his effectiveness as a teacher depends largely on his reputation for honesty and sincerity. He cannot get the interest or co-operation of his men unless, or until he has their confidence. One sure way to close the gap between management and the employees is the conscientious application of ourselves to all matters that are of interest and concern to our men and their families, because their concern is our concern. We must eliminate the fog of doubt in order that

each side of the problem can accept their share of the responsibility and clearly see the benefit of co-operation.

A supervisor's success as an instructor depends to a great measure on his:

1. Personality.
2. Knowledge of the work.
3. Experience; both in the work and handling men.
4. Confidence in himself and his men.
5. Sympathetic attitude.
6. Tact and diplomacy.
7. Reputation.

Our deeds, not words, are the greatest influence in all of our undertakings. Therefore, the new employee must not be turned loose so to speak, but we must give him a great deal of our time and consideration in the beginning in order that he will be able to adjust himself quickly to new people; conditions and surroundings.

Neither the young inexperienced miner, or the experienced miner who is being transferred to a new job can be expected to learn or do any job correctly unless he is given specific instructions about the job or work to be done. In giving instructions we should avoid using "don'ts" as such a figure of speech will develop a negative reaction in the individual. Show the individual how to "do" or tell him to "do" but always give a detailed explanation of why it should be done a certain way, in order that he may fully understand the reasons for "doing".

A supervisor must appreciate the power of "suggestion" and use it to full advantage in order to change employees unsafe work habits and practices. He must approach every problem from the "positive" side—never the negative, if he expects to influence his men and get the results he wants. Some examples and demonstrations:

- (a) Motorman gets out of cab while motor is still running and runs ahead to throw a switch, and then gets back in while vehicle is still in motion.
- (b) taking pots off a conveyor belt.
- (c) setting up posts.
- (d) throwing tools and material.
- (e) checking job assigned to a man the day before.
- (f) Mine Foreman's certificate—not enough. Biggest problem is men—sometimes ourselves, and (g) coupling mine cars by hand.

We must give the new employee of our time in the beginning, and make manifest to him our interest in his well being. We should repeat instructions; make check-up, and fol-

low through to make sure instructions are understood. We should take nothing for granted, we must have the proof for our satisfaction. We should so conduct ourselves that any employee will feel at ease to approach us on any problem concerning him or ourselves.

Today, the supervisor must be diplomatic and polite and be able to handle complex problems. There is no comparison between the present day supervisor and the old time "boss", and since so much depends on him for efficient operation, it is only fair to expect the time for him to get more training in foremanship before he is turned loose prematurely on his own and left to flounder around for answers to the many operating problems. Safety should not be considered as separate and apart from operations but definitely of prime importance in securing profitable results to both employer and employee.

Some months ago a newspaper article stated "during the next six (6) years all of the men employed in the coal mines of the United States will either be killed or injured by accidents". Stated another way it meant, that a number of miners equal to those at present employed would meet with an accident in the course of their employment during that period.

Let us weigh this statement carefully and analyze how nearly correct it is. This indictment against the coal industry must and can be answered, when we face the facts with an open mind.

Fatal accident reports for 1946, show that 984 miners were killed in this country last year, and this is the lowest number in a great many years. On the basis of one fatality for every one lost time accident, which would appear conservative, we find that during a six year period we would kill 5,904 and injure 590,400 or a total of 596,304 miners in all mines throughout the United States.

These figures are disturbing and stagger the imagination—let us not forget—we must face the facts, and facing them honestly and sincerely, this attitude which does more to create discussion, bickering, lack of confidence in each other, (both employees and management) can and will be licked only when we believe that it can be done.

There are two sides to this problem of safety in mining. There must be mutual interest and understanding between employer and employees in connection with the prevention of mine accidents. While management must

take the lead in any accident prevention program, I also feel that the greatest single factor which would greatly and quickly reduce accidents in coal mines today would be an active interest, and program on the part of the United Mine Worker officials which would carry the gospel of safety to the members of every local union in the country. The miners can contribute much more in the future towards making any safety program effective and will gladly do so when they have the active support of their leaders in a definite program on accident prevention.

In order to show the benefits of methods and practices I point with pardonable pride to some of the results obtained at our own mines, especially the Montcoal and Stickney group, who have made remarkable progress in safety during the last few years. Here are a few facts about the division.

| Year          | Major Accidents | Frequency | Severity |
|---------------|-----------------|-----------|----------|
| 1943          | 131             | 95.26     | 67.92    |
| 1944          | 89              | 44.81     | 14.40    |
| 1945          | 55              | 28.01     | 11.24    |
| 1946          | 61              | 31.11     | 7.47     |
| 1947 (7 mos.) | 30              | 22.50     | .84      |

The following figures indicate the progress made by each mine:

| MINE     | Frequency Rates (mos. 7)      |
|----------|-------------------------------|
|          | 1943 1944 1945 1946 1947      |
| Dorothy  | 92.77 46.34 30.15 28.15 23.31 |
| Stickney | 105.96 40.79 .00 27.51 9.97   |
| Nellis   | 93.46 28.17 24.08 52.92 39.41 |
| Hernshaw | 97.68 60.29 43.60 16.74 22.20 |
| No. 5    | 53.26 37.30 20.31 19.86 44.96 |
| No. 6*   | 86.11 40.60 19.66             |

(\*Opened January 1945)

These splendid records showing a remarkable reduction in accidents has resulted from a better understanding of each others' problems—from a sincere desire on the part of Employer and Employee to co-operate in matters of mutual interest, and the confidence engendered only by faith and reliance in each other. Management must do nothing to break faith, if we are to continue to operate our mines safely and efficiently. We must see the example by doing—deeds and not words are the very essence of our intentions.

In coal mining the supervisor who needs the most coaching and encouragement is the

section foreman, and management must provide him with the necessary vitamins to keep him healthy and strong for the all important

responsibilities of properly directing and caring for his men. As the foreman goes; so goes the company in the eyes of his men.

## TUESDAY AFTERNOON SESSION October 7, 1947

Presiding: JOHN T. RYAN, JR., Mine Safety Appliance Co.

### Abatement of Coal Dust Hazard in Anthracite Mines

By R. EMMET DOHERTY  
Engineering Staff, Anthracite Institute

Operation of coal-mining equipment necessarily results in the production of dust, the type of dust varying with the material—coal, siliceous rock or other. Another essential activity—shooting—produces smoke and fumes. In the past, operators and State authorities have relied on ventilation to keep such products from becoming hazards. Where the ventilation is good, it is a long step toward attainment of the desired conditions, although less effective with dust than with smoke and fumes. To be sure, however, the mining industry is supplementing measures already in effect with dust suppression. These control measures are relatively inexpensive and have the additional advantage of keeping the air clear at all times. This insures working conditions conducive to higher efficiency and, through better vision, reduces injuries from falls of roof and ribs, stumbling, running into coal, timbers and equipment and similar accidents.

Since dust, fumes and smoke normally originate in related operations and in the same place, measures for the control of one usually take care of the others. Some of these measures are outlined in the following material.

The suppression of air-borne dust in mines presents a complicated problem. Careful consideration must be given to the type of control equipment used, the points to be supplied from the equipment installed and the sources from which a constant supply of water can be secured. Also, laboratory apparatus is necessary to determine locations where control methods are required and to evaluate the final results to make certain, through water sprays of proper design, that the dust and gas volumes do not rise above safe limits.

Observations in the mines have shown that a rough but useful determination of the dustiness of the air can be made quickly by the use of a special electric cap lamp equipped with polished reflector. When air-borne dust in the air surrounding such a lamp exceeds the accepted permissible limit of 50 million particles per cubic foot, it is readily shown in the light beam of the lamp. When less than 50 million particles per cubic foot are present, the air appears clear. This test is not effective when the ordinary cap lamp is used; a special lamp must be used.

Where holes for explosives are drilled with hand-operated drilling machines or augers, the rate of feed is so slow that the quantity of air-borne dust produced is negligible. Where they are drilled by compressed-air-operated power drills, the resulting dust contamination of the area surrounding the driller has long been recognized as a major problem.

Until recently, the only recourse, except for expensive and massive wet-type tunnel-drilling machinery, was for the operators to wear filters or respirators. These are uncomfortable and while they give protection, the filters, having spaces enough to pass sufficient air, also pass some sizes of dust particles, and the protection therefore is not absolutely complete, although partially effective.

The modern compressed-air drill is equipped with simplified water attachment which forces water through the drill steel and directly to the drill bit, practically eliminating dust at this source. Conversion from dry-type drilling to the improved wet-type can be obtained.

Careful tests by dust-counting methods

show the extreme effectiveness of the wet-type sinker in both coal and rock drilling, as a means of suppressing dust. Dust counts with these machines operated dry, and then operated wet, have been made repeatedly and show that invariably the use of the wet machine is adequate to reduce the dust-borne particles below the minimum that is held to be dangerous. Even in the blasting of coal the reduction is enormous when water sprays are used before blasting.

Where undercutters are used, a full-cone spray is mounted on the machine at the return side of the cutter bar with the control valve easily accessible to the operator. Experience has indicated that with the spray at this point very little dust is generated in the dumping-out cut. Inasmuch as the continuous water spray assists in maintaining a lower cutter-bit temperature, not only is the life of the bits extended but also the danger from a probable gas ignition is minimized.

The blasting operation is obviously one where a large quantity of dust can be released, especially where multiple shotfiring is done, as in mechanized mining. Anything done toward eliminating this dust is a step forward. A 3/16-in. orifice full-cone spray nozzle is used to wet the ribs, bottom and face before firing a blast. It is also used to wet the coal pile after firing and as needed during the loading-out period.

Contamination of the atmosphere is lessened and visibility is increased. This is of major importance in an area where many accidents occur while workmen are endeavoring to inspect the newly exposed roof.

Accumulations of water in the mines can be utilized when in the vicinity of dry active workings by conducting it through pipe of adequate size to dams and storage tanks or through boreholes to mining areas in lower veins. Acid mine water can be controlled to some degree by the use of lime as a neutralizing agent.

Experience and tests have indicated that approximately 3 gal. of water is needed per ton of coal mined. No wetting agent is necessary when full-cone spray nozzles are used.

Water is supplied to the coal faces under pressure by gravity from boreholes with concrete dams and sumps located in higher veins; by gravity from shaft column lines; by mechanical pressure from air and electric pumps in the area; and by introducing air pressure into portable tank cars or stationary receivers.

The main links of piping should consist of 2 or 2 1/4-in. pipe with 1-in. pipe to the working faces. A 50-ft. length of 3/4-in. hose serves the face and is provided with a spray nozzle capable of delivering a full-cone spray, the nozzle having a 3/16-in. orifice which provides 5 gal. of water per minute at a 15-lb. pressure.

A valve and strainer should be installed at the end of the pipe to which the hose is attached.

It has been found that three nozzle sizes are adaptable for all phases where dust control measures were necessary. Most full-cone spray nozzles produce fair results at a pressure of 15 lb. per square inch, good results at 30 lb. and excellent results at 45 lb. and higher.

Since much of the water used for spraying comes from underground sources, metal nozzles were found to give short service because of the high acid content of the water in conjunction with high velocities through the nozzle orifice. One anthracite company has developed a plastic nozzle in three sizes that effectively reduces the dust concentration to within safe limits in all of the varied operations.

The mining laws of Pennsylvania provide that a certain quantity of pure air must be furnished to each employee in the mine, and further qualify this by stating that such air must be in proportions large enough to "dilute, render harmless and sweep away smoke or dangerous gases." No mention is made of harmful dusts, but the modern mining industry is going a step further to insure that such air is free from high concentrations of harmful and nuisance dusts.

Increasing the quantity of air, particularly in low veins, serves only to increase the dustiness by energizing dust particles, which then become air-borne, and further adds to the problem by speeding up the rate at which dust-laden air from one working place is carried to those adjoining.

Here again we can emphasize that the dust particle must be water-surrounded and knocked down as near its point of origin as possible. While it can be said that ventilation does little to control dust, it can be said conversely that dust control does much to aid ventilation.

The psychological aspect is that men working in a dust-free atmosphere seem conscious



that an improvement in ventilation has been made. The physical aspect is that when water is applied to large piles of loose coal, such as are present in mechanized mining, the infiltration of water results in a much quicker liberation and absorption of occluded or trapped explosive fumes, carbon monoxide and oxides of nitrogen. Thus, these are picked up and diluted by the air currents instead of forming undetected pockets in the coalpile, to be later released in the workman's face while loading goes on.

In other words, noxious-gas dilution and dispersal is hastened without costly increase in ventilating volumes. Of course, we only have reference to the aerating of loose piles and not to endeavoring to assist materially the normal ventilation necessary to sweep the solid coal face.

After many experiments to determine the efficacy of spraying haulageways to allay spillage dust, it has been found that surface tension keeps the water sprayed from a moving tank car from having the desired effect.

### Control of Coal Dust in the Operations of the Tennessee Coal, Iron and Railroad Company

By JAMES C. GRAY  
General Superintendent, Coal Mines  
Tennessee Coal, Iron and Railroad Company

The need for control of coal dust in coal mine operations is very aptly stated in a report issued by the Bureau of Mines dated March 25, 1947—quote: "the outstanding lesson to be learned from this disaster is that mines which liberate little or no methane are not immune from widespread and tragic explosions if dry and dusty conditions exist therein and adequate measures are not taken to control the dust hazard."

It is the writer's sincere desire that the information presented may add something to the considerable "know how" that has been developed on this subject by those associated with the coal industry presently as well as in the past. The information presented will be confined to practices in the Coal Mines of the Tennessee Coal, Iron and Railroad Company and there will be no more quotations.

The company operates five mines in the

Warrior Coal Basin of Alabama, lying Northwest of Birmingham and adjacent to it. Another mine is presently being developed in the same field. The output from the five producing mines is approximately 50,000 tons per day tipple weight. All the mines are mechanized, using shaking conveyors in this seams work, some of which are equipped with duckbills for loading, and trackless mining equipment where height of seams and grades permit. Modern shortwall from various manufacturers are used for cutting coal for conveyor loading, and universal machines both caterpillar and rubber mounted are used for the trackless method where caterpillar mounted loading machines are employed for loading into shuttle cars.

Wetting agents were then added to the water to form a water-dust emulsion. This also proved unsatisfactory and uneconomical due to the rapid evaporation caused by the low humidity of intake air currents.

It was later observed that where a full dust-control program was in effect at the working faces very little, if any, dust resulted from the damp spillage in transit.

It can readily be seen that by proper control methods the dust counts can be kept at or below acceptable allowable limits.

To attempt to quote cost figures on a tonnage basis would be inconclusive due to the fact that the useful life of control equipment has not been established. Against the actual cost are the indeterminable profits resulting from an improved accident record as a result of increased visibility, increased production due to higher efficiency and better morale, and a probable lower labor turnover.

The presence of water lines at the faces also has additional value in the prevention of mine fires.

The control of coal dust can be divided into four phases: (1) Face preparation, (2) Use of water, (3) Use of rock dust and (4) Dust control measures in preparation plants.

We have noted a very considerable change due to an increase of 65 per cent in the minus fourteen-mesh material in the run-of-mine product since mechanization. Not all of this increase is due to a different method of loading but can be accredited to a let up in good mining practices at the face. We no longer have the same control of the amount of powder consumed per ton of coal mined that we had under hand tonnage loading methods. The miners themselves controlled it to some extent because it means better earnings for them to do so. We will not allow a big powerful loading machine to tear itself apart trying to dig out the back end of a cut, so on the next cut we make sure it is properly prepared for loading by putting in a few more holes and putting in each hole all the powder the law allows. Soon we shall have completed the establishment of cutting, drilling and shooting standards for all face conditions in our mines. These standards are presented in diagram readily understood by all supervisors and workmen. It is a simple matter to measure how near we come at the end of the month to meeting that standard. Thus we hope to get the best start possible in the control of coal dust and that is to minimize the amount we have to control. If you haven't given this phase of dust control real attention, it is recommended that you do so—you may also find that the loading machine will perform more efficiently when loading from a properly shot face than it will from an overshot face.

An impressive feature to the writer when first employed by the Tennessee Coal, Iron and Railroad Company in 1937 was the spray line system that made water available to all working places in each mine in order to allay coal dust. But the most unique control feature was the hollow bar on all mining machines that permitted piping water to the cutter head on the end of the bar—thereby killing coal dust at its principle source. No technical paper is contemplated but we have all heard about the interfacial tension between a solid and a liquid and how wetting of the solid does not take place when the tension is high. Put enough water to the cutter head and you can forget all about the interfacial tension between coal and water. You need not be concerned, at least at this point, with full-cone nozzles, flat spray nozzles, misting nozzles, atomizing nozzles or any modifications thereof. Wet it until a handful

will ball readily under slight pressure and the cuttings are under control. This is and has been the practice on all mining machines since 1922 when the method was first developed and installed on a machine in the Edgewater Mine at Edgewater, Alabama. This method is superior to any other method ever observed by the author because it not only controls the dust at the face during the cutting operation but, because all the cuttings are wetted, no dust is created by them when they are loaded, transferred and hauled to the surface. Further—it is equally effective for all methods of cutting the face whether bottom, top or shear cut is practiced.

Other uses of water to control coal dust include:

1. Spraying during the operation of all loading machines through nozzles attached to the machine in such manner that the spray extends over the gathering head of the machine.
2. Spraying shuttle car roadways when necessary.
3. Spraying the material as it is transferred into the mine car from the conveyor or shuttle car.
4. Spraying loaded cars at convenient points in transit to the underground dump.
5. Spraying immediately before and during the dumping operation.

All the water used for allaying dust is obtained from the underground workings. In some cases the sprinkling lines are connected directly to the pump lines, in others the underground water is pumped to a reservoir or tank on the surface and then fed to the sprinkling lines, relying on force of gravity and head of water to provide the necessary pressure. The water is not treated in any manner at any of the mines.

To accomplish the foregoing, the inventory of January 1, 1947 shows approximately 72 miles of pipe lines of various sizes in the five operating mines.

In addition to providing means to allay dust, the spray system has been of immeasurable value in extinguishing fires that have occurred in the operations.

A third method of controlling coal dust is through the use of rock dust. As all working places are advanced, they are rock dusted by hand. Present company standards require



this to be done to within 20' of the working face. It is a further requirement that all breakthroughs be rock dusted immediately following the loading of the last cut of coal therefrom.

Rock dusting is also done with a track mounted high pressure machine. This is done on the third shift where the mine is scheduled for two operating turns per day and on the week-end off shifts where the mine is scheduled for three operating turns per day. Provisions are made at overcasts and in stoppings at about 500' intervals on main slopes to dust trackless air returns.

To maintain compliance with approved standards of incombustible content, field samples are collected at regular periods, analyzed at our own laboratory and the results are used as a guide for the scheduling of future rock dust activities. Every shipment of rock dust received is sampled and tested for size in order to assure maintenance of the specification of 70 per cent through a 200-mesh screen.

For the past several years approximately 10 pounds of rock dust have been distributed for every ton of usable coal removed.

In order to control dust in preparation plants live steam is blown onto the coal as it enters the crushing plant. This practice has only been used for the past year but has been found to be more effective than water spray insofar as the control of dust is concerned. This live steam method keeps the moisture content down in the material until it has reached the wet processes in the preparation plant. As a further aid to control the

dust in these plants, they are washed down each shift where possible.

There are many points where the plant design will not permit this to be done without protective measures regarding the electrical equipment. At such places washing down is not so frequent but is performed at intervals. This matter will be given more consideration in the design of the preparation plant at the new mine than was given to the plants now in operation.

The foregoing covers briefly the outstanding practices of the Tennessee Coal, Iron and Railroad Company to control dust in coal mine operations. A survey was conducted throughout the Company's coal mines in 1942 by the Division of Industrial Hygiene of the Alabama State Health Department. The survey proved conclusively that, if the practices heretofore reviewed are adhered to strictly, it is possible to keep within a maximum limit of 30 million particles per cubic foot of air at the working faces of our mines under our team conditions.

That the practices have merit was forcefully demonstrated in 1941 at the Doona Mine when a methane explosion caused the loss of five lives. The report of this disaster stated that—the propagation of this explosion by dust was arrested by:

1. Liberal rock dusting by hand while driving the entries, with subsequent dusting of the slope by machine, and
2. The use of water on the mining machine cutter bars, causing a damp condition of the dust that remained on the bottom as the face advanced.

### The Centralia Mine Disaster

By M. J. ANKENY

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An explosion occurred in the No. 5 mine of the Centralia Coal Company 2 miles south of Centralia, Marion County, Illinois, at 3:26 p.m., March 25, 1947. The explosion resulted in the death of 111 men, of whom 65 were killed by burns and violence and 46 by asphyxiation. One of the victims of the after-damp was rescued and died later on the surface. One hundred and forty-two men were in the mine at the time of the explosion;

24 men escaped unaided, and 8 including the after-damp victims were rescued.

Two hundred and sixty-seven men were employed at this mine; 50 on the surface and 217 underground. Of the 217 underground employees, 75 worked on the night shift. The average daily production was 2,259 tons of coal.

The mine is opened by two wood-lined shafts, consisting of a main hoisting shaft 540

feet in depth, through which coal, supplies, refuse, and employees are handled, and a double-compartment down-cast air shaft 537 feet in depth and 1,200 feet from the hoisting shaft. One compartment was equipped with a substantial wood and steel stairway. The coal-hoisting shaft served as the main air outlet.

The mine is operated in the Illinois No. 6 coal bed, which averages 76 inches in thickness in the present working areas. The coal bed lies flat, except for local dips. The cover over the coal bed ranges from 500 feet to 575 feet at this property.

The ratio of volatile matter to total combustible matter of a composite of four face samples of coal from this mine is 0.45. This ratio is an index to the explosibility of the dust. Experiments at the Bureau of Mines Experimental mine at Bruceton, Pennsylvania, indicate that coal having a ratio of volatile matter to total combustible matter of 0.12 or greater is explosive and that the explosibility increases as the ratio increases.

The room-and-pillar method of mining was followed, and pillars were not extracted. The main entries were driven two and three abreast, and room entries were turned right and left off the main entries, generally in pairs. The room entries were turned off the main entries at 300-foot intervals; entries were driven 12 feet in width. Rooms, 28 to 30 feet in width, were turned on 60-foot centers off the headings and air courses and were driven to a depth of 400 feet. Room and entry cross-cuts were made at 60-foot intervals.

The coal was undercut to a depth of 8 1/4 feet with nonpermissible shortwall mining machines, and was drilled with nonpermissible post-mounted electric drills. All coal was loaded into mine cars and shuttle cars with nonpermissible caterpillar-mounted loading machines.

Ventilation was provided by a 7-foot air-plane-propeller-type fan operated blowing and located about 100 feet from the bottom of the intake air shaft. During the Federal inspection of March 17-20, 1947, the fan was delivering 72,320 cubic feet of air a minute into the mine at a water-gage pressure of 1.5 inches. The fan was run continuously and was inspected daily by the electrician. One continuous air circuit utilizing down and an overcast was used to ventilate the entire mine. The 1 west haulageway was in intake air to the first working section, and the 4 west and main south haulageways and hoisting shaft

were in return air. A few concrete-block stoppings had been erected along the 1 west and 4 west haulageways. All other stoppings were of wooden construction.

The mine was considered to be gassy by the Federal Bureau of Mines, but was not so considered by the Illinois Department of Mines and Minerals. Two certified mine examiners were employed to make preshift examinations of the mine for gas and to observe and inspect for other hazards, but such examinations were started eight hours before the first shift entered the mine. An uncertified mine examiner made a preshift examination of the working faces about two hours before the second shift entered the mine. Examinations for gas were not made during the working shift. During the March 1947 Federal inspection, the mine was liberating methane at a calculated rate of 60.073 cubic feet in a 24-hour period.

The mine was exceedingly dry and dusty, and heavy deposits of coal dust were present along the roadways in working places and on the roof, ribs, and timbers in working sections. Heavy deposits of coal dust existed along the roadways in room entries and in the center of the main haulage road on 4 west. Very little effort had been made to load out excessive quantities of dust, and watering methods had not been employed to allay the dust at its source. Rock dust had been applied to the roof, ribs, and roads of active haulage entries, but such rock dusting was not maintained close enough to the working faces, and rock dust was not applied in rooms. In active entries, the rock-dusted zones at the time of the explosion terminated at distances varying from 500 to 1,200 feet outby from the faces.

Rib and roof samples collected during the investigation, from rock-dusted areas in the portion of the mine affected by the explosion, contained 45 to 73 percent incombustible matter and averaged 52 percent. Road samples collected at the same locations contained 57 to 79 percent incombustible matter and averaged 45 percent. Attention is called to the fact that some of these samples were contaminated by coal dust carried and deposited by the explosion. Rib and roof samples collected from non-rock-dusted areas in the active working sections affected by the explosion contained 29 to 38 percent incombustible matter and averaged 33 percent. Road samples collected at the same locations contained from 31 to 39 percent incombustible matter and



averaged 35 percent. Coked particles were present in varying amounts in all of the samples collected in non-rock-dusted areas, indicating that all of these locations were closely involved in the explosion.

Explosibility tests on the Illinois No. 6 coal bed, conducted at the Bureau of Mines Experimental mine, at Bruceton, Pennsylvania (see Bulletin 167, page 149), indicated that this coal dust required the presence of 33 percent incombustible matter to prevent ignition when no gas was present and required the presence of at least 59 percent incombustible matter to prevent propagation under the same conditions; this percentage gave practically no factor of safety. It is concluded from this that much of the untreated dust in the face regions was capable of initiating and propagating an explosion, while the rust on the rock-dusted haulage entries was on the border line insofar as propagation was concerned; unquestionably this mine should be rock-dusted so the combined rock dust-coal dust mixture is at least 65 percent incombustible.

Main haulage was accomplished with 15-ton electric trolley-pole locomotives over a single-track system from sidetracks to the shaft bottom. Trolley-pole and cable-reel locomotives were used for servicing loading machines and secondary haulage. Cable-reel shuttle cars were used to service two of the loading machines. Steel end-gate-type mine cars of 3-ton capacity were in use. The cars of coal were hoisted on self-dumping cages. The coal hoist, which was also used for handling men and materials, was of the single-drum design, and was steam-driven.

Incandescent electric lights operated from the mine circuit were installed at the shaft bottom and at irregular intervals along main and secondary haulage roads. Permissible electric cap lamps were used by the mine examiners for individual illumination underground. All other underground employees used carbide lamps for portable illumination. The mine examiners used permissible flame safety lamps which they cleaned, filled, assembled, and kept in their custody.

Smoking was permitted and practiced freely underground.

All machinery underground was operated electrically by 250 volts direct current. Two substations were located underground in well-ventilated fireproof structures.

All mining machines, loading machines,

drills, shuttle cars, and cable-reel locomotives were of the non-permissible type and received their power through trailing cables connected to power wires, generally located in return air.

Permissible explosives, Black Diamond No. 15 in 1¼ by 8-inch cartridges, were used for all blasting purposes. Shots were fired with No. 6 strength blasting caps and orange wax fuse ignited with the flame of carbide lamps.

Drillers worked in pairs. While one driller operated the post-mounted electric drill, the other prepared the primers and charged the shot holes. Normally, 6 holes were drilled in entries and crosscuts; 8 holes were drilled in diameter, approximately 8 feet in depth and rooms. The holes were about 2¼ inches in diameter in two horizontal planes, with an equal number of holes in each horizon. The bottom holes were about 3 feet from the undercut and the top holes about 1¼ feet above the bottom holes. Primers were generally made up near the working faces and variable lengths of fuse were used to obtain the desired order of firing. The fuses were slit near the ends so that they could be readily ignited with carbide lamps. Charges of explosives varied from 1 to 2 pounds, with the larger charges being used in the top rib holes. The shot holes were charged during the working shift. Stemming of coal cuttings and surface clay was used and was made up in prepared dummies 14 inches in length. From 1 to 3 dummies were used in each shot hole, and many charged shots were noted to be tamped with coal cuttings. Wooden tamping sticks were used. The drillers were also the shot firers, and they ignited the shots at the end of the working shift. The shot firer was the signal to light the shots by the foreman or one of the other employees after all normal face operations had ceased and the employees were in the man-trips or en route thereto. The center bottom holes were ignited first, the bottom rib holes next, then the top center holes, and the top rib holes were ignited last.

The mine was operating normally, and no unusual conditions in so far as could be ascertained had been reported prior to the time of the explosion. No interruptions to the ventilation system had occurred. The weather was clear and fair, and there had been no sudden changes in barometric pressure or unusual temperature changes.

The mine examiners' reports for March 21 and March 22 indicated normal mining conditions. Bad top was reported in nine of the

working places, and all other places were reported to be in a safe condition for the two-day period.

#### Story of the Explosion and Recovery Operations

The explosion occurred at 3:26 p.m., March 25, 1947. The assistant mine superintendent was standing in the surface power plant when the fuse in the fan power circuit on the switchboard blew out, and that was the first evidence he had that there was something wrong in the mine. Before the fuse could be replaced, several men came out of the mine and reported that there was something seriously wrong inside. The assistant superintendent then assembled a permissible flame safety lamp, procured a permissible electric cap lamp, and entered the mine. The cager was the only person at the shaft bottom when he arrived. He then proceeded to the fan, which is located underground 1,300 feet south of the hoisting shaft. When he arrived at the fan, he found it operating properly, and he then met the mine manager and three other employees there. The mine manager advised him that the situation looked bad. After a short discussion with the mine manager as to the procedure to be followed to try and rescue the workmen, he proceeded to make tests in the main return airway outby the fan with a permissible flame safety lamp to ascertain whether or not any methane was present in the atmosphere. No methane was detected and relatively little smoke or dust was present at that time. Several men arrived from the shaft bottom with a locomotive and were instructed to go into the main south entry and pick up two men that had preceded them into this entry; however, they were instructed to return to the shaft bottom if they felt any effects of afterdamp. The motor crew traveled only a short distance into the main south when they found one of the men in a dazed condition, due to the effects of afterdamp. He was brought to the surface where he recovered, but the other man was farther inside and his body was not found until the last day of recovery operations. The assistant superintendent received a telephone call from someone at 13 north 1 west requesting help for several men that were at the 13 and 14 north junction. He instructed the night foreman and the men that were with him to proceed to 13 north in the intake air, but not to go beyond 13 north. After he had issued these

instructions he returned to the surface. Upon his return to the surface at 4:40 p.m., he found that a State Mine Inspector had arrived at the mine. The inspector immediately ordered the electric power to be cut off from the mine. He then proceeded to the mine office to ascertain if the officials of the State Department of Mines and Minerals and the Superintending Engineer of the Bureau of Mines had been notified of the disaster. He then entered the mine. While passing the motor barn door near the shaft bottom, the telephone rang; answering the telephone, he found that the call was made by one of the four men who came out of the 14 north entry alive after the explosion, and he instructed the survivors to stay at 13 north until he returned to the surface and obtained electric cap lamps. Upon his arrival on the surface at 7:45 p.m., he found that the DuQuoin rescue team and the State Safety Engineer had arrived. The inspector and the safety engineer entered the mine with the rescue team at 8 p.m. and proceeded to 13 north 1 west and sent the survivors to the surface on stretchers. While rescuing the four survivors at 16 north, 16 bodies were found along the 1 west haulage road at 13 north.

The intake air enters the 1 west haulage entry through an overcast 1,300 feet in by the shaft bottom, and the return air passes under the main south overcast, which places the haulage road between the shaft bottom and the 1 west on return air. Consequently, the return airway had to be closed with a temporary stopping, and the doors at the entrance to 1 west had to be opened to short-circuit the ventilating current and place the roadway between the shaft bottom and the 1 west entry on fresh air. This procedure was repeated each time rescue teams changed.

Due to the violence of the explosion, all stoppings and doors in by 13 north 1 west and the stoppings between 20 and 21 north off 1 west were destroyed. As a result, recovery work was delayed considerably because building material had to be obtained and transported from the surface into the mine, and stoppings had to be built to provide ventilation for the recovery crews to advance. Delays were also incurred because of the amounts of carbon monoxide encountered, which had to be cleared before exploration could be continued.

Recovery work was started at 13 north 1 west and was continued on through 18, 19,



20, and 21 north room entries and the 1 and 2 west main entries. The recovery work through this area was retarded because of the effects of the violence of the explosion. Recovery work in the 20, 21, and 22 north and 23 and 24 south room entries off 4 west progressed rapidly because of little violence.

The last body was recovered in 20 north off 4 west at 5:30 a.m., March 30. Immediately after the last body was recovered, several crews of men reentered the mine to restore ventilation and to direct the air current in its proper course by removing temporary stoppings from the mouth of room entries and by building additional stoppings where they were required. This work was completed at 6 a.m., March 30. The mine was closed against the entrance of persons for two days to permit afterdamp to clear up in the return. The working faces and haulageways were examined by certified officials on Wednesday, April 2, and the mine was found to be in a safe condition for the various investigating committees to proceed. The recovery operations were officially ended at 9 a.m., April 2.

#### Summary of Evidence

Conditions observed in the mine after the explosion, together with information available from previous Federal coal-mine inspection reports, provided ample evidence as to the point of origin and cause of the explosion. Facts based on this evidence are summarized as follows:

1. The mine was dry and dusty; heavy deposits of fine coal dust were present on the roof, ribs, floor, and timbers of all active working sections of the mine.
2. Rock dust had not been applied in rooms; or in entries for a considerable distance back from the working faces.
3. Methane in an appreciable amount was not found during recovery operations and only a very small quantity of methane was found in air samples collected in poorly ventilated working faces during the investigation. No evidence was found to indicate that methane was involved in this explosion.
4. The explosion occurred at the end of the shift after all face operations had ceased, except for blasting operations. Blasting was the only procedure in progress capable of raising an ignitable dust cloud into the air when the explosion occurred.
5. Permissible explosives were being fired in a nonpermissible manner with "cups" and

fuse, and coal dust was being used for stemming.

6. Major forces of the explosion radiated from the face workings of the 1 west entry in all directions toward open workings.

7. Flame from the explosion died away rapidly upon reaching rock-dusted zones in entries and upon reaching abandoned workings in which falls covered much of the coal dust left by the mining operations.

8. The only working place in which there was definite evidence of forces traveling outby in the area between the face and the last open crosscut was the face of the 1 west entry.

9. There was definite evidence of radiation of forces to the north, south, and east at the junction of 1 west and the last open crosscuts to the right and left.

#### Cause of the Explosion

Representatives of the United States Bureau of Mines who investigated the disaster believe that the explosion originated at the face of 1 west entry, that it was strictly a coal-dust explosion propagated by coal dust throughout four working sections of the mine, and that the coal dust was raised into the air and ignited by explosives fired in a dangerous and nonpermissible manner.

#### Lessons to be Learned from the Conditions as They Relate to the Explosion

1. The outstanding lesson to be learned from this disaster is that mines which liberate little or no methane are not immune from widespread and tragic explosions if dry and dusty conditions exist therein and adequate measures are not taken to control the dust hazard.
2. This explosion has forcefully demonstrated the need to reevaluate the dust-explosion hazard. Up to the present time, it has not been customary for the coal-mining industry, the Bureau of Mines, State Departments of Mines, or any other group dealing with mine safety matters to regard dry and dusty conditions in mines constituting an imminent danger of such magnitude as to warrant the withdrawal of men, particularly if the mine does not liberate methane. If explosions of this type are to be prevented, it will be necessary in the future to regard dry and dusty conditions in mines as imminently dangerous and to withdraw the men from the mine or

portion thereof where such dangerous conditions exist, until appropriate measures have been taken to remedy these conditions.

3. The partial rock dusting of mines as a remedy for the coal dust explosion hazard leads to a false sense of security. In this instance, the application of rock dust on haulage entries did not prevent the explosion from propagating from room to room through crosscuts. A study of the conditions revealed that this explosion propagated throughout four sections of the mine by traveling mainly through rooms and dying out as it reached the rock-dusted haulage roads and abandoned areas. The spread of dust explosions from one working place to another will be prevented by means of rock dusting only when rock dust is applied in all working places up to and including the last open crosscuts. The appli-

cation of rock dust along the haulage entries in this mine appears to have prevented the propagation of flame to the shaft bottom and probably saved the lives of 31 men.

4. Permissible explosives, charged and fired in a permissible manner, are safe. Permissible explosives stemmed with coal dust and fired with fuse in a dependent sequence are dangerous. The maximum safety will be obtained, however, when all shots are fired in a permissible manner while all men except the shot firers are out of the mine.

5. Evidence obtained during the recovery operations indicated that 44 men working in two sections of the mine, not affected by the flame or violence of the explosion, could have saved themselves if they had known the principles of erecting barricades after explosions.

#### Improvements in the Design of Mining Machinery to Increase Safety

By J. E. M. WILSON

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Today the initial design of almost all face machinery is of the so-called permissible or explosion tested type which immediately suggests positive enclosures of all electrical components which for want of a better name may be termed "potential fire." It is simply assumed how that moving parts such as gear trains and chain drives will be enclosed or shielded. These features are basic with many special protective devices and arrangements added to particular types of machines, some of which will be discussed in the following paragraphs.

On modern cutters, loaders and drilling units considerable thought has been given to the location of the controls so that the operator will be back from the face in a protected position. These controls are grouped so the operator need not move from this one position to control all movements of the unit, which means his attention is never diverted from the operation of cutting or loading or drilling to search for a lever, a wheel or a crank. Controls that inadvertently might be moved to the "on" position by a roof fall or some object thrown onto the machine are

either placed in a niche or shielded; in any case, the control handle is arranged so that anything falling on it tends to move it toward the "off" position.

On transportation equipment such as locomotives, controls are grouped and arranged to the motorman's best advantage. On locomotives, all control levers are manipulated by the hands because steering is unnecessary, but since shuttle cars must be guided, accelerating switches and brakes, except the parking brake, are foot operated. Both locomotive and shuttle cars can be constructed right or left hand; this is more important in the case of locomotives because it is essential that the motorman be positioned on the side opposite the trolley wire.

Much has been said for and against providing space for the operator and the helper on mobile face equipment. It is generally desirable to provide riding space for the machine operator if for no other reason than to prevent the machine from moving away from him and getting out of control. Such space is protected as much as possible but is no barrier to his moving out in case of emergency.



On few machines is there space for the helper to ride; not because he has been overlooked by the designer, but for two reasons: first, because it is desirable to have the helper precede the unit when tramping to throw switches, watch the pick-up of the trailing cable, watch for other mobile equipment, etc., and second, because dimensional limitations preclude arrangement of ample space for the helper. Since these machines travel no faster than  $\frac{1}{2}$  to 3 miles per hour and distances between working faces are short or should be, this does not seem to be a serious omission.

On gathering locomotives, however, it is generally agreed that compartments with ample space and adequate protection should be available for both motorman and trip rider. Some provision for the snapper has been worked into the design of gathering locomotives for a number of years but they have not always been satisfactory; perhaps it was a step or a seat on a sand box or a space too small to accommodate the trip rider's body in low coal. Whatever the objections, it was a sincere effort by the engineer to design safety into a mine locomotive. Today wider gauges, greater clearances, larger radii curves and better track have made possible more spacious and safer compartments. In them a man can comfortably sit, in some, lie down, protected by high and heavy sides and ends.

The same design can be applied to haulage locomotives, but, generally, there is sufficient space in the control end for both motorman and trip rider.

To minimize bodily and mental fatigue in a hazardous occupation is extremely desirable. The use of hydraulics has contributed to the rapid and easy manipulation of mining machines of different types and has made possible motions not otherwise possible except with extremely complicated mechanisms. Unfortunately, it has introduced the hazard of oil as the hydraulic medium. The danger from oil accrues from leaks in the hydraulic system, the accumulation of oil on the machines and the possible ignition of such oil. Improved tubing, hose and fittings have decreased the possibility of leaks, but leaks must be checked immediately and oil accumulations prevented on all hydraulically actuated equipment.

So far no satisfactory non-flammable hydraulic medium has been found. Water has been tried, but while its corrosive effects

could be overcome, it neither has the necessary viscosity nor desirable lubricating qualities. It is hoped a non-flammable substitute having characteristics comparable to oil will be developed. Several well known chemical companies are working toward this end.

Mechanization has emphasized the need for water spraying at the face. Usually the alloying of dust by spraying is done during the cutting operation and sometimes, additionally, while machine loading.

Spray devices consist of nozzles or piped cutter bars connected to sources of water supply by hoses and pipes with the necessary fittings. Some people feel that the piped bar whereby water is delivered to the inside of the kerf most effectively wets all fine particles before being conveyed out by the cutter chain. Others are convinced that the cutter chain tends to obstruct the effluent and prefer a two nozzle combination: one regulated to a pencil stream aimed at the ingoing strand of cutter chain so the chain conveys the water into the kerf, and the other regulated to a spray covering a large area at the exit of the cutter chain so as to allay any dust not previously wetted.

Some mines are completely piped for water under pressure so it is a simple chore to connect spray devices to such a source. Many mines are not so equipped and must have other means of delivering the water to the face under pressure. Tanks designed as a part of the cutting machine or separately mounted on wheels and coupled to the cutter, with pumps driven either mechanically from some available drive shaft or independently driven by a motor solve this situation. Tanks as a part of the cutting unit are necessarily limited in capacity and while various compounds are available to break down surface tension to conserve water, there seems to be a definite preference for the larger capacity trailed water car.

There are many types of electrical control, each having a definite application. For the purpose of this paper, only brief reference will be made to controls that have some influence on safety.

Drum control has been the commonest type for many years, primarily, because of simplicity and favorable space factor. Its main disadvantage, safety wise, is the breaking of the operating currents within the controller case. To eliminate the main break, which is the severe break, from the controller case,

"ground potential control" was devised. Essentially, it consists of a contactor in the positive side of the line to take the main break and the controller operating cylinder in the negative side. The potential of the contact fingers and cylinder are the same as the controller case and locomotive frame, which eliminates the possibility of arcing through the controller case and burning the motorman.

The use of a contactor makes possible the insertion of a safety snap switch in the contactor operating coil circuit, so if a controller on a gathering locomotive taking power through the cable reel becomes jammed, the power circuit can be opened by means of the snap switch—contactor combination.

Where space permits, contactor control is used to eliminate breaking all machine operating currents from the controller. Its best application is for handling high amperages, for example, on heavy haulage locomotives.

Reversing controllers on gathering locomotives servicing loading machines are now almost always used. By moving the operating handle in one direction, the locomotive goes forward, in the opposite direction, it moves backward. With no separate reverse switch to throw, only one hand is needed for controller operation.

Another type, usually applied to haulage locomotives, provides acceleration by movement of the operating handle in one direction and dynamic braking in the opposite direction. Such a controller must have a separate reverse switch but considerably simplifies the dynamic braking application.

Some haulage locomotives have been built with a low voltage circuit for contactor and headlight operation; this power usually being applied by a storage battery, charged by a small motor-generator set. The principal advantage from this system is uninterrupted power for dynamic braking and headlights even though the trolley leaves the wire or a power interruption occurs.

Electrically, the fuse is the well known overload device and it is effective if properly maintained. Its popularity has waned, however, because of abuse, such as too large fuses and substitution of them with pieces of trolley wire or nails. It is still largely used in main circuits for short circuit protection.

The overload relay has displaced the fuse on mining equipment to a very large extent. Of course, it is possible to tamper with the setting of the relay but this has been hin-

dered, in many instances, by placing the relay in a locked case.

To prevent a motor from starting with the controller in the "on" position after a power interruption or after a relay has been tripped by an overload, the "no voltage" feature is used. This hook-up accomplished by means of contactors and electric lock-outs, makes it necessary to return the controller to the "off" position to pick up the main power contactor.

Torque type safety devices are used on most cutters, loaders and drills. This is exemplified by the safety clutch for the hand held drill to limit the torque to what a man can resist, the safety clutch in the cutter chain drive of the universal cutter and the clutches in the drives of loading mechanisms on loaders as protection against shock loads.

All mobile units now are equipped with brakes of varying types depending upon service conditions. Much has been done to improve brakes in recent years and therefore, a brief review is in order.

The mechanical brake is the oldest and one still widely used; more efficient linkage, larger drums and longer lasting linings embrace most of the improvements. As example of a popular mechanical brake is the quick acting lever type on service locomotives behind loading machines.

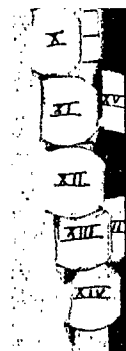
The air brake is used more than ever now on mine haulage locomotives but its application is limited because of the space required for compressor, reservoir and cylinders.

Hydraulic brakes, as applied to mining equipment, represent the newest development and one that has a wider application than air because of space factor. Such brakes have already been designed into locomotives, shuttle cars and loaders.

On equipment, having air or hydraulic brakes, independent mechanically actuated parking brakes are provided because brakes set by air or oil might gradually release after a time due to line leakage.

The automatic spooling device has been used for many years on the horizontal axis cable reel for gathering locomotives, but it is a comparatively recent adjunct to cutting, loading and drilling machines. It replaces the manually operated spooler relieving the operator or helper of this chore and assuring more even and positive reeling of the cable.

While cable is not within the scope of this paper, the flame resistant type is such an im-



portant contribution to mine safety, that reference to it cannot be omitted. Many manufacturers have adopted it as a standard type for underground equipment.

Headlights for many years were confined to locomotives, and face illumination depended entirely on the cap lamp. Now most mobile units have one or more headlights principally for better face lighting; in some instances headlights with red lenses are mounted in a conspicuous location as tail lights.

Trolley contact device is the designation given to a trolley assembly mounted on a permissible machine. Its purpose is to discourage so-called "hot tapping" on the trolley road by hanging the cable back on the trolley and placing the trolley wheel on the wire.

As previously mentioned, the majority of face equipment such as cutters, loaders, battery shuttle cars, drilling machines, drills, water tank cars, etc., now being installed in coal mines bear the approval plate of the

United States Bureau of Mines. Many machines, particularly cutters, originally open type, have been converted to the approved type by changes and replacements of certain items, per conversion instructions furnished by the manufacturers. Practically all gathering locomotives and cable reel shuttle cars now being placed in operation in coal mines are of the explosion tested type; a term given to units which do not carry the approval plate of the United States Bureau of Mines but which have had motors, controllers, resistance boxes, contactor cases, cable reels, etc., tested or "blown" at the United States Bureau of Mines Laboratory.

Much has been done and is being done co-operatively by the Bureau of Mines and the manufacturers of mining machinery to conceive and build safer equipment. This is manifested by comparing the machines being produced today with those of 50 years ago, and, undoubtedly, progress will continue.

### Improvements in the Design of Mining Machinery to Increase Safety

By ANDREW HYSLOP, JR.  
Chief Engineer, Hanna Coal Co.

The mining industry is advancing into mechanization with ever increasing speed. Each new wage contract and the economic squeeze from competitive fields is rapidly forcing hand methods into an impossible corner. Therefore, any safety program in the coal mines which is to be effective must give a great deal of attention to the design of the machinery which is being used in ever increasing quantities.

I would like to point out that ordinary compilation of statistics on coal mine accidents does not at all truly reflect the effect of machine design on accidents. Accidents attributed to machinery form a comparatively small percentage of the total accidents, about nine per cent according to the Bureau of Mines reports. Yet in a great many accidents not attributed to machinery, the design of mechanical equipment being used is a definite contributing cause. As an example: a loading machine operator is injured by a fall at the face. This is listed under falls of

roof and coal while a closer analysis may reveal that the design of the loading machine necessitated that the operator work too close to the face or that the shape of the gathering head is such that adequate posting was not possible. Frequently, we find accidents called haulage accidents where the design of locomotives in mine cars is the basic cause of the accident. When accidents are thus analyzed, the design of machinery looms quite large as a factor in accident prevention.

The No. 1 killer in the mines is falls of roof and coal. This classification accounts for approximately 50 per cent of our coal mine fatalities and 25 per cent of nonfatal injuries. Studies on roof accidents have indicated that something like 50 per cent of roof accidents are caused by insufficient or improper timbering. This amounts to 25 per cent of the fatal accidents in mines and 12½ per cent of the non-fatal accidents. Major disasters in coal mines account for about 10 per cent of the total fatal acci-

dents, yet this 10 per cent brings on a deluge of critical publicity, and endless revision of safety regulation and inspection standards requiring millions of dollars in expenditures, yet this timbering classification with much greater importance from a safety standpoint gets only meager attention.

This classification which carries such a preponderant percentage figure demands close scrutiny in any study of mine safety. It follows therefore that in designing machines for coal mines, the effect on roof control must be given paramount consideration. To construct rugged machines of high capacity which will operate in the close clearances demanded by good roof support, presents a problem of no small magnitude to the engineer. Many mistakes have been made on this point. Machines have been built which would do a good job where roof structure allows good clearance, but fail completely when tried in mines with a roof which requires close timbering. The attempt to use machines requiring clearance beyond the limits of the roof condition can only mean a post mortem from a safety standpoint. As we work out our better coal seams and are turned to more coal from areas with less favorable natural conditions, this factor of clearance becomes increasingly important. It follows therefore that in construction of the mining machinery of the future, which we demand be more rugged and of ever increasing capacity, this problem of clearance requires the best in engineering skill and "know how." Briefly stated, the goal in design for close timbering is the maximum in maneuverability in minimum space requirements. Much has been done to attain this, especially in cutting equipment where machines have been designed which are quite flexible; however, much remains to be done before we can say that we have the problem solved in other types of machines.

While on this subject of timbering, it may be well to mention the mechanization of this phase of mining. Machinery manufacturers have been slow to enter this field due to the press for the machines and parts already in production, however, the need for such machines is so great that several operating companies have taken it upon themselves to build machines for this service. Such machines include a device for mechanically lifting a crossbar to the roof and holding it there while the supporting posts are installed

under it, usually a power saw for cutting the posts to correct length, and facilities for carrying supplies either on the machine itself or on a car towed by it.

It has been found that the use of these machines has considerably increased the work that may be done by the timbering, and, perhaps of greater importance, has improved the quality of the timbering job. Since posts can be easily cut to length with a minimum of effort, we find that with this machine there is less make-shift posting, more crossbars and more posts are set with greatly improved workmanship in this phase of the work cycle.

Another important factor in machine design from a safety standpoint is the noise made by the machine while operating. The miner depends a great deal on sounds for indication of roof trouble, consequently a noisy machine may increase roof hazards to the men working nearby. Noise also interferes with signals or sound warnings used by men and thus increase the hazards. It must be said that most manufacturers are building much quieter machines due largely to the use of precision gearing and bearings. The extended use of hydraulics also tends to give quieter operation.

No. 2 killer in the mines is haulage, in fact when man hours of exposure is considered, haulage accidents by far exceed all other classifications in accident frequency and severity. As was mentioned before, it is my opinion that a close analysis of haulage accidents will disclose that a very high percentage must be attributed to equipment design. In any large group of miners, we invariably find quite a high percentage of finger amputations and maimed hands which stand out as gruesome evidence against the link and pin car coupling. Fortunately, this method of car coupling is slowly and belatedly being replaced with automatic or semi-automatic types of couplers. The use of larger mine cars has done much to reduce haulage accidents. Their introduction into the mines was accompanied with dire forebodings of increased hazards in switching these hitherto unheard of loads but experience has proved that the large car has many safety advantages over the small car which are reflected in its safety record.

One of the greatest indictments against the manufacturer from a safety standpoint



it in the design of locomotives. Since the first use of locomotives underground, this machine has usually been designed with the comfort and safety of the operator as an afterthought. A wood board bolted to a corner of the bumper usually provides the precarious, awkward, and uncomfortable seat for the motorman. A horrible record of motormen falling or being knocked from this perch in front of moving trips has been the result. Having personally witnessed such accidents in the mine, I can vouch that the word horrible is a mild description of such accidents. The triprider or snapper is likewise forced to ride on the locomotive with nothing better provided for him than an abbreviated step plate. He is fortunate if a grab iron is provided, and thus with his body often outside the locomotive altogether, we have a record of squeeze and run-over accidents. It is true that some manufacturers have tried to improve this situation but the great majority of locomotives now being manufactured are very little improved in these safety features from locomotives built thirty or more years ago. We have found that it is relatively easy to redesign the conventional locomotive to correct these hazards. The bumpers are replaced with semi-circular rolled plates which are brought up to about the height of the side frame. This provides additional space in the front end for all accessories such as re-railers and electrical devices so that there is nothing on top of the locomotive to obstruct vision or form a clearance hazard. On gathering locomotives, this end compartment provides space for a triprider's seat on either side of the locomotive where he can comfortably and safely ride when necessary. On the operator's end, there is usually enough space for three men to ride if this is necessary. The rolled steel plate provides good protection from collision hazards and the danger of falling out is entirely eliminated.

In case of derailment with conventional square end locomotives, the corner of the locomotive will usually hit a post or the rib so that the locomotive tends to turn crosswise of the haulage way. With the inertia of a trip of loaded cars behind it, this usually means severe damage to equipment and the hazard of very serious injury to the men operating the equipment. With semi-circular ends on the locomotives, the machine will usually be guided parallel to the track until

the trip is brought under control, with much less danger to equipment and personnel.

We have rebuilt a number of locomotives in this way which have now been in operation two years with very good results. Time and again we have reports from the operators on cases where this arrangement has saved them from accidents which might well have caused serious injury in a conventional type locomotive.

I have tried to stress the relation of machine design to the two classifications of accidents which have the highest number of accidents because I believe that here we have the greatest opportunity for improvement in our accident record and a field which both operator and manufacturer have slighted somewhat in safety efforts. Safety in machine design is a broad subject and space will not permit me to go into detail on the many places in the construction of mining machinery where there is room for improvement in safety design but I might mention a few of the high spots.

Hydraulic oil ignited by an electric arc from cables or wiring has caused many fires with serious personnel hazards. On much of the hydraulic equipment it is found difficult to prevent oil leaks which are quite dangerous if they occur around cables or other electrical devices. Until a suitable non-flammable hydraulic fluid is found, the hydraulic system should be isolated from possible ignition sources and the possibility of leakage held to a minimum.

We need protection from faulty cables or electrical failures which may cause shock or fire hazards. Experimental work is now being carried on with ground protection relays which shows much promise for this service. Flame resistant trailing cables also are being used quite extensively.

We have too many accidents to skuttle car operators who must operate the car from a position where he is exposed to close clearance or collision hazards.

We still have drill operators mangled and killed by being caught in revolving thread bars and other drilling machine hazards.

In the solution of these hazards is machine design. It is all too easy for the coal operator to sit back and demand machines which will perform certain operations and give the manufacturer little help with the safety features. Usually the designing engineer employed by the manufacturer is a man picked

because of his mechanical ability and many times he is not too well acquainted with the peculiar problems encountered in the mines. Men with expert mechanical ability and an intimate knowledge of mining are hard to find due in large measure to the laxity of mine management in bringing mechanical engineers into the mining industry. It has been customary for a company to fill its mines up with machinery of all types yet give virtually no thought to the personnel hired to maintain and improve this equip-

ment. Some operating companies are beginning to see the light in this respect and we find in places a definite effort to entice men with better training and educational qualifications into the mines. Competent engineers in the mines working in close cooperation with the manufacturers will go a long way toward working out these problems of safety built into machines as well as improving the operating efficiency of the machines and thus can mean much in reducing the cost of mining coal.

### WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: JOHN T. RYAN, JR., Mine Safety Appliance Co.

### Cost of Haulage and Roof-Fall Accidents

By E. F. LIMERICK

Personnel Manager, Consolidation Coal Company (W. Va.)

The theory of workmen's compensation is that economic loss incurred as the result of employment shall be at least partly assumed by industry. This expense plus the loss of production and the property damage resulting from accidents is as truly an item of production cost as labor or equipment. When management is successful in controlling this item, there is, aside from the profit motive, the additional satisfaction of having prevented suffering and distress.

These observations are intended to record a personnel manager's telescopic view of the coal industry in the State of West Virginia. Our program advances on the major premise that everything possible should be done to prevent accidents and on the minor premise that when an accident occurs, the victim must be handled immediately and shall receive the best medical and hospital care available. Strict adherence to procedure means we do our best; provided, of course, that in all cases we have the full cooperation of the workers, the management, and the medical fraternity.

During the past few years the coal industry has become highly mechanized. As the mules have left the mines, hazards have been removed, but as machines and electricity have been introduced, new hazards

have been created. In many cases management has been complacent on the subject of compensation and seemingly unaware that as wage rates have advanced premiums have likewise increased. The workman who formerly received \$800 per month may now receive \$1000. As the compensation rate has remained stationary at \$3.50 per \$100 of payroll, the employer now pays \$14 monthly as protection premium whereas he formerly paid \$7. Much more tonnage is now produced with less manpower, and this has permitted the extension of benefits without the necessity of sharp advances in premium rates.

In our state some coal operators point to the records which disclose several industries have a higher accident frequency than coal mining. This is not an escape from the fact that for the fiscal year ending June 30, 1946, of the 406 fatalities reported by the Workmen's Compensation Department, 314 or more than 75 per cent occurred in the coal industry where approximately 33 per cent of the covered workers are engaged. Coal mining is still a hazardous occupation and many of the accidents are serious. During the five-year period ending December, 1945, we had 1577 fatalities, only eight less than during the previous five-year period. However, by utilization of machine power, greater operating



efficiencies and accident prevention, we have reduced the exposure and produced 564,790 tons per fatality, as compared with 380,935 tons in 1935.

The field of accident prevention is a constant challenge to the safety engineer. We believe the postwar readjustment has now advanced to the stage where every mine superintendent should review his working forces to be certain every workman has the proper aptitude for the assigned task. Long service is not necessarily proof of competence nor immunity from serious injury. For example, our state records show that for the five-year period 1941 to 1945 inclusive, employees with mining experience in excess of ten years accounted for 84 per cent of the fatalities. Another record discloses that during that period men with less than five years' mining experience accounted for 14.5 per cent of the fatalities; but when we consider service at the mine where killed, we find that 67.8 per cent had five years' or less experience. This disparity seems to indicate that when new men enter the industry they must work under the close supervision of a certified miner, and they are not assigned to dangerous tasks without proper instruction and coaching. But when men are employed with previous experience, the employer does not properly check their qualifications, or he fails to warn them of the hazards of the new employment. The correction of this procedure seems to us to offer one of the greatest opportunities for accident prevention.

Some men are just naturally awkward even on the city streets. When such individuals are employed underground they are much more likely to be injured. We consider it important to maintain a record of all accidents of each employee, and when caution fails we endeavor to persuade him to leave the coal mine for his own safety. We also suggest that each mine superintendent review his accident record at least annually. He may be surprised to see how some section foremen have many accidents charged to them while others have few. In doing this he should not forget there is generally a tendency to assign a good foreman to the most hazardous sections.

Since 1941 the mines have had an unusually heavy labor turnover, and many men properly trained in first aid in mine rescue have left the occupation. Because of the six-day work week, victory gardens, and other reasons, this feature of accident prevention

is being somewhat neglected. We believe it is imperative that management recreate interest and activity in this important work. The Pennsylvania State Department of Mines now has mine safety trucks, manned by a three man crew. These trucks move into mining communities and organize safety classes.

We are impressed by the safety features embodied in the new type mantrip cars. We believe they will ultimately save the lives of many mantrip travelers. We are hopeful improvements in timbering methods may eventually lead to a decrease in accidents from that cause. The modern timber jack has been helpful, but there are still too many cases of hernia, and too many injuries from falling jacks. Perhaps here again more thorough underground coaching is a requirement. We certainly think it is the responsibility of every safety engineer to keep abreast of such developments and employ accident prevention devices as quickly as they are proven feasible.

Of course, the necessity of rock dusting, proper placement of fully equipped first aid canisters, underground communication and block signal systems is already so universally recognized as to require no comment.

After accidents occur every possible step should be taken to employ first aid, and to provide such medical, ambulance, and hospital service as the victim requires. Prompt and intelligent treatment will often save lives or become an important factor in returning the injured to gainful employment. On every major injury we visit the injured either at the hospital or his home as a check to determine if the patient is receiving proper care. Unfortunately, it is common practice for the Compensation Department to honor the physician's invoice immediately after the reduction of fractures or original corrections, and the result is often negligence in aftercare. It is our duty to correct this tendency. We frequently find the local physician advances the patient to a certain stage of recovery where progress is arrested. When this occurs, we cooperate with the attending physician and get the patient to an orthopedist or some other specialist as conditions indicate. We do not hesitate to employ the services of a well-trained physiotherapist as we find the stimulation of such treatments often enables the claimant to return to employment much quicker than if nature is allowed to take its

course. Frequently the physician will release the patient for light work with the thought that he can resume his normal duties gradually. It is becoming increasingly difficult to find such light work in this period of high wage scales and this feature demands the utmost cooperation of the safety department and local mine management.

Studies have been made of the 1377 fatalities which occurred at West Virginia mines during the years 1941 to 1945 inclusive and it is interesting to note that 10.78 per cent of them occurred at approximately 2:00 P. M. The next most dangerous hour was 1:00 P. M. with 6.15 per cent; then 11:00 A. M., when 6.02 per cent occurred, and 9:00 A. M., when the percentage was also 6.02 per cent. This may indicate that at those periods of the workday supervision should be especially alert.

In the year 1915 fifty-eight per cent of the fatalities in West Virginia coal mines were due to falls of roof and coal or haulage. The record of 1925—ten years later—shows that 35 per cent of the fatalities were due to those causes. The record of 1935, after ten more years, shows that the percentage had risen to 85 per cent, and after ten more years in 1945 the percentage was again 85 per cent. Surely, here is a very fertile field for study and research by the safety engineer.

Unquestionably the haulage is moving faster. The larger mine cars require more lateral clearance and the lack of bottom clearance is causing accidents. The manipulation of mechanical loaders requires considerably more skill to avoid the displacement of timbers. These are good points for attack. In 1945, while our state mined 131,509,714 tons of coal, 189 men were killed. Only 21 of these men were killed on the outside, 149 of the underground fatalities were due to falls of coal and slate; 74 were killed by haulage; 1 was killed by gas explosion; and were killed from all other causes.

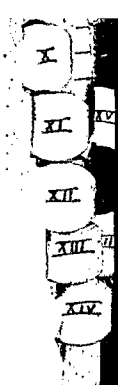
During the forty-nine years from 1897 to 1945 inclusive, 75 percent of the fatalities were due to haulage and falls. No one knows what caused all of these deaths, but we do know what caused many of them. Haulage was moving too fast. Improperly trained motormen and brakemen had moved and placed cars without proper warning, or had failed to heed signal lights. Many of these haulage accidents were comparable to our surface traffic accidents. Timbermen had

failed to properly timber, safety posts had not been set. Workmen had worked under dangerous loose roof and in many cases had failed to sound the top. Timbers had been knocked out by moving equipment. These fatalities were due to substandard conditions: violation of rules; poor supervision, or carelessness, and perhaps a few were unavoidable.

We see that in West Virginia 85 per cent of the fatalities were due to haulage and falls of roof. This percentage will vary in other states because of roof structure and other local conditions, but in every mine these are the major causes of accidents. Whether fatal or non-fatal, these are the injuries that involve ambulance and hospital care. They require the attention of bone specialists, X-ray services, the reduction of fractures, and body casts. They are really the costly injuries and represent perhaps 80 per cent of total normal accident costs. Recently the McGraw Hill Company estimated that compensation, medical costs, loss of tonnage, and recovery of equipment resulting from accidents cost the coal operator fifteen cents per ton, and that estimate was offered prior to the wage increase of July 1, 1947. This figure appears high, but it covers only direct costs. Certainly there are other indirect costs.

Whatever the cost today, it is likely to increase. The records of the West Virginia Compensation Department disclose that between the fiscal year ending June 30, 1935, and the year ending June 30, 1946, the total charges for hospital service have increased 365 per cent; fees of doctors and nurses have increased 408 per cent; X-ray charges 823 per cent; ambulance charges 1844 per cent. The trend is still upward. We also find in the year 1937 the reserves of the Compensation Department were commanding a return of 4.22 per cent, whereas in 1946 the funds were invested for a return of 2.66 per cent, and even this rate is declining as investments carrying the higher interest rates are maturing.

The return on reserves is an important item because mine mechanization is demanding the young vigorous G. I. instead of the old-time miner with the strong back. These young miners have young families, and in case of death leave many dependents instead of no minor children and a widow far advanced in years as is often the case when the older miner dies. The recent Centralia disaster was unusual because 65 of the 111 men





killed were beyond the age of fifty years. These 111 men were survived by only 78 children, 97 widows, and 6 dependent parents, a total of 181 dependents. In our state if a miner dies and leaves a widow 20 years of age with no children, she will be paid monthly benefits as long as she lives, if she does not remarry. If the widow lives until she is 70 years of age, she will receive \$18,000.

We have only emphasized direct costs. There are many indirect costs of equal importance. Today we hear much of the keen competition between coal and other fuels. We are alarmed by the increase in gas and oil heating installations and the popularity of the diesel locomotive. This competition between the coal industry and the oil and gas industry will doubtless become even more intense. If we are to keep abreast of those industries, we must like them attract and retain keen, alert, young personnel. The wage and salary rates in our industry will attract them. The working conditions are being constantly improved, and good roads and the automobile permit the miner to live in the community of his choice. When the prospective coal miner asks why it is that in 1885 the coal mining industry of West Virginia killed 3.61 men for each 1000 employed underground, and 60 years later in 1945 was still killing 3.44 for each 1000 men

so employed, safety may be the factor that determines his choice of a career.

Mine explosions and catastrophes are dramatic, but the relentless day-after-day, month-after-month, and year-after-year cost of haulage and roof-fall accidents is the real menace. In 1945, when 269 miners were killed, 223 were due to these causes, and only 4 were killed by catastrophes. The explosion of March 23, 1947, at Centralia was reported in newspaper headlines and on the airwaves around the world. Suddenly everyone became a little more safety conscious. Perhaps that is what we need—the shock treatment. I venture the prediction this year will record a reduction in accidents.

The improvement of our safety record seems to be the mutual responsibility of the coal operator and the miner. In 1945 in all the mines of the United States, haulage accidents alone were responsible for 21 per cent of the deaths. The principal causes were low clearance, violation of rules, defective equipment and the carelessness of miners.

A few days ago a friend remarked that when the coal industry gives to safety the same attention now given to production, the record will improve. A superintendent recently remarked 40 years of experience will not hold up the roof. I believe both statements are correct.

### Prevention of Accidents from Falls of Roof in Mechanized Mining

By W. B. ODENDAHL  
Superintendent, Utah Fuel Company

The introduction of mechanical equipment into coal mines to cut, drill, load, and transport the coal revolutionized the industry, and in turn, it introduced new hazards in mining as each piece of equipment was added. This is particularly true with reference to hazards from roof falls where mechanical equipment is used at the working faces. The contract hand miners work with one or two men in a working place in relative quiet so that the loosening or working of the roof rock or coal can often times be heard. Mechanical equipment in mines is noisy. Many operators found that during the first year or two after

the introduction of mechanical equipment at the working faces there was an increase in the number of accidents. However, this was usually overcome by improved methods and the accident rate was reduced to below that of hand mining.

The number of men in a working place in a mechanized mine varies according to the operation; however, four or five men in a single working place is common and with the noise of the operating equipment, the hazard from roof falls is intensified.

To prevent accidents from roof falls we must first determine the causes of such acci-

dents, then find the solution for each. Briefly, the causes of these accidents are the following:

#### In Good Roof

1. Too much dependence placed on good roof so that occasionally there is little or no propping, or roof timbering is neglected.
2. Safety posts not used.
3. Roof tests infrequently made.
4. Loose ends, and:
  - (a) Slabs of coal or rock resting on loose standing coal pile, which fall when coal is loaded out.
  - (b) Slips.
5. Irregular timbering.
6. Roof protection secondary to production.

#### In Bad Roof

1. Irregular timbering methods, or systematic timbering not used.
2. Lack of frequent and regular roof tests.
3. Taking chances under a bad roof to load a car of coal.
4. Roof protection secondary to production.
5. Delayed mining—setting the necessary timbers an hour or a day later than safety demands.
6. Safety posts not used.
7. Improper timbering—rock or coal breaks between props or crossbars.
8. Attempts to hold up draw slate: it is, to go under draw slate or draw rock that less refuse may be handled.
9. Timbering clogs and kettle bottom.
10. Improper timbering—timbers kick out.
11. Failure to set temporary or safety posts when pulling down or timbering bad roof.
12. Failure to test roof before removing temporary or permanent timbers.

#### Other Causes

1. Tracklayers, mechanics, machine men, drillers, shot firers, and others assume roof is safe. As they only work in a place a short time, they do not make roof tests. They assume that the previous crew has made the place safe.
2. Machines knock out props.
3. Lensing out of roof rock or roof coal that is not properly timbered.
4. Removing timbers by hand from worked out areas, using sledge, axe, etc.
5. Cutting face or rib with machine removes the only support of loose roof coal or rock.

Each of you can name a great number of other causes of accidents from roof falls; the purpose of this list is only to call attention to some of the more common ones.

The prevention of accidents from the foregoing causes generally is accomplished in four ways:

1. By systematic timbering.
2. By systematic roof testing.
3. By increased safety supervision.
4. By crew training.

Rigidly enforced systematic timbering is usually a remedy for the greater part of accidents from falls or roof due to human failures such as:

1. Too much dependence being placed on good roof.
2. Safety posts not used.
3. Loose ends.
4. Roof protection secondary to production.
5. Irregular timbering methods.
6. Taking chances.
7. Failure to set temporary or safety posts when pulling down or timbering bad roof.
8. Lensing out of roof rock or coal, and
9. Cutting face or rib with machine removes only support of slabs of loose roof coal or rock.

The justification for the use of timber in coal mines is that when coal is extracted some of the natural support for the overlying strata is removed. Unless some of this support is replaced promptly, numerous injuries and fatalities result. Systematic timbering provides the minimum timbering requirements to make normal working places reasonably safe as determined by the supervisory personnel of the mine. When substandard conditions are encountered, additional timbers should be set. In mechanized mines systematic timbering provides one of the ways to counteract partially the noise of the machinery; or it provides a way to make roof conditions safe in normal mining operations in any particular mine regardless of the amount of noise from mechanical equipment.

Systematic timbering methods usually provide for safety posts set near the working face and advanced as the coal is loaded out, and crossbar sets, with or without lagging, or props with cap pieces set at pre-determined distances to take care of roof conditions normally encountered as the coal is extracted. When systematic timbering is enforced we



find that the places are timbered regardless of condition or human failure; thus, the foregoing causes of accidents due to human failure are counteracted successfully.

It must be mentioned here that good results from systematic timbering may be nullified by the delayed setting of safety posts, crossbar sets, or props. When systematic timbering plans are followed properly, it generally provides protection for men and equipment against unlooked for hazards that cannot be charged to human failure, such as unseen slips, loose ends, or slabs of loose top coal or rock which may be cut loose from their only support when the mining machine cuts a place or a coal pile is loaded out.

We find that testing the roof at regular intervals of not more than 30 minutes is a good practice in the prevention of accidents from roof falls. A thorough check of the roof usually takes less than one minute. The procedure in our Sunnyside mine is as follows: For entry driving and shaker conveyor operation, the roof is tested at the beginning of the shift and at 30-minute intervals. On mobile loader units in rooms where pillars are not being recovered, roof tests are made at the beginning of the shift, when the machines enter the working place, and at 30-minute intervals thereafter until the machine withdraws from the place. In pillar work with either mobile units or shaker conveyors, roof tests are made at the beginning of the shift, at the beginning of the cutting, drilling, or loading cycle and at 30-minute intervals thereafter. Roof tests are made during car changes and when the equipment is idle. Roof testing bars are provided on each machine at the working faces.

We have found that systematic roof testing is difficult to establish, especially where the labor turnover is large. New employees must be drilled and constantly reminded to make regular and frequent tests of the roof. By this means the men know the condition of the roof, and constant care of the roof during the time of the exposure of the workmen is possible.

When bad roof is encountered the loose material is taken down or timbered promptly.

During my experience in coal mines I have observed that the mines which have the enviable safety records are rigid enforcers of their systematic timbering methods and other safety rules. One of the foremost causes of accidents is the toleration of conditions

not up to the standards required by the safety rules; that is, the tendency of production men to maintain production by taking chances occasionally in attempting to load out a fall of coal without doing the required safety work. It should be admitted that mine foremen and assistant mine foremen are primarily production men and although we hold them accountable for the safety practices in the mine, we find that better results are obtained by the employment of a safety engineer to check and redress on the safety practices of each crew. The responsibility for the enforcement of safety rules is placed more on the safety engineer, although full co-operation is demanded from the mine foremen.

We have found it advantageous to have the safety inspector make special investigations from time to time and report on the compliance with each particular safety rule by the men or crews involved. Safety inspections and supervision by the foremen and safety men check all safety practices in the mine. Are timbers set promptly when the proper amount of advance is made or is the timber setting delayed? Are unnecessary chances taken? Is the timber set correctly so that it will not kick out when sudden roof weights come? Are timbers and lagging placed properly so that roof rock or coal will not break and fall between timbers? Are kittle bottoms pulled down and is dead roof supported as it should be? Is timber from abandoned sections pulled out by mechanical means? Are safety posts set when pulling down or timbering large areas of bad roof? Are regular and frequent roof tests made, and is the roof tested before safety posts or other timbers are removed?

One large Illinois mine that has an excellent safety record holds the district foreman, or tank foreman, responsible for accidents from falls of roof in their section or district. Safety supervision is part of their duties. This is considered good practice so each foreman should know that his crew is working in a safe place or is working to make it safe. The safety supervision of the foreman or safety man plays a large part in crew training when the supervisor takes time to explain why certain procedures must be followed.

Safety rules and safety inspections cannot overcome the personal equation. Therefore, it is necessary that crew training be carried on, to establish practices in each working

place, so that the work becomes habitual or routine.

Age and experience are factors in miners' education; however, it appears that some men absorb all the knowledge that they will absorb regarding roof conditions within one to three years and after this stage is reached no further development is observed. In crew training the occasional toleration of unapproved conditions or violation of safety rules is extremely harmful. When men are observed working under hazardous conditions, we have found it worth while to suspend work temporarily for a few minutes to discuss the existing hazard. Employees sometimes state that incomplete crews or shortage of men on a crew cause safety work to be neglected. We attempt to convince the men that any reason for coal production work is such hazardous positions is not acceptable to us, and that even though only one man was working in a place, he should do his safety work first. While we insist on these conditions, we frankly tell the crews that production must be maintained as well as the safety work done, and that the doing of safety work is no excuse for failure of regular production. Of course, at times, there are exceptions to this rule of normal production.

The coal bed in The Utah Fuel Company's

Sunnyside No. 1 Mine has an average pitch of about 15 per cent with cover up to 2,500 feet. The coal bed has a sandy shale caprock about 24 inches in average thickness overlain with approximately 90 inches of coal. This unusual thickness of cover with caprock and coal above the coal bed mined introduces many hazards from falls of roof, bounces, and bottom heaving which oftentimes crush timbers within less than a second's time. We must therefore make sure that the crews on mechanized equipment at the working faces know how to set timbers properly, make regular roof tests, extract pillars cleanly, and maintain the correct break lines for the roof in the pillar sections to avoid bounces and bottom heaves. We teach the crews regarding the characteristics of the mine; the dangers from falls of roof that may occur with caprock 24 inches thick which may sound solid during roof test when the broken caprock area is larger; the correct method of setting props and crossbars in a pitching coal bed; how timber should be set to keep from kicking out; and similar details of their work.

The suggestions given here in general form can be applied to advantage in the prevention of accidents from falls of roof in mechanized mines if such practices are not now in effect.

## Overload Protection of Electric Circuits Underground

By A. LEE BARRETT

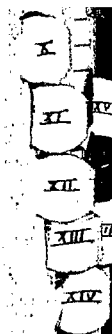
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Mine power systems are quite different in many respects from those usually found in industrial plants. Wide areas are served, usually by a circuit which is connected continuously throughout the mine. In some mines one circuit may run for several miles. There are usually a small number of branch circuits involved considering the areas covered. In all mines, circuits are sectionalized at approximately 3000 ft. by means of switches. All branch circuits, or at least most branch circuits, are sectionalized by manual switches. In some mines automatic switch gear is used to give automatic overload protection at various logical points in the system. However, at the present time this practice is by no means general.

Circuit hazards in mine electric systems are much greater than those encountered in industrial installations. A prominent hazard is falls of roof or coal, which may break the wire and may cause ground faults or partial ground faults. Ordinarily electric cables in mines cannot be insulated so that a fall can easily cause a short circuit.

The humidity in most mines is greater than 95 per cent and at many points the floor is wet and water may be dripping from the roof over insulators, increasing the difficulties at that point.

Most coal mine entries fall in the range from 5 to 9 ft. high, and from 9 to 15 ft. in width. All electrical circuits must be contained in these entries and space must also



be provided for moving equipment and men. Consequently, due to the proximity of the power circuit to the locomotives and other moving equipment, a considerable hazard is introduced. Mine haulage track is not always good so that wrecks are not unusual. A wreck frequently does considerable damage to the power circuit. Difficulties caused by a ground fault or mechanical breakage are much more serious than usually is the case in industrial plants.

A ground fault frequently results in heavy arcing, which may be sustained. If the damage to the circuit is mechanical it may mean that a trip of coal has wrecked and a great deal of coal dust could be thrown into the air as a result of the wreck. The arc resulting from the ground fault could ignite the coal dust resulting in a mine explosion. A continued ground fault even if high in resistance may also ignite the coal which may be on the bottom of the entry and a mine fire may result. The fire hazard is one of the most serious hazards in any coal mine.

Since the mine circuit is completely interconnected, any power interruption resulting from a fault seriously affects the whole operation. Unless the mine is completely sectionalized the whole mine will be shut down until the fault is located and the proper switches are opened to isolate the fault; even then large areas may still be without power if they are supplied by a single power circuit which may be opened in isolating the fault. Further, mine power is usually supplied from a relatively small number of sub-stations and the fault may be on a sub feed circuit, in which case power cannot be restored until the fault has been cleared.

In general, direct current is used in mines. There are some smaller installations where alternating current has been used and the future probably will lead to more alternating current installations. Voltages in most common use are nominally 250V and 500V direct current; actually sub-station voltages are more usually 285 and 585.

Practice varies widely with respect to placement of sub-stations. They will usually be spaced from 1 to 2 miles in 500V operations, and at 1 mile intervals or less, in 250V operations. Actual mining operations govern sub-station placements and no general rules can be followed.

As has been previously stated, overload protection varies widely from mine to mine. It

can be seen from the foregoing discussion that there is a great need for adequate overload protection of electrical circuits in mines. A great deal is yet to be done in this direction.

Installation and operation of overload protective equipment should be handled with engineering care. Numerous instances have been brought to light where overload equipment was serving no useful purpose because of circuit conditions and improper placement of the overload protective equipment.

The mine track system is used for one side of the electrical circuit in practically all mines; as a result circuit uncertainties are always present unless track bonding is checked from time to time.

A series of tests now being conducted by Mr. F. E. Griffith, formerly of the Pennsylvania Department of Mines—currently with the U. S. Bureau of Mines, and Mr. C. L. Brown of the U. S. Bureau of Mines is uncovering some very interesting information with respect to mine circuits.

When published, this information will undoubtedly be of great help to coal operators in laying out and operating mine electrical systems. Their tests show that mine circuit resistances approach their theoretical value in few cases. Usually they are higher and it is not unusual for the resistance to be double the theoretical value. (This points to the fact that more attention should be given to maintenance of mine circuits than is usually given and foreshadows a very pertinent problem in overload protection.)

A number of cases have been found where the circuit resistance was high and the overload setting required to handle the normal load on the circuit was also high so that a direct short circuit, at the end of a sub circuit, would not result in enough current to trip the overload device. This is obviously a dangerous situation and one which should be corrected either with sectionalizing breakers or with adequate circuit resistance.

There are usually five points in the underground distribution system at which overload protection might be applied: (1) At the sub-station; (2) between sub-stations; (3) at main branch circuit junctions; (4) at secondary branch circuit junctions; (5) at equipment connections.

At the sub-station protection is desired for the conversion equipment, for the station wiring, for the distribution circuit to sec-

tionizing breakers, and in some instances—to the face. Usually the sub-station is located near the main haulage circuit and some protection is afforded main line locomotive by the overload protection provided in the sub-station.

Interrupting capacity required in overload equipment located at the sub-station is primarily determined by the capacity of the incoming alternating current line. Direct current circuit resistances in the proximity of sub-stations are quite low and would allow excessive current to pass if not limited by incoming line characteristics. Usually an interrupting capacity of 25,000 amp. is sufficient, though in some cases interrupting capacity of 50,000 amp. is better practice.

Protection at this point usually consists of hand or automatic oil circuit breakers ahead of the conversion equipment and of individual direct current circuit breakers—either manual or automatic reclosing, for each direct current circuit leaving the sub-station. In some mines it is the practice to tie all circuits leaving the sub-station to one automatic circuit breaker. This has the disadvantage of requiring high circuit breaker settings minimizing circuit protection on individual circuits.

Sub-station sizes in mechanized mines range from 300 KW to 1000 KW, and may be either rotary converters, motor generator sets, or rectifiers. Breakers must be installed with a continuous capacity in line with actual operating conditions. Circuit hazards in the sub-station conversion equipment and wiring are comparable with those found in industrial plants. The situation changes quickly however, when the circuit enters the bore hole or connects to the mine distribution system.

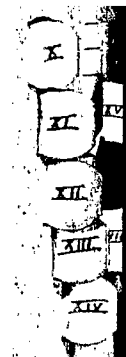
Feeder circuits almost always parallel and include the trolley wire, so that they are exposed to dripping water, falls, and wrecks occurring on the haulage ways. Fault resistances may vary from 100 ohms or more to 0 ohms in case the trolley wire directly contacts the rail. There are no circuit breakers at the present time smart enough to differentiate between a high resistance fault and a normal mine load. The normal instantaneous output of a mine sub-station is usually between a 75 per cent and 800 per cent of the sub-station's current capacity. Depending on the circuit layout of the mine, all of this load or a part of it may appear on an individual distribution circuit. Obviously, under these

conditions, it is very difficult for circuit breakers to provide much protection against mine fires resulting from high resistance ground faults.

The required circuit capacity of main feeder lines varies from mine to mine, and in a given mine. The usual overhead conductor capacity between sub-stations is of the order of 1,000,000 circular mils including trolley wire and feeder wires in 500 volt mines, and 2,000,000 circular mils in 250 volt mines. The rail side of the circuit usually has approximately the same capacity, although in 500 volt mines with heavy track the capacity may be greater. Where automatic reclosing direct current circuit breakers are used on the various feeder circuits out of the sub-station, attention should be given to the proper reclosing time. Considerable difficulties are encountered with equipment in the mine if the reclosing time is too short, while the loss of time would be too great if the reclosing time were long. A minimum reclosing time of approximately 30 seconds is good practice, and maximum reclosing time should not exceed one minute. Minimum reclosing time is established by the time required for motors to come to rest or be completely disconnected from the distribution circuit in such a manner that they will be re-cycled through their starting cycle when power is restored. If sufficient time is not provided for these things to happen, flash-overs may occur on the motors involved.

Safe reclosing loads is also a matter for serious consideration at the sub-station. Good practice requires that permanently connected loads such as heaters and lights be held to a minimum as it is impossible for the breaker to differentiate between such loads and fault loads when attempting to reclose. It is poor practice to use any across-the-line starting motors controlled by knife switches on mine circuits, as the armature resistance of a direct current motor is very low at standstill, and the sub-station breaker cannot differentiate between the load and the load caused by a ground fault.

On idle days and off-shifts it is common practice to shut down all but one or two sub-stations at the mine, feeding all circuits from the remaining operating sub-stations. This introduces an additional hazard due to the fact that additional circuit resistance is inserted from a load point at the end of a mine circuit and the sub-station which may be serving that point. Under these circum-



stances circuit resistance can be so high that the circuit breaker will not trip even in case of a direct short circuit at the remote point. One method of eliminating this hazard is to provide two circuit breaker settings easily adjusted on the sub-station breakers—one setting for normal work-day conditions and a much lower one for idle days or off-shift conditions. This greatly improves protection against faults which might cause fires.

It is good practice to install an automatic reclosing circuit breaker in the main feeder lines between each two sub-stations. Usually this tie breaker would be installed at the load center of the circuit running from one sub-station to the other. At this point the interchange of current on the circuit is a minimum and will allow for the lowest circuit breaker setting. This is an important consideration if several sub-stations are used on a common circuit, as it will assist in isolating the fault from a remote sub-station whose working breaker setting may be excessive when the distance from the fault to the sub-station is considered. Minimum circuit resistance between this tie breaker and the sub-station is usually in the order of .06 ohms for the 500 volt installation and .03 ohms in the 250 volt installation, so that interrupting capacities in excess of 10,000 amperes are not required for this type of service. Maximum loads carried by this sectionalizing tie breaker will be less than half the maximum load fed to the circuit by sub-stations at either end. As with sub-station breakers, an idle day or idle shift presents certain problems if all of the mine sub-stations are not operated. As in the case of the sub-station breaker, it is good practice to provide two current settings easily adjusted on the tie breaker so the current rating can be considerably decreased during idle periods. This will provide much better protection against high resistance faults which may not operate sub-station or tie breakers when operated at normal current settings.

Reclosing time of the tie breaker should be short as compared to the reclosing time of a sub-station breaker since the reclosing time of the tie breaker is added to the time of the sub-station breaker. If the tie breaker does not close in quickly there may be a serious increase in voltage on one side of the breaker on closing which could cause flashovers.

It is good practice to install circuit breakers at the junction of main branch circuits and interconnecting circuits between sub-stations.

A fair degree of protection may be obtained in 500 V mines however, without the use of main branch circuit breakers providing circuit conductivity is good. Main branch circuits in general lead face entries or panel entries which include the mine working sections. The average circuit resistance between the main branch circuit breaker and the sub-station would be in the order of .06 ohm for 500 V mines, and .03 ohm for 250 V mines. These values are quite variable however, since it is possible for a main branch circuit to break off very near a sub-station, and since there is considerable variability in mine power systems. In 500 V mines main branch circuits usually have about 500,000 circular mills in the copper circuit and the equivalent of about 1,000,000 circular mills in the track return. 250 V mines in general have about 1,000,000 circular mills in each side of the circuit. Main branch circuits may extend to a distance of approximately 5000 ft. They are gradually built up from 0 as the section is developed to their full extent and gradually reapproach 0 as the section is worked out.

Interrupting capacities of 10,000 amp. are usually adequate for these breakers though in certain instances where the circuit connects close to a sub-station higher interrupting capacity would be required. The power supplied to a main branch circuit is as variable as the extent of the panel entry or face entry. Breaker settings of around 1000 amp. for 500 V mines, and around 8000 amperes for 250 V mines are usual.

Reclosing time should be similar to that for sub-station breakers for the same reasons. Resistance of the main branch circuit at the time of reclosing should be as high as possible, in order that good protection may be had against high resistance ground faults. Normally it would not be expected that there would be too many fixed loads such as lights or resistances in these areas.

A dual overload setting is good practice on circuit breakers for main branch circuits, as they are useful on idle day and off-shift periods, when only a small pumping load may be carried. Much better protection is secured against fire if a dual overload relay setting is used.

Secondary branch circuits are usually working section circuits or butt entry circuits. In some instances two working sections may be a part of the secondary branch circuit. These circuits usually have a minimum length of ap-

proximately 500 ft. and build up from 0 to 2500 ft. dropping back to 0 as the section is worked out. It is not general practice at the present time to use sectionalizing circuit breakers for secondary branch circuits; however, it is felt that this would be a very good practice.

Secondary branch circuits may usually be adequately protected with 300-500 amp. circuit breakers in 500 V mines, and 600-1000 amp. circuit breakers in 250 V mines, settings are variable depending on the extent of the section.

Circuit resistance from the secondary branch circuit breaker to the sub-station is highly variable depending on the location of the junction of the secondary branch circuit with the main branch circuit. Good practice would indicate that in 500 V mines the maximum resistance at the secondary branch circuit should be around .20 ohm and the minimum resistance to the secondary branch circuit breaker should be around .03 ohms; in 250 V mines these values should be approximately .10 ohm and .03 ohm. These figures indicate that circuit breakers of 10,000 amp. interrupting capacity should be used.

Various types of equipment may be used to protect secondary branch circuits. Automatic reclosing circuit breakers are probably the best overall, however, automatic reclosing contactors can be used satisfactorily as can hand reclosing circuit breakers. The difficulty with hand reclosing equipment is the time required for a man to travel from the working face to the secondary branch circuit breaker in order to reclose it, and the lack of knowledge on the part of the operator as to what the circuit conditions are at the time of reclosure. It is entirely possible to use fuses for the protection of secondary branch circuits; however, the same objections would apply to fuses as hand reclosing circuit breakers and the cost of operation would be higher. Reclosing time for secondary branch circuit breakers should be approximately 30 sec. in order to give equipment time to clear the line.

The best idle day protection for secondary branch circuits is to disconnect the power; however, if it is necessary to leave power on secondary branch circuits dual overload relay elements can be used giving the maximum protection during times of low load. A common practice with considerable merit is to provide small fuses for these sections during

idle time, which can be inserted or cut out by the operation of knife switches.

Electrical equipment used in mines can be classed in three general groups: stationary equipment, such as pumps, compressors and shop equipment; semi-portable equipment, such as belt, shaker and chain conveyors; elevating conveyors and car moving equipment and portable equipment, such as locomotives, mining machines, shuttle cars, loading machines and drills. Portable equipment is usually supplied with cable reels and lengths of cable running from 350 ft. to 500 ft.

Stationary equipment is usually installed in a manner very much similar to surface stationary equipment. Wiring is usually adequately protected and danger from fire is reasonably remote. Circuit hazards too are greatly reduced as stationary equipment is usually located in well timbered areas or in permanent underground buildings of tile, concrete block, or brick. Choice of protective equipment depends primarily on the size of the equipment. In most instances fuses are adequate and most economical.

Semi-portable equipment such as conveyors are usually wired in a less protected manner so that good circuit protection is desirable to insure protection against fire or explosion. Frequently conveyors are so located and ventilated that coal dust may introduce a hazard. While this can be kept definitely under control by the use of water and rock dust, it is a sound plan to add all the protection in the circuit that is feasible.

The best protection for this equipment and its wiring is an automatic or more usually a manual overload circuit breaker. Contractors are also satisfactory since an interrupting capacity of approximately 5000 amp. is adequate due to the high circuit resistance from the equipment to the sub-station. Secondary branch circuits feeding this equipment are usually of approximately two hundred and eleven thousand circular mills in 500 V mines and 422,000 circular mills for 250 V mines. On the basis of average circuit conditions throughout the mine, it would be expected that the average resistance from stationary equipment to the sub-station would be in the order of .15 of an ohm for 500 V mines and .075 ohm in 250 V mines. Resistance from the equipment to the sub-station can, however, vary widely—depending on the location of the equipment on the secondary by-circuit,



the location of the secondary branch circuit on the main branch circuit, and the location of the main branch circuit on the main feed lines. Fuses have the difficulty that blowing time of larger size fuses is long. This may mean an arc of several seconds to as much as a minute duration before the circuit is open. This obviously introduces unwanted hazards in dusty areas.

Portable equipment such as shuttle cars, locomotives, cutting machines, and loading machines are equipped with trailing cables ranging in length from 350-500 ft. 500 volt mines in general use 26 and 24 cables, whereas 250 volt mines use 24, 22 and 21 cables—depending on the size of the equipment involved. The following table indicates the circuit resistance of various cable sizes in common use.

| Cable Size | Ohms Resistance<br>for 500 ft. Cable |
|------------|--------------------------------------|
| 26 cable   | 40 ohms                              |
| 24 cable   | 35 ohms                              |
| 22 cable   | 16 ohms                              |
| 21 cable   | 13 ohms                              |
| 20 cable   | 07 ohms                              |

It will be noticed that these cables add a significant amount of resistance to the circuit on which they are used, and that the current flowing in case of a fault in the cable is reasonably well limited.

Portable cables are subject to a number of hazards including falls of roof, mechanical damage in handling, and possible damage from associated equipment. They present on failure one of the most serious problems in the electrical circuit since they are in the active working place where gas and dust accumulations are most likely to exist.

Most portable cables are presently protected by fuses at the point where they attach to the main power circuit of the mine. In order to hold trolley tap cable fuses to small

sizes, fuses are manufactured which are not approved by the Bureau of Underwriters, because of their small size. As a result there is considerable variability in the blowing time of fuses manufactured by different concerns. It is not unusual when failures occur for a cable arc to persist (under certain conditions) for as much as one minute, when fuses are used.

It is thought that very much better protection could be had from the use of circuit breakers at this point, since fuses require considerable time before blowing in case of a fault. Experimental installations of small circuit breakers in trolley taps have indicated that a greatly improved situation exists when they are used. People using such circuit breakers report that no flashing has been seen when cables fail. At this time there is need for the development of a small trolley tap circuit breaker which would be light in weight—preferably less than 15 lbs., rugged in construction so that it could be handled rather roughly in moving the equipment, and reasonable in cost—preferably not more than \$50.00.

It is realized that the considerable distances involved in mine electrical circuit makes adequate servicing, testing, and inspection a problem. However, the hazards present are serious. It is felt that a great deal more than ordinary engineering study should be given to the layout and design of electric circuits underground. Overload protection should be carefully thought through to insure that the mine is properly protected under all conditions. Inspection could profitably be improved in order to prevent the wide divergence of theoretical and actual circuit resistance in the mine. Such a program would go a long way toward improving the economics of power consumption in mining as well as to increase the safety of the mining operation.

## Advantages and Disadvantages of the Machine Safety Ground

By F. E. GRIFFITH

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The idea of safety ground is not new, and it did not originate with the Federal Bureau of Mines nor the "Krug-Lewis" agreement of 1946. In Bureau of Mines Technical Paper

404, "Safety Rules for Installing and Using Electrical Equipment in Coal Mines," published in 1926, the Bureau advocated safety grounding, but safety grounding (earthing)

was required by law in British coal mines as early as 1911. In at least five states of this country, safety grounding is required by law, and most coal-mining departments of the other coal-producing states recommend it.

The National Electrical Code and the National Electrical Safety Code require safety grounding of the frames of portable equipment, specific mention being made of equipment used in hazardous locations, such as places where combustible dust or flammable gas may be suspended or diffused in the air.

Industries other than mining have practiced safety grounding of non-current-carrying metal parts of electric machines and equipment for many years prior to 1906. The petroleum and other industries, as well as most mining companies, have much capital invested in their properties and are interested in the protection of that investment, as well as in the protection of life.

Power companies, for years, have spent much time and money to keep frames of equipment connected intimately with earth. In some cases, in order to obtain a low-resistance safety ground, several miles of counterpoise are installed to obtain a good earth connection. The track in a coal mine has proved to be a natural counterpoise owing to its multiple contacts with the mine floor and is the best available medium of connection for safety ground.

The advantage claimed for safety grounding is that it will prevent or greatly minimize a dangerous electric potential difference between metal frames of mining equipment and other objects which are at or near earth potential. Thus, the danger of electric shock will be lessened; also, arcs and sparks from such protected equipment will be minimized, provided proper circuit protectors are used to immediately demerize the power conductors if a fault to frame occurs.

In discussing the disadvantages claimed for safety grounding, I shall give my opinion of their relative merit or justification. Disadvantages claimed for safety grounding are:

1. The increased cost of trailing cables if provided with ground conductor.—Certainly, this is a justifiable objection, but, if safety is involved, handsome dividends may accrue as a result of the increased cost.

2. The increased size of trailing cable with ground conductor and insufficient capacity of present reeling devices for the larger size

cable.—This is not a well-founded objection because trailing cables are being manufactured having two current-carrying conductors plus ground conductor. These cables are little, if any, larger than the original two-conductor cable.

3. Requiring a safety ground conductor in trailing cable may result in installing trolley wires closer to the faces.—This objection is not justifiable, for relatively little weight need be added, and the major and minor outside dimensions of some parallel cables being constructed are practically the same as for previously constructed two-conductor cables.

4. More time is required to splice cable with three conductors.—Yes, more time would be required to splice the three conductors; but, on the other hand, if proper circuit-opening protection were provided, fewer splices would be needed.

5. The cables are harder to handle because of the added weight.—The weight added by the safety ground conductor hardly justifies this objection.

6. There is danger of connecting wrong wires when splicing, and a careless operator may connect the neutral (so-called return) power conductor and safety ground conductor together at the rail tap.—Splicing the wrong conductors together is certainly a possibility, as is also the connecting of the neutral power and safety ground conductor to the same rail tap. Where this is found it indicates a lack of understanding and negligence on the part of officials in giving proper instruction and training.

7. An electric fault to frame, in the event of poor voltage regulation may cause trailing cables to heat dangerously or even ignite.—This objection is justified in the case of a solid safety ground (solid ground conductor is one that has sufficient capacity to carry full load current), but poor voltage regulation should not be permitted nor tolerated in coal mines at any time. Low voltage may not only create a danger with safety grounding, but an equally great or greater hazard throughout the entire direct-current power system. Poor voltage cannot be justified, either from the point of view of safety or economical operation.

8. With solid safety grounding, a short circuit in the current-carrying parts of the motor or control gear may burn a hole through the explosion-proof compartment.—From a theoretical point of view, this argu-



ment is justified, but, from personal observations, I have found many more holes burned through explosion-proof compartments where a safety ground was not installed than where such protection was provided. This is also an argument for better overload protective devices.

9. A safety ground on a machine exerts added strain on insulation.—This argument is justified in cases where the metal frame is insulated from earth, but mobile mine equipment either rests on or intermittently contacts the track or objects at track potential; therefore, the winding and conductor insulation must be adequate to withstand this strain.

10. The electric shock hazard is not great enough to warrant safety grounding, because accident statistics do not show sufficient frequency to justify the added operating difficulties.—Electrical accident reports do not give adequate detailed information concerning the fault or failure responsible for the accident; thus, it has been difficult in the past to compile a comprehensive break-down of these accidents that would cover all the sundry causes. Certainly, relatively few electric shocks received by mine workers result in their being injured or killed. It should be kept in mind that an electric shock may not in itself be injurious, but may startle or throw a person off guard while performing work that involves certain elements of danger, and he may be caught in revolving gears or cutter chains, or run over by moving equipment, and killed. While I was working as mine foreman, a machineman stepped into a moving coal-cutting chain and his limbs were ground off up to and including part of his pelvic structure. He lived for several hours following this injury, much of which time he was fully conscious and suffering relatively little pain. In effect, his story concerning the accident was that, upon touching the machine frame, he received a shock which so startled him that he inadvertently stepped into the moving cutter bits. Examination of the machine revealed that the motor winding had short-circuited to the frame and had charged it to full line potential. If this machine had been protected with a safety ground, the accident would not have happened. Was electricity responsible for the death of this man? The report on this accident did not indicate that electricity was involved in any way. There are a number of other cases with which I am familiar where

electric shock was indirectly responsible for death and injury.

11. With off-track equipment, it is claimed that most of the current would be attenuated and that the shock would not be too severe.—The idea of attenuation of fault current following diverse paths and thereby reducing the severity of shock or magnitude of current and potential in any one path is not well founded. In the first place, attenuation of electric current straying through many paths is potentially bad. It may be responsible for premature detonation of blast fired electrically, or minute arcs or sparks may be the ignition source of a methane-air mixture. Moreover, actual test data obtained by the Bureau of Mines shows mine floor to be erratic in conductivity. In one case, the floor where the cutting machine was resting showed high dielectric strength; yet only a few feet away the resistance was low, and full-line potential could be measured from this point and the metal frame of the machine.

12. The opening of the track-conductor circuit outby the point of safety ground attachment would energize to line potential the machine and all other equipment on the inby track, including the track, if a fault occurred on the protected machine. This claimed disadvantage is not well founded nor justified. If this were true, then, under a similar set of circumstances, except that the machine was not provided with a safety ground, the metal frames of the equipment would raise to trolley-wire potential every time the controller was fully opened. Therefore, this condition would prevail with or without safety ground. We know that this condition is not obtained in actual practice. Bureau engineers learned some years ago from tests and measurements that unhooded mine tracks poorly insulated, and in one case room tracks insulated from the main or bonded track system, showed exceptionally low resistance to the main body of earth. This, in all probability, accounts for the fact that we do not appreciably raise the potential of mine tracks above earth potential, certainly not to the point where it would produce serious electric shock. The main point is that safety grounding would not add to nor minimize this claimed hazard.

13. At least one oppositionist claims that safety grounding will not work satisfactorily nor be generally installed on mobile mining equipment until better circuit-protected apparatus is developed or available for mine

application. I am wholeheartedly in accord with at least part of this line of thought; this concerns development and procurement of better circuit-protective devices. Moreover, I agree that more satisfactory results can be expected if such devices are used in conjunction with safety grounding. There has been much agitation on the part of mining electrical men for a single-pole, power-tap circuit breaker for mobile equipment application. I might state that there is at least one manufacturer devoting considerable research in this direction.

It appears to me, in summing up the many objections to safety grounding, that what is wanted is improved overload and short-circuit protective devices to be installed with or in conjunction with safety grounding. The principal question is not so much whether protection is necessary, but how or what method can be used to obtain maximum safety. In other words, it seems to boil itself down to making a choice between two methods, namely: 1. A solid safety ground connection, one in which the conductor is of sufficient size to carry the full load current so it will operate directly the circuit-protective devices; and 2,

a relay circuit-breaker device, one in which a small conductor can be used to carry a small fault current sufficient to cause the circuit to be deenergized.

It appears to me that we must compromise our differences and thus make a virtue of necessity, split the difference, and get on with things of equal or greater importance in coal-mine electrification.

There are many prudent, foresighted legislators and mining engineers who advocate abolition of electricity from coal mines and favor the use of Diesel, compressed air, or hydraulic power for coal mines. I do not anticipate any immediate action in this direction, but if mining-electrical engineers procrastinate and bicker over this issue it will decidedly strengthen the hand of those proposing abolition. It is my thought that this problem can be handled amicably and at the same time provide adequate safety.

An approach toward solving this problem would be for the mine workers' and coal operators' appeal board to appoint a committee of unbiased informed men to sit down and prepare rules on this subject that will be final and binding.

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# *Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME IX

COMMERCIAL VEHICLE SECTION

NATIONAL SAFETY COUNCIL, INC.  
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## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

### THE NATIONAL SAFETY COUNCIL

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## 35th National Safety Congress Transactions

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Commercial Vehicle Section

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TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: EDWARD J. EDMOND, Director of Automotive Safety, Armour & Company

## Making Better Use of Safety Materials

(Panel Discussion)

Discussion Leader—J. P. HIGHTOWER, Mgr., Dept. of Safety & Personnel, Pennsylvania Greyhound Lines.

Participants:

H. M. CLAYTON, Standardization Eng., Memphis Gas, Light & Water Div.

GROVER MACKLEM, Safety Dir., Railway Express Agency, Chicago.

MAX JENSEN, Supt. of Operations, Consolidated Freightways, Inc.

GORDON WALKER, Safety Dir., Denver Chicago Trucking Co., Inc.

MR. HIGHTOWER: I will now entertain any question you might desire to ask. Undoubtedly there are many of you who would like to know more about contests, bulletin boards, pay envelope inserts, the mailing of safety material to homes in lieu of the direct handout, the use of the dash card, the use of films, and the use of supervisory material which the National Safety Council makes available to you.

MR. CLAYTON (Oklahoma City): I just wondered what other use would there be for bulletins except putting them on a bulletin board?

MR. CLAYTON: We have found it very effective to use posters as a back-drop at our safety meeting.

MR. MACKLEM: Is it a poster or bulletin? MR. HIGHTOWER: I think the question would include either.

MR. MACKLEM: I think there is a good use for both at a safety meeting. In other words, your bulletins do contain a message, such as an analysis to deal with some specific item you are having trouble with, and I believe it can be rehearsed in open meeting to good advantage. The same way with the poster. If it is posted near the bulletin board, it does attract attention to the bulletin board and is a means of having the other material on the board read.

MR. JENSEN: In line with Mr. Macklem's remarks, I have found posters helpful in analyzing the accidents that have happened in the past few months. Each one of them,

of course, carries a specific type of accident. In using them for analysis, they make a very good basis to lay down your framework for future accident prevention.

MR. H. D. SCHEFFER (Lansing, Mich.): I would like to direct a question to the panel. How successful has the sending of direct mail to the driver been? If they have used it, what was the ultimate cost and was the expense really more than offset by the gain from that type of campaign?

MR. HIGHTOWER: You have in mind whether or not the direct mail of safety material to the employee's home is a better means of getting the thought across than a handout and whether the cost is justified?

MR. CLAYTON: I have always liked to get my mail at the office because there is a place there for the mail to be delivered, and there is a place to sit and read it. But it is a different proposition in handing out something to the driver of an automobile or truck. He has no office; he has no place to read it except at home, and by the time he has wrestled with the letter all day, it is probably ruined when he gets home. For that reason I feel that mailing should be to his home.

If it is worth sending the man in the first place, it is worth mailing to him so that he can get some good out of it. Delivery of unaddressed mail by others is very unsatisfactory as I have found it, and by delivering it through the mail, you can rest assured they will receive it. I am very much in favor of mailing to the homes all of this information that we wish to send to the drivers.

MR. MACKLEM: I agree with Mr. Clayton. I think it serves a double purpose because after all, if we are going to seek reduction of accidents we have got to carry into the homes literature which benefits not only the driver but also his wife and family. It is pretty hard to measure the value of it. I might quote one incident.

A driver changed his address. He moved his home and failed to give a supervisor his new address. His wife didn't receive that



material at home for the next couple of months. Finally she wrote me and wanted to know where the material was; so we caught up with him.

That incident shows the benefit of mailing to the home.

MR. JENSEN: There is not very much I can add, except that I agree with the remarks of Mr. Clayton and Mr. Macklem. We all know how many safety bulletins have been consigned to filing, even when they are placed in a certain spot which is accessible to the drivers, so I feel the expense is justified.

MR. WALKER: We have used two methods very successfully in our operations. A home delivery to the drivers' wives, I believe, is much better than the handout method.

MR. HIGHTOWER: I take it, in summary, the panel is of the opinion that direct mailing does guarantee that the employee will receive the message, and further, it has the advantage of putting it in the driver's home, the message which not only the driver but his family will read. As a result, perhaps the family will have some influence upon the driver or employee.

Further, I would also say that any man who sits down in leisure time to carefully read your message, which he will do at home, is going to retain that message a much longer time than if he stands at a dispatcher's window or at a terminal dock and reads it and others on the bulletin board. As a matter of fact, the longer it lays around the house, the more times he may pick it up and read it; therefore, the thought may stick with him longer.

MR. GRUMME (Silver Fleet Motor Express): I have heard some say that too frequent mailings of safety messages to the individual breeds lack of interest and doesn't get the desired result. On the other hand, more lengthy and less frequent messages to the individual brings better results.

MR. HIGHTOWER: The question for consideration, gentlemen, is whether or not we think too frequent mailing lessens the effect of the material?

MR. CLAYTON: We have attempted to keep our mailings down to one a month. That, I do not think, is too frequent. But I do believe that you could have them too frequent. That is just an opinion and not from experience. So far as making them longer and less frequent, I don't think any mailing is any good if the material is too lengthy.

MR. MACKLEM: I agree with Mr. Clayton. It has been my experience that it is better to put over one point at a time rather than to pile up a lot of reading matter that a man won't take the time to read. I think we do get plenty of it as it is. If you can put over one point and deal with that one point thoroughly, you have accomplished something. We confine our mailing of literature to drivers to once a month.

MR. HIGHTOWER: I would like to ask a question. When you refer to getting over one point at a time, have you ever in your experience, continued with the same theme for several months in succession?

MR. MACKLEM: We sometimes use the cause of accidents that we might consider the most frequent. We will add maybe just one line at the bottom, "To watch out for back-up accidents," or some little message pounding away on that high-frequency accident cause.

MR. HIGHTOWER: Mr. Jensen, can you add anything to this opinion as to whether too frequent mailing of messages to the home lessens the value of the message?

MR. JENSEN: There is a point, I guess, beyond which we should not go in the frequency of mailing, but I believe the degree of assimilation depends on the way the material is prepared. I have tried to check my mailing system, being sure it contains the cartoons, the posters, and be sure it is consistent to the point, and has a little humor, then have that stressed the next week and the next week. I don't believe that long messages over long intervals will get better results than short ones.

MR. WALKER: I agree with Mr. Jensen. We send out literature possibly once a week, too. That includes all kinds of literature like *The Driver Letter*, the National Safety Council letter, the house organ, and special messages, too, from time to time. All in all, something goes out about once a week.

MR. HIGHTOWER: Do you send different types of literature out in the same envelope? I mean, several different types of literature?

MR. WALKER: No, always one type.

MEMBER: We have a slogan contest that runs every month. The contest ends on the 15th of the month, and the slogan is used at the bottom of all correspondence regardless of what the subject may be to the driver personnel. It is a short slogan which the drivers themselves send in to us, and

for the winner, we give a little prize. It doesn't amount to much, but for so consecutive days that same little driver slogan is shot at at our fellows on every conceivable piece of correspondence which goes out to driver personnel. The contest generates enthusiasm because we get a surprising number of letters. We get the home and two or three others from the mechanical department to decide which is the better slogan, and then all correspondence that actually goes out to our driver personnel carries that one little pertinent phrase. It is just a little shot-in-the-arm idea which generates interest.

MR. HIGHTOWER: Is that for the distribution of your literature and correspondence that is mailed into the home of each employee?

MEMBER: Yes, everything we may use. MEMBER: I would like to ask this question of the panel. What success, if any, have you had in driver participation by way of expression or answer to mail in which "quizzes" are used? Suppose we send out a picture with a number of improper driving illustrations, and ask the drivers to check or correct the errors.

MR. CLAYTON: I might say that we have made a practice of mailing out *The Driver Letter* to the drivers, and that letter one-month ran quite an article about how to honk your horn. Any of you who know the laws of Memphis know that horn honking is absolutely prohibited, and I had 88 phone calls asking whether we were going to let the bars down so the drivers could honk the horns. Since then I have been very careful to proofread these letters before I mailed them. But there were 88 men who thought enough of it to call up about it, although only five hundred of the letters were sent out.

MR. HIGHTOWER: One of the members in the audience has asked whether or not there have been any results from direct mailing from the standpoint of corrections by the employees and also of constructive suggestions as a result of your direct mailing?

MEMBER: That is, the real answer to the particular problem we might send out.

MR. HIGHTOWER: Have you ever presented to your drivers a problem confronting you?

MR. CLAYTON: No, we have never presented them with anything that required an answer. For one reason, we didn't want to be overly disappointed in the number of

answers. I always try to answer letters that are written to me, and yet I forgot to answer one letter that came to me. We are very prone to forget to answer letters, and these men on trucks, I imagine, would be worse than anyone else. We have never put it up to them on the basis of asking for an answer.

MR. HIGHTOWER: I more or less agree with that. We have an awful time getting them to make up a log or an accident report.

MR. MACKLEM: I am afraid I can't help out there. I haven't had any experience. I feel like Mr. Clayton, that it is trouble enough to get them to make out the reports we have already asked of them.

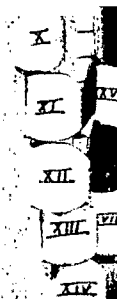
MR. HIGHTOWER: Mr. Jensen, in your Consolidated Freightways, have you had any results from your direct mailing?

MR. JENSEN: Yes, with varying degrees of success in so far as the answers are concerned. Just recently we tried out a plan that seems to be producing a few more replies than before. We are circularizing drivers on specific problems: "How do you reduce back-up accidents?" "What constitutes defensive driving?" The best answers are printed in our semi-monthly magazine along with a picture of the driver. That seems to be producing more replies than ever before.

MR. WALKER: I have tried to measure the results of direct mailing by questionnaires sent out to the drivers and have specifically asked that the drivers don't sign them so that I could get an honest cross section of the way they feel. The results have been encouraging. As I said, I have tried to measure the results of direct mailing through the use of questionnaires. When I send them out I specifically ask the drivers not to sign them when they send them back to me, and I have been getting about 80 per cent back, and the replies are very encouraging.

MR. HIGHTOWER: Have any of you employers in the audience, through direct mail to the employees at their homes, presented some of your problems and invited an answer or a corrective suggestion?

MEMBER: In answer to the first, we have had fair success. I would say that perhaps they thought it was compulsory, something that at the time we tried to dissipate, and most of them did send them back. I think the suggestion of having no signature may be very helpful. The type that we sent out



was a questionnaire, and we sent out one on which they marked the various things that were wrong. We have got a new plan in mind now. They want to get a cross section of opinion before we use that as part of our over-all supervisory training program.

MR. HIGHTOWER: If you feel free to do so, can you give us a concrete example of some of the things you have asked them through your direct mail? What are some of the problems?

MEMBER: We sent out a questionnaire involving some 80 or 90 questions on rules of the road and particular ordinances that might be violated and asked for the answers. We got answers to practically every one. We sent out one on tools that were mislaid. Then we used that in the same pattern in driving and got a pretty fair response. Those are about the only two I can offer at this time.

MR. HIGHTOWER: We have touched on bulletins and posters, direct mailing into the homes, and I think those are about all the questions we have covered.

MR. PEARSON (Minneapolis Gas & Light Co.): We have not used direct mail up to this point, but it certainly sounds very interesting. I am just wondering if the material put out by the National Safety Council or other safety material that might be purchased, is as effective as the material that is put out by the specific company involved? I am just wondering whether there is a more personal interest in material put out by the company or material that is used that might have been purchased elsewhere?

MR. HIGHTOWER: I think that is a good question. May I repeat it? You want to know whether or not this panel feels that the professionally prepared materials obtainable from the National Safety Council, or some other organization, is as effective as the bulletins you draw up on your own desk or the letters you prepare yourself and send out over your signature?

MR. CLAYTON: It would be my judgment that if we were provided with a staff sufficient to get out material of the same standard of excellence that the National Safety Council gets out, such as the *Safe Driver*, *The Driver Letter* and others, then it would be preferable to issue one through our own office that applies to the local personnel in particular. We have made some slide films that apply to our own case which have gone over in a big way because they know it applies to them

in particular. But unless we do have a staff sufficient to work up something of real value, I would say it would be best to use the type furnished by the National Safety Council. We use the *Safe Driver* and *The Driver Letter* every month.

MR. MACKLEM: I don't know that I can add anything, but I do agree with Mr. Clayton, that we are dealing mostly with drivers. While the literature put out by the National Safety Council carries a serious message, it is still put up in a humorous way to catch the eye and carry the message. This material also gives an analysis of accidents and tells how to avoid them. Therefore, unless you do have an artist to do your work, I believe that insofar as driving is concerned the prepared literature is better. However, you may have other problems, and we, too, have prepared pictures to take care of that end of our work. But so far, we like the National Safety Council material.

MR. JENSEN: I don't agree entirely with Mr. Clayton and Mr. Macklem. While I don't believe that any of us could put out the posters and material to the degree of excellence that it is now given us through the National Safety Council, I feel there is still room for some tailor-made posters in our own organization. It costs a lot of money, but a driver that is driving a truck and trailer doesn't like to see before him all the time a semi, and therefore, we spend a lot of money every year by drawing these up and making them to fit our own organization. We still use the National Safety Council's, but I do believe they should be supplemented.

MR. MACKLEM: We do use our own bulletins, but that is more for the warehouse.

MR. HIGHTOWER: I would say that it is the opinion of the panel that the National Safety Council material is of value and does the job. I don't believe we agree that the material received from the National Safety Council or other organizations will do the job alone.

Personally, I feel that along with those professionally prepared materials that there should be something of your own handwork because you have a little more personal touch with your people. I don't believe that month after month, or week after week, we will put it, you should send out professionally prepared material and nothing else. I don't believe it will be as effective as if you varied that occasionally.

In my own organization we have a young lady who comes down one day a week and does art work for stenciling or multilith. We put out our own posters, not exclusively of the professional work but we send it along occasionally, inject it into our schedule, along with the bulletins of National Safety Council, Greyhound's own Safety Council, and any other agency. I think you have to vary it, and you have to use some imagination, to get across the message that fits your outfit and ties in with the prepared materials that are available.

MR. CLINTON DREYER (East Bay Safety Council): I would like to pose this question in two parts. (1) What is the opinion of the panel as to the value of a fleet contest? And (2) if they are in any fleet contest in any local community, what is the value of that fleet contest to them?

MR. HIGHTOWER: Mr. Clayton, can you give Mr. Dreyer an opinion as to the value of fleet contests, local, national, or otherwise?

MR. CLAYTON: We have definitely benefited from the national fleet contests we have taken part in. Not every year is better than the previous year, but the trend is downward. So far as a local fleet contest is concerned, I am unable to say because we have no such animal in our town. Someday, maybe, we will have, but at the present time, we do not.

MR. MACKLEM: We are just the reverse in our organization for as yet we have had no national fleet contest. But we do have contests, and have had for the past two years, within our own ranks. Our organization is split up into divisions, and the fluctuation of those divisions from top to bottom and in between, is certainly a good indication that the contests are doing considerable good. Also we have made some headway in the reduction of accidents, and I think we can attribute considerable of that reduction to these contests.

MR. JENSEN: I firmly believe in all three. I believe the national contest serves its purpose while the local contest gives you quicker results. The intra-company contest also serves a definite purpose.

I should like to cite an incident that happened in 1944 and 1945 in Peru. We had about 7000 native drivers there, when we first started to see them, who had never ridden in anything except a donkey cart. We had so many accidents the first month that it

had almost reached a point where we couldn't operate the fleet. Then we started a contest and appealed to their vanity. When we quit, our accident frequency was down to two. That shows what a contest will do.

MR. WALKER: We might not like to admit this, but the contest serves another purpose; it keeps us supervisors up on our toes. Whenever we see somebody is getting ahead of us, we try a little harder to try to bring our safety record up.

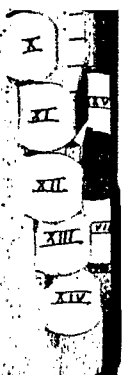
MR. HIGHTOWER: It appears that the panel is in agreement that contests are worthwhile.

MR. HAROLD COFF (Mistletoe Express Service, Oklahoma City): I might say that I am somewhat of a nut on contests. We have interfleet contests, intercity contests, national contests and so forth. There is no better incentive for any group of men than to be competing against one another. We start out when we are little kids, running foot races, trying to beat the other boys. Divide your drivers up into groups where they contest against one another in their work and have a blowout about every quarter. Make the losing team or teams do something at this picnic, dinner or whatever you have, to show that. Kid them along that they didn't do good enough to win, this would cause every man on those teams to work for you in the interest of accident prevention.

In my city we have a contest among all of the fleets in the city. The fellow who is driving against the other men on the street every day knows that he is competing against that particular outfit. There is more incentive for him to get around without any trouble. I think a contest is one of the finest incentives in order to keep drivers always thinking of safety. After all, the main thing in safety is to keep thinking about it.

MR. VANBUSKIRK (Merchants Motor Freight, St. Paul): I might say that I have had a recent experience with contests. We have had contests among our drivers for about seven years. We have various terminals. At each terminal the drivers are contesting against the drivers from other terminals for a period of a year.

Last night I attended a banquet with our Chicago city drivers. Three years ago these drivers had an accident record of some 58 accidents per hundred thousand miles. They said they couldn't compete with the rest of the terminals because Chicago is a tougher



city to drive in. They wanted a special basis, a handicap of some kind. We talked it over and decided we couldn't do that. We told them it wasn't a tougher city and we believed they could prove otherwise. This year ending July 31st, they won the contest.

Their accident rate was a little over 11, that is, for the city of Chicago. Maybe you think those boys weren't proud! Along with that banquet, they were given a trophy to keep for a year. That trophy has never stayed at one terminal over two years during this seven-year period. So it does cause a lot of enthusiasm among the drivers even though it runs for a year. I firmly believe that cutting it from a year to a quarter would result in more enthusiasm.

MR. HIGHTOWER: Van, may I ask you how many vehicles are in your Chicago fleet?

MR. VANBUSKIRK: About a dozen.

MR. HIGHTOWER: A reduction in the accident rate from 18 to 11 even though it were only two vehicles is still a nice reduction.

MR. SCHEFFER: There is one phase of the contest I would like to have discussed, and that is, an accident review board in conjunction with contests. I assume that they have problems the same as we do. Where is that going to come in in this particular accident? And do they use driver review boards in this contest to determine the chargeability? Sometimes intercompany contests are on a little different basis.

MR. HIGHTOWER: Your question is whether or not any member of the panel resorts to driver review boards in determining the chargeability of their accidents?

MR. CLAYTON: We have a review board, but it is made up of the members of the general safety committee on which all departments of the division are represented. The members of that committee are those who have men from their departments up for accident reviews. We study every accident with the man present, and he is allowed to say anything he wants about his accident and explain it to the best of his ability. We set the accident up on a board, and find it very helpful to have the men there when we make the review. We often find there were many mistakes in writing up these reports when we talk to the men.

MR. HIGHTOWER: Does your board membership include a driver?

MR. CLAYTON: A driver from the department and the man's foreman are included.

ed. The foreman takes the attitude that he is a lawyer representing the man who has had the accident, and his co-worker takes the opposite attitude. He is usually harder on him than the foreman.

MR. MACKLEM: Yes, we do have an accident review committee, which consists of seven men. The supervisor of vehicular service is the permanent chairman, but he only votes on a decision in case of a tie. The committee is made up of drivers and supervisors. This includes the inspector, you might call him, as well as representatives from the maintenance department. These men pass on the chargeability of an accident.

MR. JENSEN: We have had, for the past ten years, an accident investigation board made up of representatives from the shop, the terminal manager, a representative elected by the drivers themselves, (who has a one year period and must have two years or more seniority). The driver upon whom they are passing judgment may appear if he so desires.

MR. WALKER: We are beginning to use a system that is all too new with us to report on at this time.

MR. HIGHTOWER: The panel seems to be very much in favor of an accident review board on which is included a driver. Getting back to the value of contest or results obtained from contests, I would generally summarize it by saying that we all agree that contests serve a purpose. It appears that we feel that contests do stimulate interest in accident prevention. It gives birth to pride in company, or first, we will say it gives birth to pride in team versus team or division versus division and at the top, company against company. Such pride creates a desire on the part of everyone to be a winner; therefore, through the concerted action of team members or all operators within a company, there is an effort put forth to cut down the number of accidents so that that particular team or company will come out a winner.

MR. GOFF: I would like to inject something about this review board proposition from my experience. I don't think there is any use to have a review board to investigate any accident. A driver is guilty of negligence whenever he gets into an accident unless it is specified as is set up by the rules of the contest. Say that his truck is properly parked in an alley or whatever it might be. If he has an accident, he is responsible for placing

that truck in a position so as to get it banged up. He could have thought a little bit, and when you have a differentiation between chargeable and non-chargeable accidents, you are just opening up a lot of chance for argument. If all accidents are chargeable, you have got that whipped right off the bat. Make a lot of different rules and say this man isn't guilty and that man is, and you have got an argument every time you have an accident.

MR. PAUL COBURN: I think you are talking about fish and fowl in the same breath. If I understood the question, it was about a contest, and before, I thought we were talking about review boards and chargeable or non-chargeable accidents. In the first place, when you go into a contest, usually there are rules for conducting that contest. The majority of contests define a "reportable" accident for that contest. It is not left to judgment as to what is a reportable or a non-reportable accident. The National Fleet Safety Contest and a majority of the local contests conducted by safety councils define a reportable accident as any accident unless the vehicle is properly parked. In the majority of instances I don't believe you would need any review board or the judgment of any person to decide the answer to that question.

On the other hand, as to the driver's responsibility for an accident, that, I believe, is a different story, not related to fleet contests.

MR. MCBRIDE [Fort Wayne, Ind.]: We in Fort Wayne have been following the rules and regulations set down by the National Safety Council on our fleet contests.

MR. GOODWILLIE [Wilmet Motor Coach]: I think what Mr. Scheffer had in mind was whether the presence of a driver on an accident review board in any way prejudiced the findings of that board. In other words, I think we all agree there has been an increasing nationalistic spirit or fraternal spirit in connection with the unionization of industry in general, and I think maybe he was questioning whether drivers on a review board tend to be impartial or whether they tend to be biased. Did they tend to lean over backwards and favor the man whose case was before the board?

MR. HIGHTOWER: Mr. Clayton, I believe, remarked that in his case, where they did have a driver sitting in their committee,

that driver was prone to be pretty tough with his fellow driver who had had the accident.

MR. CLAYTON: More so than the foreman or other supervisors.

MR. MACKLEM: Those are exactly our findings, too.

MR. JENSEN: That has been my experience, too. I have noticed that in some instances drivers complained a little bit about a decision, and then they were elected to the board and came in and stated they would never complain again because they really got a square deal.

MR. SCHEFFER: In answer to Mr. Goodwillie, I have something I think would be of interest to everyone here. We have an unusual situation in Detroit. We have signed an agreement between the various locals to issue certain reprimands to drivers for certain infractions of company rules in accidents and various things of that nature. It varies from a few days to several weeks layoff, until it reaches dismissal. In many instances they have used review boards to find out whether or not a certain type of reprimand should be meted out to this particular individual who has been either involved in an accident or some misdemeanor, but it is mostly on accidents where the review board comes into play. In four or five instances that I know of with these review boards in existence, the drivers have been very fair both with the company and with the driver. We have been at it better than a year and still have to get our first kick-back.

MR. HIGHTOWER: For the sake of clarification, you referred to an agreement between these locals, then to a review board. Is this review board made up entirely of local members?

MR. SCHEFFER: The review board is elected by the drivers, usually representatives from the carrier representatives, from management representatives, from maintenance departments. In each instance three drivers sit on this board, other members might be men elected from each home terminal. They are the only ones who have any right to vote. The others, the management representatives, merely sit in as a guide or consultant. When the analysis of the accident has been thoroughly gone over, and they are ready for the question, only then are the drivers allowed to vote. Of course, that is done for a specific reason because if there is any reper-

cussions they can always come back and say, "Well, it was the vote of the drivers. Management didn't enter into the picture." To date there has been no attempt to reverse a decision.

MR. HIGHTOWER: That is the first time I have ever heard of an accident review board composed entirely, or with the authority vested entirely, in the drivers and no one else.

MEMBER [Memphis, Tenn.]: We had exactly the reverse procedure happen in our company. The union absolutely withdrew their men from the safety committee and said they would take no part in it whatever. That happened before I went with the company, and I have only been with the company a short time. They did not want the operators who were associating daily with the men to pass on accidents. That was their excuse. They said that they didn't feel their operators should be allowed to pass on a brother operator.

MR. GOWENS [Smoky Mountain Trailways]: With your permission I would like to tell you some of my experiences with that which has been favorable in permitting drivers to sit on our review boards. We started out by setting up a review board composed of supervisors and myself as safety director for the company and one driver, with the idea that in the event the driver did show any prejudice in favor of the fellow driver, then we had two men on the board who could overrule him. We used that as a check because we didn't know how it would work. After using it about six or seven months, the drivers who had been participating in this review board acted so favorably that we decided it was a good thing and expanded it.

We still have only three men on our review board, but now, instead of staying at our home office to hold our meetings, we go from division to division over the entire system. Of course, a different driver is represented at every division. That worked so well that now all of our meetings of the review board are held in an open meeting. All drivers who have been involved in accidents during the preceding month must be at the meetings even if it causes them to be off work that day.

We have found that we were getting results that we had never anticipated, inasmuch as the drivers who are sitting in those meetings, even though taking no part in them, get a

lot of good and learn a lot about the company's attitude and also learn a lot in regard to other drivers' mistakes. We require that the driver who is involved in an accident be questioned in order to get all the information we can, and we have found that it has helped on a lot. From my experience I am greatly in favor of getting all the driver participation we can on the review board.

MR. HIGHTOWER: Gentlemen, we have drifted far afield from the subject that was assigned to this panel. I permitted it because I felt, as I said in the beginning, that the value of these meetings is in the exchange of ideas. I think that any of you who is interested enough to ask a question that isn't too far afield is entitled to an answer if he can get it. However, to get back to the subject which has to do with safety material, I would like to ask if there are any other questions with respect to use of materials?

MR. VANBUREN: I should like to ask what the panel thinks of using local items from local newspapers, such as accounts of accidents, wrecks and traffic violations in addition to displaying the professionally prepared bulletins.

MR. CLAYTON: We have not used newspaper clippings because as a rule they are too small to read at any distance, and they don't catch the eye. We have used photographs of accidents that have happened, enlarged photographs, with very good results. When these pictures are posted, the drivers look at them and discuss them. Any time you can get drivers to discuss an accident, you gain something.

MR. MACKLEM: We haven't used newspaper clippings to any great extent, but we have used photographs, and I think that any material you can get pertaining to your own operations, dealing closely with it, certainly has a place on the bulletin board.

MR. JENSEN: We have never used photographs, but we have blown up local accident accounts from time to time as well as headlines from our house organ.

MR. WALKER: We have used material of that kind.

MR. HIGHTOWER: Do you use the newspaper clippings just as they are or do you blow them up?

MR. WALKER: Sometimes just as they are and sometimes we blow them up.

MR. HIGHTOWER: I think we will all agree that any materials on the bulletin board

## Commercial Vehicle Section

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have to be something that will catch the eye of the fellow who will casually walk by as well as the man who is interested enough to start before it and read every line that might appear on it no matter how large or small.

MR. SCHEFFER: When you haven't the time to "blow-up" items, you can take a small piece of white cardboard, the size of a letterhead, and place that item in the center. Take a ruler and make a border. Then place that on the bulletin board, and you will be surprised what a number of them will read it. Dress it up so it will catch their eyes.

Instead of having a traffic meeting of all drivers, we were thinking about having some conferences between the foremen and the men in the local garages where we would not interrupt schedules or bring the men out on their own time. The question for the panel would be: what materials should the supervisors or foremen in a garage use in talking to the men? Why would they suggest these materials?

MR. HIGHTOWER: What materials would be recommended for the use of any supervisory personnel in discussing accident prevention with drivers—and supervisory personnel—and where are those materials available?

MR. CLAYTON: In my opinion—and we have done this to good advantage—the material is available right in your own organization. The material is in the drivers themselves, if you can just draw it out of them. Or if you are asking about taking up some particular subject—and I think that subject should be a very particular subject rather than a broad subject—you can take photographs that will demonstrate what you are talking about.

For example, we had quite a bit of discussion about cleaning up the trucks. With wires and clippers and everything all in the middle of that truck there is no room left for the men to ride. Of course, the material takes first place, but we had quite a discussion about how to get the men into the trucks so they could ride safely to the job. We took pictures of the inside of these trucks and then discussed housekeeping. That is an example of how to get your own material, and it will be most effective for a meeting of that kind.

MR. MACKLEM: We do something like

that. We call them "Spot meetings." They last for from two to five minutes. The material used so far as we are concerned is a letter to the drivers about some recent accident, and we bring out the point that it might happen to them if they are not alert and careful.

The material can be found, I think, at the garage if that is where your meetings are held. It can be found in articles and posters of your own or in material furnished by the National Safety Council.

MR. JENSEN: We also use the same source of material as Mr. Clayton and Mr. Macklem. However, I believe the National Safety Council puts out a *Newsletter* that is very useful as a source of material for your safety meeting.

MR. WALKER: Short films and other forms of visual aid might be used.

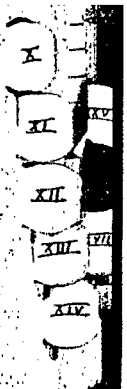
MR. HIGHTOWER: There are a multitude of sources of materials for the guidance of your supervisors. I would like to add to Mr. Jensen's remarks that this section does have available a *Newsletter* which contains supervisory material which certainly is a good guide for your supervisors. I think you should augment that with the materials these other gentlemen mentioned and which you would find in your own property.

MR. GANNON [Commonwealth Edison, Chicago]: The utmost thought in our minds seems to be: we must hold meetings. Then we start looking for something to use at the meeting. My personal experience has not been in getting the material, but in finding the time to give the men the material that is always available in our business. I have used those short meetings for years—10 or 15 minutes at a time. However, we are always supplied with a lot more material than we are able to give to the men.

MEMBER: Now in our particular organization it isn't very easy to get the drivers together. We have about 25 routes, with headquarters in six different states. You can't get these drivers to a meeting, as they are probably contacted once every six weeks. Does the panel feel that material solely through the mail is sufficient to carry on a satisfactory accident prevention program?

MR. CLAYTON: I am inexperienced on that problem.

MR. MACKLEM: I don't have a condition of that kind, either. I have found, however, that casual talks with the men are valuable.



MR. JENSEN: We have had a somewhat similar experience. This has been particularly true in Montana and North Dakota, where we have only two or three drivers, whom we might call "the forgotten men." We have helped that quite a bit by having the supervisor go out and take these men to breakfast and give them a little first hand information. They would never hear about it otherwise, because they haven't the opportunities to get to a meeting or a dinner or luncheon.

MR. WALKER: I am in the same position as the questioner. Certainly direct mailing is not the last answer on that sort of a problem. It is only one tool. Meetings—supervisor's meetings, safety director's meetings, have to be used to cover that situation.

MR. HIGHTOWER: I think that this sit-

uation is a fairly good example of the value of the use of the materials that are made available to us. Here is an example of an operation in which the individuals cannot get together in a meeting. From the question I assume that the operation is so scattered that they don't have the supervisory force to make the individual contacts. Therefore it seems to me that the answer is obvious: the mailing of the material directly to the men is the only thing that can be done. And certainly, careful selection of that material and careful preparation of your own messages that are sent through the mails to these drivers should accomplish some good. I think that is certainly a testimonial for the use of good safety materials and particularly for the distribution of such material through direct mailing to the homes of the drivers.

WEDNESDAY MORNING SESSION  
October 8, 1947

**Group Meeting on Driver Education and Training**

Presiding: GORDON C. GRAMAM, Supervisor, Safety Education Dept., Detroit Public Schools;  
Chairman, National Driver Education and Training Committee, N.S.C.

**What the 1947 Winter Driving Tests Show**  
(Summary of a Talk)

By RALPH A. MOYER

Research Professor of Highway Engineering, Iowa State College  
and Chairman, Committee on Winter Driving Hazards,  
National Safety Council

1. Motor vehicle death rates as related to motor vehicle travel are highest in the winter in all sections of the country. Winter death rates are from 24 to 33 per cent higher than summer rates in the northern half of the country, and from 5 to 23 per cent higher in the southern half. The two major factors producing these higher winter accident rates are inadequate traction and reduced visibility.

2. Inadequate traction on road surfaces is primarily due to snow and ice and, to a lesser extent, to wetness, particularly on certain types of pavement. Combined with faulty driving practices, poor traction generally results in skidding, a circumstance frequently reported as a factor contributing to motor vehicle accidents.

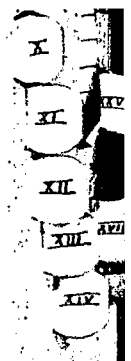
3. Reduced visibility in winter driving generally involves one or more of three circumstances: longer hours of darkness; lowered visibility at times of snow or sleet storms, fog, mist, etc.; and obstruction to driver vision from frost, ice or snow-covered windshields, snow banks, etc.

4. The most striking fact revealed by the Committee's test projects\* was the surprisingly wide variation in performance with bare tires on smooth ice. Braking distances on smooth ice range from a low average of 110 feet to a high average of 250 feet, depending upon the ice condition, and to a lesser extent, the type of vehicle. Acceleration and performance on curves likewise varies, but to a somewhat lesser degree. The extreme variability and unpredictability of the surface condition present the real hazard of ice and snow to the unwary driver.

5. During the winter months special emphasis should be given to winter driving problems in the fields of driver education, highway maintenance, accident analysis, engineering improvements, road condition reporting, and traffic law enforcement. Full cooperation should exist between those responsible for road maintenance and those responsible for traffic safety.

6. Drivers must appreciate hazards of winter driving and understand ways of surmounting them if they are to avoid trouble on the highway. Thus, a broad educational program should be conducted by those responsible for traffic safety. Drivers should know that:

- a. Ice and snow increases braking distances from 3 to 12 times that required on dry pavements. "Wet" ice, most frequently encountered after freezing rain or sleet storms, is twice as slippery as "dry" ice encountered at low temperatures. Braking distances on glare ice for cars and trucks equipped with natural rubber tires are 10 to 30 per cent less than with synthetic tires. Glare road ice and the smooth ice of a frozen lake give comparable braking distances. Trucks generally skid farther on ice than passenger cars.
- b. Speeds must be materially reduced on slippery pavements to avoid dangerous skidding. Speeds should be in the normal driving range of other traffic and passing kept to a minimum. The recommended safe speed on glare ice for cars and trucks with bare tires is in the range of 15 to 20 m.p.h.



c. The rules for safe driving under adverse road and weather conditions are fundamentally: Get the "feel" of the road; adjust speeds to conditions; slow down well in advance of intersections and curves; use tire chains on ice and snow; keep windshield and windows clear of snow, ice, fog and frost; follow other vehicles at safe distances; signal intentions of turning or stopping; and apply brakes with a gentle pumping action. Tests have shown that a very rapid and hard pumping action will produce considerably shorter stops, but it is doubtful if the average driver can employ this technique to advantage.

7. During fall and winter months, public officials and safety organizations should also give special emphasis in public information programs to the hazards of driving and walking during the hours of dusk, darkness and at other times of reduced visibility.

8. The use of tire chains is the most practical means of self-help for increasing traction on snowy and icy roads. When such roads are not treated with abrasives, chains are a practical necessity for providing traction for passenger cars and trucks. Tire chains reduce passenger car braking distances on ice and snow around 40 to 50 per cent; truck braking distances about 60 to 70 per cent. They provide fairly uniform traction on dry and wet ice. On icy curves, however, speeds with chains on the rear wheels only should be no higher than without, because chains on the rear wheels only do not provide the necessary steering control required on curves. However, in the event of a skid, chains on the rear wheels are helpful in maneuvering

out of the skid.

9. Highway departments should strive for "bare pavement maintenance" during the winter season. This can usually be accomplished by prompt and complete snow removal, expedited by the direct application of chlorides without abrasives. Where it is not economically feasible to remove the ice or to prevent its formation, the spreading of abrasives treated with sodium or calcium chloride is recommended.

10. The spreading of treated abrasives on snowy and icy roads makes driving safer. Braking and acceleration performance is from 30 to 65 per cent better than on bare ice. With untreated abrasives performance is from 10 to 25 per cent better than on bare ice, depending on density of spread.

11. Traffic engineers and accident analysts should continually check the records of accidents occurring during the winter months to identify and correct road locations which are especially prone to accidents when the surface is slippery or visibility poor.

12. State highway departments should develop effective systems of winter road condition reporting, so that drivers will be sufficiently warned of storm and road conditions. This information should be made readily available through all publicity media, and should be accurate and dependable. Safety instructions dealing with road or weather conditions should be combined with the reports.

13. Police should cooperate in this program by promptly reporting road conditions and by warning motorists of the need for using tire chains when traversing sections which are extremely hazardous because of ice or snow.

\* (The talk by Professor H. M. Johnson entitled "The Detection and Treatment of Potential Accident Makers" and the panel discussion "Have Driver Clinics Any Safety Value?" can be found in Volume XXVIII of the Congress Transactions, the School and College Session.)

## WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: JOHN A. EBELING, Supt. of Operations, Olsen Transportation Company

## Determining the Preventability of Accidents

By KENNETH E. KETZEL

Director of Safety and Training, Fred Olson and Son Motor Service Company

It seems to me that to adequately consider the question of determining the preventability of an accident requires that we consider it from two extremely different viewpoints. First is the justification for establishing any kind of a procedure which will determine whether or not an accident could have been prevented, and second is the actual mechanical details involved in the establishment of such a procedure. Since I believe the justification to be the more important of the two, I should like to consider that aspect of the subject first.

I doubt whether there are any in the motor transportation industry who would retain the idea that a driver should be assessed the damages involved in an accident for which he may be responsible, so we may immediately dismiss that as a reason for determining the preventability of an accident. It is possible, however, that a reason which may instinctively be advanced would be that an accident must be determined preventable or non-preventable in order to determine whether or not the driver will receive a safe driver award. While that is very true and necessary, for me it still does not indicate the basic reason behind the development of a procedure for reviewing accidents. I think the presentation of a safe driver award is the end-product of an overall safety program, rather than the program itself.

It should not be necessary for me to state that we are in this type of work for the sole purpose of preventing accidents. We recognize that their prevention is desirable, first because of the humane angle of saving lives, and second, because it has a direct bearing upon the production of profit without which a business

has no excuse for existing. This being the case, I believe we also recognize that an effective accident prevention program is one which constantly reminds the employee of the safest and most efficient way of doing his job, and any tool that we fashion for that program must necessarily have that for its purpose. It

is in that direction then, that we look for the value in a system for reviewing accidents and determining their preventability.

This explanation up to the present point may suffice to justify a program from the standpoint of management, but we who are attempting to administer such a program in our respective companies, must also consider whether or not there is any justification for it in the eyes of the driver. Surely, we cannot tell the driver that we are attempting to bring his standard of performance up to that of the driver of a private automobile, because it is obvious that there is little, if any, earnest effort to correct the poor driving habits of private automobile drivers. It is even more obvious that to install a system for administering corrective measures to them would be an extremely difficult task. The results of this deficiency are very well reflected in the behavior of many private drivers on the streets and the extent to which they are involved in traffic accidents. If the private driver does not offer a higher standard of performance for the commercial driver to seek, then how do we satisfy ourselves and the commercial driver that he should be subjected to a review of traffic accidents that he may have had? Why don't we just let him go about driving as he pleases, without attempting to correct any bad habits that he may develop?

It is my belief that, to best satisfy ourselves and the commercial driver that the constant review and correction of his traffic behavior is not only justifiable, but desirable, is to liken him to any other production employee. I say production employee advisedly since in the business of transporting freight or passengers, the driver is actually the man who produces revenue and controls, to a very great extent, the cost of operation. In that respect, a comparative parallel may be drawn between himself and any employee who is actually engaged in the manufacture of a product, whether he may operate a machine on an assembly line, whether he works under

one roof within the space of a very few feet, or whether he works over a larger area.

Now consider for a moment what would be the course of action if, for instance, a lathe operator were to constantly turn out parts that were even a minute fraction of an inch off specification. His working habits, I believe, would be quickly and thoroughly analyzed to determine the reason for off-specification performance. Following that analysis, an attempt would then be made to correct those habits so that his production would be as close to specification as is humanly possible. If that employee's performance failed to respond to what was considered adequate corrective measures, he would probably be released from the job or at least transferred to another one where his own natural limitations would not subject him to error. Precisely the same procedure must be followed with a production employee who is in the business of driving a commercial vehicle. A man who has a preventable traffic accident has, somewhere along the line, developed an improper driving habit which must be corrected if he is to continue in that job.

The purpose, then, for establishing a procedure for determining the preventability of an accident is to discover not only if the accident should be charged to the record of the driver involved, but also to discover weaknesses that may exist in that particular man's driving pattern, and following that discovery, make an attempt to correct those weaknesses. Justification for the procedure from the driver's standpoint begins to take shape in a very simple statement. *Any operation of a commercial vehicle implies safe operation.* It is the driver's job, and he should expect that his performance on it will be corrected when necessary, just as the lathe hand must expect correction on his job whenever his performance becomes off-specification.

The other position from which it is necessary to discuss this subject is the actual mechanics involved in the establishment and operation of some definite procedure for determining the preventability of an accident. This I should like to say at this point that the material which I will present in this part of the discussion does not necessarily represent my own ideas of an effective accident review system, nor does it necessarily represent the system which we use in our own particular company. It will, however, be an attempt to give you a digest of what, from my observa-

tions, appears to be the most commonly accepted form of review system among the companies using them. It is not conceivable that the same procedure in all of its details could apply or be desirable to all operators of commercial vehicle fleets. There are, however, from all of the variations that are in effect, certain basic principles which have been developed. In the absence of any other starting point, any company who is about to set up an accident review system, would do well to follow those principles, making whatever variations from them they deem apropos to their own organization.

With due regard to all of the variations, there is one respect at least in which most companies are in accord. The procedure of reviewing an accident is best projected through the medium of an accident review committee. That committee has for its responsibility the consideration of each questionable accident as it occurs, weighing all of the facts involved and rendering a decision of "preventable" or "non-preventable" insofar as the driver or management is concerned. I have indicated that it will consider each questionable accident and I say that because it is conceivable that, in a very large operation, the volume of accidents could be great enough to make the consideration of each one of them by the accident review committee a physically impossible task under such a set of circumstances. It would be more advisable for the Safety Director to review each one as it occurs and classify them into three groups—the obviously "preventable," the obviously "non-preventable," and the questionable and then reserve the latter group for consideration by the committee. An alternate to this method of handling a large volume would be to install a review committee in each of the terminals covering the operation and assign it sufficient time and personnel to handle the accidents involving each terminal's drivers.

I have indicated that it is desirable for the committee to render a decision of "preventable" or "non-preventable" insofar as management as well as the driver is concerned. This I believe to be especially important in selling the program to driver personnel. If an accident occurs because of conditions over which management alone had control and is adjudged "preventable" on that basis by the review committee, then I believe it is the duty of that committee to correct management in order that the validity of other decisions

affecting the drivers, will not be questioned.

It is obvious that if the accident review committee is to render its decisions impartially, strictly on the basis of the facts involved, its organization and the conditions under which it works must be carefully planned and controlled. Some of the factors which affect the proper functioning of a committee and which warrant our consideration are its size, its representation, its manner of reference to an accident, whether in the presence or absence of the driver, method of correcting the driver, method of voting, and discussion within the committee.

Aside from the fact that the size of the committee must naturally be dependent to a certain extent upon availability of personnel to serve on it, some thought must also be given to its size with respect to facility of operation. A committee that is too large can become cumbersome to the point where it accomplishes nothing and by the same token, one that is too small, while it may accomplish a great deal from the standpoint of volume can very often leave the impression that it is biased entirely in one direction or the other. Review committees that are now in existence usually vary from three to nine people and emphasis is placed upon the fact that the number is always an odd number.

Representation in the committee should include both management and the drivers, with a safety director or some other representative of the safety department presiding at the meetings. Representation of management may be either a terminal manager or a superintendent of drivers, while representation of drivers should be the drivers themselves. Incidentally, for those of you who have had no experience with the performance of an accident review committee, the presence of drivers on the committee should not be viewed apprehensively since you will find that in most cases they will be more exacting in their consideration of the facts involved than the management representatives. The presence of drivers on the review committee is important and it is equally important that they be selected to serve on the committee by the drivers themselves in order that any air of favoritism by management towards certain drivers be eliminated.

Another important point of representation is that it be equal between management and drivers. That is to say, if you have a five man committee, the appropriate set-up would

be to have two representatives from management and two representatives from the drivers, the fifth man being the safety director or representative of the Safety Department, acting solely as chairman of the meeting.

To enlarge somewhat upon the duties of the safety director in the functioning of the committee, I should state that in most cases it will not be necessary for him to cast a vote. Usually, from a practical standpoint once the facts involved in the accident are accurately analyzed and developed, the majority of the other review committee members will be in accord in their decision. The most important job for the safety director or his representative in the conduct of the meeting will be to stimulate discussion among the committee members and at the same time keep the discussion on the subject at hand.

It is very easy for the committee members to wander into a discussion on other problems of operation or perhaps even reminisce upon past experience. While their extraneous conversation may be very interesting to listen to, it does not accomplish the purpose for which the committee convenes. This is important not only from the standpoint of saving time but also from the standpoint of keeping pertinent facts involved in the accident from slipping into obscurity. It is the safety man's job to see that the discussion adheres to the subject at hand and does not wander far afield from it.

There is not as much uniformity among accident review committees in the manner to which the accident is referred to them or in the manner in which it is considered as there is among some other characteristics of the committee systems. There are some committees who refer to an accident by number only and do not have the driver present to state his case, while others prefer having the driver present to enlarge upon facts. I am not sure which method is in the majority, but both have valid reasons for their choice and it might be well to consider them. Those who favor reference by number only feel that this eliminates the possibility of any malicious prejudice on the part of the board members toward the drivers involved and also feel that it eliminates the possibility of the accident review committee taking on the aspect of a trial court. On the other hand, however, those who favor having the driver present feel that the driver by and large is not a man who is adept in using a pencil efficiently and feel



that in many cases even his most earnest effort to turn in an accurate written report of the accident will not honestly portray the circumstances. They feel that it is desirable to permit him the opportunity to go before the review committee and explain it by word of mouth.

Once an accident has been heard and a decision reached, the work of the review committee is not finished. As I pointed out earlier, the purpose for establishing the accident review committee is to discover not only if the accident should be charged to the driver, but also to use the facts as developed as a basis for correcting improper driving habits. With this in mind, it should be the job of the review committee to indicate in their decision what factors were prevalent in a "preventable" accident so that the driver may be corrected and the possibility of repetition be reduced. It then follows that such information must be imparted to the driver involved and it is generally agreed that the discussion of the committee's decision with the driver, and his correction, should be done in private either by a representative of the safety department or by the driver's terminal manager. This particular feature of the accident review system must not be neglected and must be delegated to a specific individual if the purpose of the system is to be carried out to its proper conclusion.

By way of conclusion, permit me to remind you that the establishment of a procedure

for the review of accidents is an important part of your safety program—important not alone from the standpoint of safe driver awards, but important from the standpoint of a basis from which corrective measures may be given to accident-prone drivers. Permit me also to remind you that the effective administration of such a system requires considerable thought and planning.

The material I have attempted to present is purely a resume of the more common practices now in effect. Whether or not any of them or all of them will be used in your own organization is up to you to decide. It may be that none of them are applicable to your particular set-up and then again it may be that you can adopt all of them as your program. Whatever method you select, whatever features you include, adopt it only after you have given it careful consideration as to the effect it will produce upon your driver personnel. For those of you who do not now have an accident review system in effect, I should like to urge you to install one. The operation of an effective one can very possibly add the necessary "shot in the arm" to your present safety program. For those of you who now have accident review committees operating and have had them operating for some time, let me suggest that it may be a good time to review their method of operation and satisfy yourselves again that it is producing the results you had originally planned it to produce.

## Determining the Preventability of Accidents

(Panel Discussion.)

Discussion Leader—JOSEPH GRUMME, Jr., Safety Dir., Silver Fleet Motor Express, Inc.

Participants: KENNETH N. BEADLE, Dir. of Safety, Pacific Intermountain Express Co.  
EDWARD J. EMOND, Dir. of Automotive Safety, Armour & Co.

CARL J. KNURCK, Dir., Safety & Personnel, Keshin Motor Express Co., Inc.

G. D. SONTHEIMER, Administrative Asst., Dept. of Operations, American Trucking Assn., Inc.

CHAIRMAN GRUMME: Mr. Emond is going to start our discussion by presenting an actual accident diagram.

MR. E. J. EMOND: (Mr. Emond presented

a blackboard illustration of an accident diagram and concluded as follows): The definition of a preventable accident is that it is one in which the driver failed to exercise all possible care and caution. He could either prevent it or not prevent it. There is no "degree" of preventability. There may be a degree of responsibility but not preventability.

MR. G. D. SONTHEIMER: I think that part of our difficulty with our review boards, and getting the cooperation of drivers stems from the fact that, in American education, everybody is taught that so long as they obey the law, nothing of the nature of stigma will be attached to them. In other

words, in a situation of this kind, the driver who had no stop sign to obey feels that there is no blame to be attached to him.

In our safety meetings we discuss preventable accidents. We will bring up an accident that has been judged preventable and go over it with the drivers.

But we are doing that in a way that will re-educate him in social responsibility rather than legal responsibility. Are we making an attempt to show a man his social responsibility in these things? His responsibility to other people rather than just his responsibility for obeying the law?

I think, perhaps, a good deal of the work done in our safety meetings could be revamped along these lines. That is something we must do to help sell this program to the drivers.

Now I might be wrong about that, but it seems to me that we might re-educate the drivers as to how to solve this problem. If we are to sell them on it at all, we have got to teach them social responsibility. And that is neglected generally. Even what I have seen of safety meetings. We talk about, "Joe had an accident, and here is the reason it was judged preventable and charged against him." But we don't go into the background of the thing.

Sometimes we don't point out a simple thing like this. In an intersectional accident, the time element alone may make the difference as to whether it is a preventable or nonpreventable or avoidable or nonavoidable accident. Taking just the time element, if a vehicle coming from the one direction spotted the other vehicle, say, not feet back from the intersection, the accident at this time would be preventable. But the closer he approaches to the intersection, the more unavoidable becomes the accident.

You have to take a good many things into consideration here, but I personally feel we should devote more time to our safety meetings and make them much more interesting. We could do this if we stress re-education along the social responsibility line.

CHAIRMAN GRUMME: I am thoroughly in accord with Mr. Sontheimer's statement. Once you have pointed out the facts involved in a preventable accident to the driver, you have to tie those facts together in some way, but I disagree that the way to do it is through his social responsibility. I don't think he feels that any more than you and I, and I doubt

whether we think of it when driving down the street. I think the way to tie it together is to show him how the accident will affect him through the effect of bodily injury to himself, and how it may affect him, his family, and his job in the future.

MEMBER (From the Floor): Mr. Chairman, there is one thing I would like to ask the panel. What do these safety representatives of fleets, who are conducting review boards, consider pertinent facts in bringing to light what actually happened? How far do they go in their questioning of the driver as to the exact factors of the accident itself? What degree have they asked him questions about what was he thinking about prior to the accident's occurrence and things of that nature? I believe that has a direct bearing on the preventability of an accident.

MR. CARL J. KNURCK (Keshin Motor Express Co.): Drivers are often very poor with a pencil. We get an accident wherein two people were killed. The description of the accident by the driver appears on the report and is covered by two sentences, of less than ten words each. If you bring this driver before the review board, will you get all the information you want? Of course, there are a lot of questions you ask. It all depends upon the accident. Confine your questions to just what actually happened, the speed of the vehicle, the other vehicle; what side of the road was he on, the weather conditions, etc. You will get a complete picture before the accident review board.

MEMBER (From the Floor): Who composes the review board? In my own case I demand a representative of an insurance company. An insurance man will find out more in five minutes questioning than I can find out in 30 minutes.

MR. EMOND: Our setup has two men from management and two of the drivers, with a chairman who asks what questions are necessary to give a true picture to the members of the board as to what took place so far as the accident report is concerned. It is up to the members of the board to question the driver who had the accident. The insurance representative is asked to sit in so that the members of the review board may ask the insurance representative any pertinent questions. If and when the safety engineer of the company is on the premises, he acts as an advisor, the same as the fleet engineer from the insurance carrier, but they have no



vote, except in the event, they have a deadlock, the chairman casts the deciding vote.

MEMBER: I would just like to determine what a preventable accident is. How long does it take before the driver knows that he is being charged with a preventable accident? Is it done within a week, 24 hours, or what? How soon is that investigation held?

CHAIRMAN GRUMME: How soon is it determined and the driver notified whether or not the accident is preventable?

MR. EMOND: Two weeks.

MEMBER: Then about two years from now, when he is sued and you are sued along with him, does he go into court and say, "I was responsible for that accident because the board said so?"

MR. EMOND: No, sir. An explanation of what the driver could have done to prevent this accident has no bearing in legal procedure.

MEMBER: Don't forget that he puts his hand on a Bible and takes an oath that he is going to tell the truth. Therefore, if I am an attorney, I am going to ask him what his accident report said.

MR. HUFFMAN: I think we can clear this up in this way. If what has been said here is true, you could not conduct any accident prevention program to either declare guilt or no guilt. If a man were sued, in the first place he would become the defendant, and naturally, he would never take the stand. Your record is between the company and the driver, and that is a company record and has nothing to do whatsoever with the law suit. Your accident prevention program would have no connection with a law suit, and if it had, so far as your company was sued, this man would be the defendant and would naturally stand on his constitutional rights and never take the stand. So either way you figure, it wouldn't enter into a law suit.

CHAIRMAN GRUMME: Here we are primarily dealing with an accident prevention program and not the legal aspects. I agree that I am not too sure you have the answer to the question.

MEMBER (From the Floor): What must a driver's attitude be then? Do you expect him to go into court and say he was not responsible for the accident?

CHAIRMAN GRUMME: What is his attitude going to be towards your accident

prevention program if you don't charge an accident like that to him?

MEMBER: I don't know. It doesn't appear to me that a safety or accident prevention program can be successful if your approach is a legal one and what might happen to you in court. I doubt very much whether such evidence would be admissible in court, and even if it were, the accident prevention board is not a jury nor are they qualified as experts to definitely determine whether the accident was chargeable or not chargeable, preventable or not preventable.

MEMBER (Northern States Power Co., Missouri): We have entertained the idea of a committee or a review board for several months. I want to know whether anyone goes to the scene of the accident immediately?

MR. READLE: If it is in the city, yes. I am sure that many would give the same answer, your driver supervisor or whoever it is. Now if the driver is out in the mountains several hundred miles from the nearest terminal, there is little chance of anyone going to the scene and, therefore, you would have only the driver's word.

MR. KNURCK: In all major accidents there is someone from the company who goes to the scene of the accident.

MR. EMOND: We rely upon the judgment and integrity of the law enforcement agency that covers the accident. That is where you get an unbiased picture. That is the way we generally proceed on our review board.

MEMBER: Do you change the personnel of the review board for each month or accident?

MR. EMOND: Some organizations use seniority in drivers—the older drivers. To start the ball rolling, two years ago, when we created this, we picked the men in order to sit on a review board who had at least five years without a preventable accident, and they rotated every 60 days.

MR. KNURCK: I believe in rotating, but I don't go by seniority.

MEMBER: Mr. Kettel, in his talk on this subject, indicated that it was a good policy to let the men themselves choose their committeemen. Do either of you gentlemen follow that procedure? Or do you pick your men?

MR. KNURCK: If they wanted to, it would be agreeable.

MR. EMOND: Only in concentrated areas do we allow the review board drivers to be picked on, in places like Chicago, New York, and Los Angeles City. In such places, we allow them to choose their leaders, and it is a good thing. You can go down to one of your larger locations, and within 25 minutes you can pick out the good boy. He generally is a leader among men. If they vote him to be their representative on the review board and he gets up there and is persuaded by the evidence that the man could have prevented the accident, it is going to stick. That is one good thing about having the men pick their own review board officials. But they can't succeed themselves. They have to go off the review board and come back in rotation.

MR. READLE: We are not doing it that way now, but that is what we intend to do, if we can ever set up the plan to get the drivers to select their own men.

MR. SONTHEIMER: I think that method of the drivers selecting their own representatives is undoubtedly the best, but I think there should be some qualifications set up. In other words, they can't elect any man, but they must choose from among those men who have a no-accident record. In other words, if you want to set it at five years, they should be held to choose the men with at least that many years of no-accident driving.

MEMBER: Why do the representatives necessarily have to be accident free. Are you saying this then, that a man who has had an accident would never be as good as a man who has never had one?

MR. SONTHEIMER: I think the man who has had an accident may eventually develop into an excellent driver, but I think you will find the man with a no-accident record devotes more thought to it. He is apt to be more impartial than a man who is a little bit afraid when he is off the board that somebody else may charge him with an accident, which he doesn't think should be charged against him. The driver with a fairly good no-accident record will be a more impartial member. I don't think that it is too good an idea to count on the safety director's selling this individual a bill of goods on an accident. We like to have men make up their own minds from the evidence and be able to scream it themselves. I don't feel that the man who has had one or two or three accidents won't eventually be as good a man

as the other. Many men have a desire to stand out in your organization and would like to serve on your board. If they have to reach a certain record so that they may be appointed or elected, there is just that much more impetus behind your entire program.

CHAIRMAN GRUMME: I think the consensus of opinion is that the men should be permitted to choose their own representatives on the committee. However, it should be clearly understood that the committee-men should be rotated.

MEMBER: A lot of our drivers are not primarily drivers but trouble shooters or service men. What do you advocate concerning awards? Are these trouble shooters to be grouped together with men who are primarily drivers, or considered separately?

CHAIRMAN GRUMME: I think that your problem is that you have several different types of drivers, some of them service drivers and others who are just truck drivers. The problem is how to separate them in order to determine the type award they are to receive, and also how to treat them so far as processing them through the over-all safety program.

MR. EMOND: You could have a member on the review board who is a trouble shooter also. In other words, if the case before the review board involves a trouble shooter, you want to have a couple of trouble shooters on the board as they will understand the trouble shooter's problem. I would recommend to you that you put in two trouble shooters in lieu of the two truck drivers for a trouble shooter's accident.

MR. RAY WALKER (Tanner Motors, Los Angeles, California): Do you require your executives, safety directors, and head office men to stand for hearings on accidents occurring with company-owned vehicles?

MR. READLE: The royal razzing they get in our office is much more painful than any formal review that would be held.

MR. WALKER: The owner of our company has stood three accident hearings in a year. I can assure you it had a tremendous psychological effect on the drivers when we posted it on the board. Incidentally, we post it in every city in which we operate, so if a driver has a hearing he is up before all of the drivers.

MR. KNURCK: No, we don't. We have very few accidents with the company-owned cars. We don't do anything about it as yet.

MR. EMOND: Our executives stand before the review board because I forgot to mention it before—we have what we call a general review board, which is the supreme court of all of our 428 outlying review boards. That is made up of executives.

MR. GOODWILLIE (Willert Company of Chicago): Do you in any material way reward the driver members who serve on your boards? If you do not, have you had any demand from any union that the drivers serving on these boards be remunerated for their time?

MR. EMOND: Our men are reimbursed for the time spent on the review board. Maybe that is why we get such lengthy decisions. At no location in our organization does a driver sit on the review board on his own time. Our general review board costs us, about \$548 to meet once a month to review outlying review board reports.

MR. BEADLE: We don't reward them. There hasn't been any beef yet. It is a question of not just the drivers but your management personnel, for you have got to interrupt work, and you know how busy everybody is.

CHAIRMAN GRUMME: Are your drivers on the clock or off the clock in a committee meeting?

MR. BEADLE: It is usually waiting time. He is off the clock.

MR. KNURCK: We haven't had any trouble with the union as yet, but there has been some inkling they might want us to pay for it.

MR. JAMES SKIPTON (Marsh McLennan, Houston, Texas): Should the information available from your claim adjusters be used by your review board committee in determining the chargeability of an accident? In other words, they have information available from the statements from witnesses and such, but might possibly in some cases put a different picture on the information available from your driver.

MR. SONTHEIMER: I think that all available reports of the accident should be used in order to supply more facts on which to make a determination. In most cases there is no single accident report that is so complete that you have all the facts before you, and you may find one or two in each of the reports that have not been brought out by one single report. I think that everything available should be used—the insurance re-

port, the police report on the thing if it is obtainable, and all other information you can get.

MR. BEADLE: I think the insurance adjuster's report should be used. In one case particularly that resulted in a reversed decision from the original one, the insurance adjuster's report brought out information that was contradictory to the statement the driver had made and where it had already been judged a non-preventable accident.

MR. KNURCK: We don't ask for the insurance adjuster's report. If we think it necessary to have his report, we ask for it. So far, we haven't needed it.

MR. EMOND: It all depends upon how the investigation was made. If the insurance carrier had an agent investigate at the scene of the accident, then we want to use it. But in most cases, with all due regard to carriers, you are only asking the question of the other fellow, which it would be in this case, so you are getting a contradictory statement. We like to use reports issued by police departments, because, with the exception of cities of large population, you get a diagrammatic picture of the accident.

CHAIRMAN GRUMME: A question was asked a few minutes ago from the floor as to when a driver is notified as to whether or not the accident will be determined preventable or non-preventable. Many insurance companies are a little bit slow in giving you their investigation reports, and it is important that a driver be informed promptly whether an accident is preventable or not preventable. You don't get the insurance company report in sufficient time to get the benefit of the prompt notification to the driver. Your company is probably an exception to that rule, but I know many insurance companies from whom it is difficult to get prompt reports of their investigations.

MR. NEYHART (Pennsylvania State College, State College, Pa.): Your discussions have been about the preventable accidents. Now then, I haven't heard anyone say anything about what the penalties are and who is going to issue the penalties against these men who sustain preventable accidents.

MR. SONTHEIMER: I don't have any particular answer for that one because I am not a fleet operator, and I know the difficulties the fellows get into, so I will leave it to these fellows who actually handle it.

MR. KNURCK: If the accident is adjudged

a preventable one, the driver is charged with it, and it goes against his record that way. We fellows in these fleets are governed a lot by the unions. I question, even so, whether time off is the answer to accident prevention work.

MR. EMOND: The penalty, in the setup I am most familiar with, is the loss of his National Safety Council Safe Driving Award—which is really something to lose. Heretofore, in our organization, we had a penalty setup. If a man had a preventable accident during the first six months, he lost a week; after three accidents, he was discharged. Some of the labor organizations' rules and regulations didn't coincide with the setup. I think that when you strike out the penalty system from the review board and just take away his driving award, you have really done something. When you give a man a lay-off, you have antagonized the man towards review boards. Besides the fellow you are going to hire may be worse than the one you have already fired.

MR. BEADLE: I had more difficulties in establishing and promoting accident review boards in my company. They had employed penalty and disciplinary action in their review boards before any time which created considerable dissatisfaction. We had actually to divorce disciplinary action from the action of the review board in order to reestablish the prestige of the board.

MR. SONTHEIMER: I think you can determine preventability with the following two questions:

(1) Did the driver do everything in his power to avoid the accident?

(2) What could he have done that he did not do to avoid the accident?

So far as I can determine those are the two questions that need to be answered in determining preventability of accidents.

CHAIRMAN GRUMME: I was just handed a pamphlet, which I understand from yesterday's meeting, has not been used a great deal by Council members—"For Experts Only." In the booklet is a section entitled "What is a Preventable Accident?"

"Responsibility to prevent or avoid accidents goes beyond carefully observing traffic rules and regulations. Professional drivers are expected to drive so as to prevent accidents, in spite of hazards of weather or road, traffic conditions, and the other fellow's faulty driving and failure to obey traffic regulations.

"Calling an accident preventable is based on whether or not the accident could have been prevented or avoided by the driver in question—not who was primarily responsible or at fault."

I think, with that, we will adjourn the meeting and thank you for your participation very much.

#### THURSDAY AFTERNOON SESSION.

October 9, 1947

Presiding: W. C. MERRITT, Safety Director, Trucking Incorporated

#### A National Standard for Safe Driving

By W. ROBERT SMITH

Manager, Personnel & Insurance Dept., Scott Bros., Inc.

You men from all sections of the country each have your part to play in the development of a national standard for safe driving. Development, adoption, and administration of a national standard, in my mind, appears to be both desirable and at the same time difficult of accomplishment.

To develop a standard, we must re-examine and re-evaluate our present ideas of safe

driving and do it by objective research.

I think that most of us will concede that in our attempts to develop methods of testing and selecting, we have easily run into over-simplification of things on the one hand; and what seems highly contradictory but is equally true, some of us have over-complicated the process. We have developed a lot of tests, a lot of questionnaires, a lot of



methods and techniques with one objective in mind: to obtain the perfect driver.

Of course, that is one of the difficulties that confront safety men. They have made their problem difficult in the very beginning because they are seeking perfection, and yet the fallibility of the human race is one dogma I could present to you which could occasion no rebuttal at all.

We are trying to pick perfect people; no-accident people; people who never have accidents and never made mistakes. Certainly, none of us are satisfied with a driver who has an accident. What we try to do is select, in the pre-employment examination, a driver who will work for us "X" number of years with no accidents.

We have set up a very difficult objective. To develop standards of selection and training to attain that objective will require, obviously, equally perfect schemes and methods and techniques.

To administer a national standard we have to have a unification of all interested agencies because the standard is to be national. There will be a national award; a national form of recognition of safety accomplishment. Obviously, to be national, it will have to be administered nationally.

To have it done so in this heterogeneous country, we will need the unity of all the established agencies. You can't just scrap everything that has already been established and set up a new agency to take care of them.

In the development of a national standard, we will need national administration. That is going to require the unification of ideas and of efforts of all agencies and people interested in the safety program. Of course, by national administration I don't, of necessity, mean centralized administration. I think we can administer national standards and national programs without the curse of centralization. Certainly, in 48 states we ought to be able to find 48 agencies or any desirable number above one, that will accomplish this standardization we are talking about.

What should a national standard of safe driving consist of? This is merely my idea. I would avoid the usual education, engineering, and enforcement. Let us take the standard driver, the standard vehicle, and the standard highway, using each of them in the broadest sense. By the highway is meant not only the roadbed but the traffic condi-

tions, signs, and all the other features which in some drastic form of coercion or intimidation directly or indirectly attempt to standardize the actions of the standard driver.

Taking these three points in order, what should be the makeup of the standard driver? Now we do not limit the driver to merely the commercial driver even though the commercial driver is under the particular control of his employer and other agencies. We all know that the commercial driver, unfortunately, or fortunately, is an integral part of all drivers and all conditions on the highway.

So we can't talk about a standard driver in terms of a commercial vehicle driver alone because many of his difficulties are brought about by association with other drivers on the highway. What are some of the standards we should consider for drivers in general?

I would say it's one of pre-licensing education—not the traditional pre-licensing education which consists of reading little pamphlets or booklets that your state hands out and which were never meant so much to be understood as to be a handy reference guide for a local constable or J.P.—but education on all educational levels, starting with very early childhood.

We must recognize that until the age of 29 the greatest cause of death is accident. When we do, we will bring all our forces to bear in combating accident causes.

From the very beginning of the training of the individual, assuming that ultimately 60 or 70 per cent of them will drive commercial vehicles, we have to begin this standardized safety training.

The frequency with which accidents occur to an individual depends to a great extent on his environment, so we have to develop the standardized driver with full knowledge of the difficulties that he faces, the hazards, the risks in his own surroundings and environment.

There, of course, you get somewhat away from standardization because of communities and highways and territories that differ in their accident exposure.

Avoiding or nullifying a hazard is often a simple thing, but making an individual aware of it and continuously aware of it is the problem. Telling an individual what to do when he gets to an intersection and sees

a car approaching against a red light at an uncontrolled speed is an easy thing to illustrate, but to get that same individual under those actual conditions to react as you have trained him, always not only once, is the problem of accident training.

There is hardly another thing in the world which you measure not by the high frequency of your ability to comply but by your very low frequency of failure. In other words, if you are a ball player and you hit three out of ten, you bat .300. On the other hand, if you are a commercial vehicle driver and have a route that extends out 35 blocks from your home terminal, there are at least 35 intersections, which means that a round trip would involve 70 intersectional hazards every day. Then you add to that highway the two-way traffic and you have an additional number of hazards with all of the involved right and left and U-turns. You have cars pulling in and out from the curb and from garages and parking lots.

You can see how complex your job is when it comes to standard training of the individual because the success of your work is going to be measured in terms of how many individuals you can carry through "X" number of years without ever failing, not with failing twice or four times as compared with either eight or ten, but without ever failing because the minute a safety director tells how many accidents he wants to have he is faced with the problem of trying to determine how much they are going to cost. No one knows what the next defect in driving technique will bring, and you can only extend your standard on a high plane.

The second point in addition to pre-licensing education is driver-training in high schools. I think the commercial vehicle operator in his own community ought to get behind the program. It may be that only a small fraction of the high-school trained drivers will become commercial vehicle drivers. This is due to the fact that driver training is usually taught in the fourth year of high school, while most commercial vehicle drivers complete only two years which practically restricts them from the benefit of the training. But the indirect benefits that they get as a result of the improved standards of all users of the highway should be invaluable.

There should be a national standard of licensing requirements, including mental, physical, and driving tests, for all drivers.

The driving tests should use heavy vehicles for commercial vehicle drivers. This may now be merely an ideal, but make it a standard to look forward to.

Within the commercial vehicle operating field work should begin on the development of a national standard of pre-employment examinations of drivers. When an applicant comes to you for employment, you should have some way of evaluating the term of employment he had before, of evaluating the reasons for hire and the reasons for termination of employment.

As it is now, a man walks in and says he worked for such and such a company for 10 years, and unless you know the intricacies of their personnel and safety program, you are unable to appraise whether that term of service is indicative of a good employee in terms of your own organization.

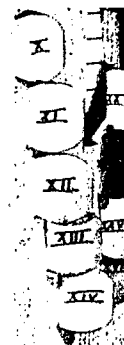
While present tests tend to eliminate the unsafe driver or tend to point out unsafe practices, habits, or conditions, they give but small assurance that those who are not eliminated will be free of accidents.

In any discussion of the development of standards of selection I think it is about time we re-examine and re-evaluate all our present methods. Do it occasionally, periodically, and apply more objective research to it. The driver-testing experts have had to make a subjective approach to the problems because they didn't have the experience of the commercial operators to guide them and to curb or test their equipment as they went along. So a lot of consideration in the development or recommendation of a national standard of testing equipment and a lot of research is necessary. Commercial industry certainly has a stake in it and should contribute to it.

Now let us take the other factors. The standard vehicles and the standard-highway are topics of such tremendous scope that we could spend days in convention conference trying to develop the vehicle standard and trying to develop the highway standards.

However, it seems to me, of all the standards that we might develop, the one we should develop first is that of pure, safe driving. By pure, safe driving I mean the actual operation of the vehicle including driving in the proper lane, safely approaching intersections, and properly stopping and pulling in and out from the curb.

Accident statistics, even the best of them,



only show us what happened. They don't show us why or how. We know that certain drivers have a preponderance of accidents pulling out from the curb. We don't know why. You could only know why if you were the driver involved.

Your whole accident statistics setup is very largely subjective—only the result of what the driver told you, accredited or modified to some extent by reports of investigators, claim adjusters, or the police. But in the final analysis, our efforts to oversimplify get us into all kinds of difficulties in these things. So we say that the fellow who pulled out from the left, from the curb, without looking, probably has a bad left eye. The fellow who stopped too quickly and got rammed in the back or didn't stop soon enough and rammed the car ahead, either had too fast reaction time or too slow. I don't think it is that simple.

It seems to me that one of the mistakes we have made in our thinking is to some-

what isolate automobile driving from other factors of human behavior. We try to make a person who is driving an automobile and is involved in an accident into some person totally different from the individual or human being who is not a driver. Are there certain things that a driver does that other human beings don't do? According to my personal feeling, that isn't true at all.

I think that we have years and years ahead of us in the development of national standards of measuring, testing, educating, and correcting. I might be an awful pessimist on this score, but I think the answer to making drivers safer—and if your formula doesn't work for practically all of them, then maybe your formula isn't what is producing the results—lies in our learning more about their actions, why they do what they do at a certain time. Maybe when we find out why they do it, we won't be able to do anything about it, because it will be something we will be unable to cure.

### A National Standard for Safe Driving

(Panel Discussion)

Chairman—C. D. CALKINS, Dir. of Safety, Pacific Motor Trucking Company.

Participants:

E. R. BENNER, Mgr., Delivery Service Div., Marshall Field & Company.

A. EWING GREENE, Vice-Pres., Mason & Dixon Lines, Inc.

H. D. SCHAEFER, Mgr., Automobile Accident Prevention Dept., Auto Owners Insurance Co.

Don E. TOWNSEND, Safety Dir., Dixie-Sunshine Trailways.

CHAIRMAN CALKINS: We will begin our discussion with any questions you may have on Mr. Smith's talk.

MR. RAY WALKER (Tanner Motor Tours): This question is a rather peculiar one of national standards. I would like to ask the question of why, in your opinion, is information concerning national standards necessary?

MR. SMITH: I tried to express in my talk why I think it is necessary. I think, too, that often we are inclined to take an improvement of a condition and consider it final. In other words, we went for years beating drivers over the heads who had accidents

before we developed better techniques of handling drivers. I am just hopeful that we won't decide that these present techniques, because they are so much better than before, are to be final.

In so far as the benefits of national standards are concerned, there is probably a lot to be said for both sides. However, I think it would tend to eliminate a lot of confusion in interstate operations, and it would make the employment of drivers somewhat easier. It would make the training of school pupils in safe driving easier because there are many transfer students from one state school system to another. In respect to driver awards, a national award might receive greater acceptance from the drivers by reason of its being a national award, somewhat like the greater effect of receiving an award from the Federal Government than from your state government, for example, and that is probably true of all states except those south of the Mason-Dixon Line.

I don't know whether I prove my point, but I think there are basically sound reasons for the adoption of national standards, plus this over-all reason that you bring to bear

the efforts and intelligence and education and know-how of people from all over the country. Thus out of the sum total, if it is properly administered, you might get a better standard than if restricted to provincial, state, or local.

MR. W. J. SIMON (National Highway Users Conference): I would like to direct a question also to Mr. Smith because he did raise a very thought-provoking question in one of his statements. He said, "What we need is a better standard for driver licensing." That statement is contentious on at least two points: the contention being over whether or not Act II of the Uniform Vehicle Code is not an adequate standard for driver licensing, and the other contention being would he propose a federal driver licensing regulation?

MR. SMITH: I shall say, first, that I am not familiar with this Act II of the Uniform Code as you described it. I only know from the record that less than half the states did not examine drivers except during the last 10 or 12 years, and a few states still don't examine them. In many states it is still very easy to get a license. In practically all states there is a coefficient of efficiency and effectiveness of passing a driver's license test and actually being able to drive an automobile that is very close to zero.

To avoid being facetious, I think a national standard of licensing is desirable, and by that I mean a very high standard. I realize that when you seek to develop such a standard, you run into such practical matters as cost, facility of administration, and all that sort of thing. Then there is the question of whether or not, if it becomes national, it cannot better be administered by the federal government than by the state governments because as it is, a state government might not do it as well as the federal government.

It seems to me that all present methods of pre-licensing examinations are inadequate. Like most testing devices, they do eliminate people who would be very bad accident risks. But you could eliminate most of those without going through the ramifications of a test. The unfortunate part of it all is that the people who pass the examination think, *per se*, that they are qualified drivers and then go out and start mauling people. What can we develop that will test a driver and help to make him a safe driver? By "safe driver" I mean a driver without an accident.

I don't think there is such an animal in existence.

MR. NEVHART: I am going into the field of testing for just a minute. One of the panel members has done a terrific amount of testing, not only in his own fleet but throughout the state of Texas and earlier in the war, at Oak Ridge. It was his opinion, first of all, to have a national standard on a certain level which, we might say, would be a standard license, and secondly, certain restricted standards for those who could not qualify for the standard but who might be permitted to drive under certain conditions. In terms of the men whom you are testing and their deficiencies, would you be of the opinion that it would be possible to set up a national standard for most people and then a set of sub-restricted standards of licensing?

MR. TOWNSEND: I recall, that yesterday the statement was made that there is no series of tests that can make any miraculous change in your accident record, and that there is, so far, no validity to the tests that have been given. I want to point out, first, that if you recall the 2300 tests which were made on various types of operators brought into the police departments, you will note that there was no particular cross section of operators covered. Furthermore, there was no material study made of the individual's qualifications or experience.

In my experience in testing, I have found, first, that if you have an unfavorable accident record, that a series of tests will, if properly administered, make a miraculous change in your accident record. Remember, I said, "If properly administered" and properly sold to your operators. In my own organization and in some of the organizations I have been working with, there are figures to prove that.

I do believe that, as has been said here, there is much research to be done, but I also believe that we are in a position at the present time to set a standard which will far exceed anything that we have had prior to this time. I think, so far as future research is concerned that this is the case. I am placing it directly in the hands of the National Safety Council and other agencies cooperating as well as the Commercial Vehicle Section. We have, I believe, approximately 100,000 operators in our membership. Certainly, if all of the fleets in the Commercial Vehicle Section were to combine all of their experi-



ence in this field of testing and make it available, we could make much more rapid progress than we could by having one organization do all this work. However, I do believe it should be established on the basis of your licensing.

The gentleman mentioned the Uniform Traffic Code in connection with the licensing. If we felt that the driver's licensing laws were adequate in the selection and licensing of operators, certainly we wouldn't be going to as much trouble as we do to try to improve the standards within our own fleets. At least, that would be a factor in my opinion. Does that answer you?

MR. NEYHART: Partially, but I think it will come out again with some of the later questions.

CHAIRMAN CALKINS: I am almost sure that we are talking about a subject that cannot be covered in the 15 minutes we have at our disposal. I have in mind something that we may be able to do with respect to the standard of achievement. Since we are being plagued by accidents within the industry, I wonder if there isn't something that we, as a group, can do to remedy the situation? I think that we have a tool within our reach. Could not the industry get together to determine just how good a driver is? I am going to ask Henry Scheffer this question: I don't know whether or not your organization has any particular setup to determine the driver performance of your assureds, but if you do, could you tell us something about that?

MR. SCHEFFER: We don't use any highly technical or specialized process. We do, however, keep a record of each individual accident by every driver in each specific fleet. We have this information in our adjusting departments, which is then fed into the engineering department. There it is put into figures whereby we of the engineering staff are able to review these accidents. Many times we find that it is expedient to pass the information along to one of the lesser engineers. He, in turn, sits down with the driver in question and tries to bring out, from questioning, the things that we feel this driver has been doing which are causing him accidents. As I have said before, we don't use psychology or physical tests because we are not too sure of them.

MR. BRYCE [University of Toronto, Toronto, Canada]: I want to tell you of my

appreciation for the assistance that is given us from down here in the safety work in Canada, as I have been trying to operate the Division of Public Safety at the University of Toronto, which is patterned on that which is being operated at Penn State.

Mr. Smith, in his talk, mentioned "the place for licensing" and the "proper standard of licensing." We in Canada are also interested in a national standard of licensing.

It seems to me, if you have a general licensing standard, even though not very high, you have a "jumping-off place" for considering everybody. There isn't a youngster who goes on a ball field who doesn't know the rules of the game. They are standardized. It doesn't matter where he goes. If you chalk up an error against a man, you can get pretty sound unanimity on the reason for that error. That took 25 or 30 years to develop.

If you had a standardized licensing system all across the United States, then the average driver, would know what to look for when he is checking up on the other driver, and better performance would naturally follow. I don't care whether the standard is low or high so long as it is a standard.

Mr. Smith has said it is going to take a long time. Sure. But the very fact that we will get unanimity is well worth while. I am going to request all fleet people to work towards getting licensing regulations for the general public, so we will have general appreciation of all our problems.

In Canada we have three types of football: in the Maritimes, one set of rules; in the Central section, another; and on the Coast, there is another. We can never get together on football. You fellows seem to have the same difficulty in traffic regulations.

CHAIRMAN CALKINS: I am wondering whether it is possible for anyone here to at least give us a foundation for driver licensing? What things should enter into it? I am going to ask Mr. Greene, as a truck operator and representative of management, what he thinks should go into this very basic element?

MR. GREENE: Mr. Chairman, that is also a wide question. I might give you some very elementary standards—general standards. Of course, a man should be physically capable of driving. He shouldn't have any handicaps that would prevent him from having control of his vehicle at all times. And certainly, eyesight and hearing are very important.

I think that one of the best standards that

we need to have is, as the gentleman said, unanimity of rules and regulations so that everybody knows the objectives in mind.

We operate in 12 states and the District of Columbia. There is a good deal of variance in the traffic rules of those individual states, and the driver, in traveling from one state to another, is confronted with a new problem when he crosses each state line. If all states had the same rules, then that driver would know what those rules were, which would greatly simplify matters.

Departing from that subject a little bit, I think the best approach to establishing a national standard of safe driving is through educational lines. I think that all of our high-school pupils should be trained to drive a motor vehicle because the vast majority of them do drive them, whether they be commercial or private vehicles.

I think someone told me one time that it took chickens three generations to learn not to run across the road in front of an automobile. If it takes us three generations of people to get away from automobile accidents, we had better get started.

We all have different ideas as to what those standards should be. We have different ideas of what the norm should be. But if we started out and educated our young people and brought them along with a standard education on vehicle operation and traffic problems, I think we would eventually establish the norms we need to assure safe driving practices on a national basis.

MR. SCHEFFER: I agree with Mr. Greene entirely in what he has said. In the city of Detroit for a period of the past two years we have been conducting what is known as a "driver refresher course." We have found that, by giving a test on traffic regulations at the outset, about 75 per cent of the commercial drivers failed or had poor averages in ordinary traffic regulations' tests. These were not ordinary passenger drivers. Some of the men who were sent to this school were picked out as the star drivers.

At the end of the three days, they passed with flying colors.

Now how could some of those fellows have gotten their chauffeur's license when they had failed so terribly at our school? We believe that this shows that if we had better testing at the time the license was granted, a lot of accidents would have been eliminated.

The records of our company don't show that physical defects are causing any where near the amount of accidents that have occurred. It isn't ignorance of the law that is causing the accidents, but rather that the law is misunderstanding on the part of the persons involved. They often know a law exists, but they do not understand the law correctly. Because they do not understand the law, they assume that they are doing the right thing and frequently get into difficulty.

MR. TOWNSEND: A while ago, gentlemen, I spoke of testing. I want to clarify that a little bit. I am not going to say that testing of the type that uncovers physical defects is what caused the reduction in the accident records that I know about. But I will say that this testing, by developing the proper attitude, could at least give us a standard which we can start on. If this program will develop a proper attitude in reduction of accidents, at least there is a start.

MR. SMITH: May I answer Mr. Walker? I am from one of the Eastern states, and we operate in 14 states, all Eastern and Middle Western. I don't think we will ever win the National Safety Contest based on accident frequency until an allowance is given for exposure to accident frequency. Although there is a standard definition of an accident, the manner in which a person describes his own accident has a lot to do with determining whether or not it falls within the classification.

CHAIRMAN CALKINS: In conclusion I should like to say that the improvement which we have discussed in this panel will undoubtedly spread by virtue of the fact that you people come from practically every state in the Union and from Canada. We will only get something out of this, however, if we go back to our own backyards and plug and fight.

# *Transactions*

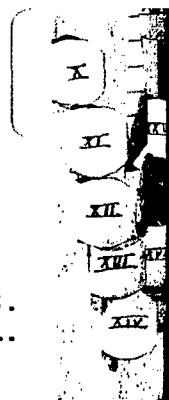
35TH NATIONAL SAFETY CONGRESS



VOLUME X

CONSTRUCTION SECTION

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## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

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## Construction Section

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### TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: LLOYD A. BLANCHARD, Chief, Safety Div., Corps of Engineers, Washington, D. C.

### The Chapter of Accidents

By N. B. O'CONNELL

General Superintendent, Turner Construction Company

Those who build buildings can testify that the chapter of accidents in our business is a long and expensive one.

Billy Muldoon was born and raised in a small New England mill town. He finished his high school course and had hopes of going to college, but he had to help out at home; so he got a job at the local mill. By the time the construction of the big new addition to the factory got underway a few years later, Billy Muldoon was already happily married and the father of two fine children. Attracted by the high construction wages and the stories of big take-home pay, he quit his factory job, got himself a laborer's card and went to work for the contractor. Billy was strong and quick to learn and it was not long before he was a pusher in the stripping gang.

January 16, 1945 was a gray winter day with snow in the air and a brisk west wind scurrying through the bleak skeleton structure. Billy Muldoon stood on the fifth floor, in charge of hoisting large form panels and was about to hook one on when a gust of wind blew the cable hook beyond his reach. He leaned out; the panel, unbalanced by the wind, toppled against him and pushed him overboard to the frozen ground sixty feet below.

For days he was on the critical list. Then it became evident that his rugged Irish constitution, aided by fervent prayer and competent medical attention, was going to prevail over a list of injuries which included ten fractured ribs, a fractured pelvis, fracture of three transverse processes and a compression fracture of a lumbar vertebra, to say nothing of a punctured diaphragm and injury to the genito urinary tract. By April he was out of the hospital wearing a spinal brace and walking with the aid of a cane and, by July, he was back on the job doing light work.

But he had to give up his job with the contractor, could not keep his end up at

the mill, and, finally, his parish rector had to make a place for him working around the church. Billy Muldoon is still in his thirties. His fall has had a tragic effect not only on his life but on the lives of his wife and children.

Hjalmar Frederickson was 35 years old when his useful days as a journeyman carpenter came to an abrupt end. When he first came to this country, he worked on building construction because all his friends were in that line. He was a good mechanic, loved his trade but hated intensely working as a "wood butcher" on concrete forms.

Not long after he married, he put the family savings into a little carpenter shop. But the war came on with its restrictions on lumber. Hjalmar had to go back to working on buildings. He hated the work, but those war plant construction jobs paid well.

It was while placing the forms for a fill on top of a new type of sound absorbent insulating roof tile that Hjalmar met his misfortune. One of the tiles broke under his weight and he fell as feet to the concrete floor below. The doctor called it "a comminuted fracture of the right humerus" and stated that there was some indication of injury to the spine. There was not much the doctors could do and, as time went on, Hjalmar suffered almost constant pain in the ulnar nerve, which I understand is the one which gives the "funny bone" sensation. Hjalmar's wife got herself a job soon after the accident, for they had obligations which could not be met by compensation checks. Hjalmar catches odd jobs when he can, but he is not good for much, and the doctors deem him totally disabled. It is just a sort of slow, living death.

Fatsy Moreno was an Italian immigrant many years ago. He came over with his father while he was still a young boy. They settled in a small New England town with his father's relatives who worked on the large estates in the neighborhood. As was generally the rule, Fatsy was one of a large



family, and, as soon as he had satisfied the school requirements, he went to work with his father.

Patsy's uncle worked in the city and made good money as a cement finisher. So when Patsy married, the couple moved to the city, and Patsy went to work with his uncle as a helper. In due time he learned the trade and, through his uncle's influence, got a cement finisher's card in the union.

Happy years followed for Patsy and Maria, his wife. They had seven kids, and they were determined to give them a good start in life. Their youngest was born when Patsy was 45; and as is so often the case, he was the pride and joy of his parents, and they had high hopes for him. Frankie was in first year high school when the news of his father's injury rocked the Moreno household. Patsy had been working on a new building that was going to play an important part in the war effort as far as planes were concerned. He was on a scaffold patching the walls of a high concrete shaft. Men were working at the top of the shaft some forty feet above him. They were removing 8 x 10 timbers which spanned the shaft and which had formed the framework for a canvas weather protection. About 30 feet below was a plank deck which served as what seemed to be a substantial protection for Patsy and his partner. Besides, the men at the top knew that the cement finishers were working below and they were being extra careful.

How the 8 x 10 got loose, no one seems to know; but it did and it took the overhead protection with it.

Patsy was conscious for the most part, but he suffered severe shock, a brain concussion and multiple bruises on the back and chest. He was out of the hospital in 10 days and returned to work feeling okay except for a pain in the head. He tried to get up on a two-foot high scaffold, but he shook so badly that he had to be helped down. He tried it again a few days later but with the same result, and, in the meantime, the pain in his head became worse.

There has been some mention of malingering, but the fact remains that Patsy has never been able to work since his accident, and he was a good worker before then. He has grown morose and has lost interest even in Frankie. He sits and broods hours on end.

This is the human side of our chapter, and it paints a picture that is at once touching

and impressive. Being at heart a romanticist, the construction man is deeply moved by such accidents, for he recognizes that it could just as readily be he. A wave of caution sweeps over the job after an accident, and a jittery, nervous atmosphere pervades the air. Very often the men knock off of their own volition and take the rest of the day.

It only the awareness of danger and consciousness of accident possibilities that are apparent on a job the first day following a bad accident could be maintained, it would seem that the pain and suffering of those injured ones would not be entirely in vain. But the push and drive and excitement of the job soon dims the memory of Billy Muldoon lying pale on the saw or the memory of Hjalmar Frederickson as they carried him off in the stretcher.

Although most of us who build will admit that we would not be happy in any other field, still we work for profit and we get a real kick out of beating the cost books. The economic phases of our chapter cannot be neglected or minimized for they play a more important part in our business than most of us recognize. Many of us in the field have the erroneous though comforting feeling that the company carries insurance; that, true, we must exercise care to avoid accidents—but then accidents do happen, and although we hate to see anyone hurt, we know that after we get the injured workman off the job, the insurance company will do the rest. As for cost, well, that's why we pay the insurance premiums. It just means that the insurance company will not make as much money as they otherwise would.

This is a common lay belief, but nothing could be further from the truth. Let us examine the economic aspects of our three cases to see what the bills amount to and who pays them.

Billy Muldoon's case was not overly expensive when you consider how badly hurt he was. His case cost in compensation, medical expense and indemnity about \$5,000. Patsy Moreno's case, because of the neurological condition that developed from what appeared to be minor injuries, will probably be long drawn out and is forecast to cost about \$7,500. Hjalmar Frederickson, you will remember, was decapitated totally disabled, and the final outcome of this case is expected to reach \$12,500. A grand total of \$25,000 for the three cases! A lot of money

even if you haven't got it! This is real money—cash money—and the greater part of it is paid out to our three injured construction workers. Not bad, you say! Let us see.

Billy Muldoon gets a cash settlement of \$5,000 after receiving \$1,000 in compensation payments. But when he was hurt, he was earning at the rate of \$60 a week; now he's getting \$45. Billy is in his thirties and probably had to good years ahead. Assuming that he would average \$50 a week, he could have earned \$25,000 more than his most optimistic prospects now indicate. No bargains here for Billy—a potential loss of \$21,000.

In the Patsy Moreno case, there was a final lump sum settlement of \$5,000. Patsy was 58 when the timber fell on him, and he was earning at the rate of \$50 per week, and times were good. Assuming that he could have worked until he was 65, he could have earned \$21,000. With his compensation he got \$9,000. So it looks as if he suffered a potential loss of \$14,000.

Hjalmar Frederickson has received \$5,000 to date, and it is estimated that the case will be settled for \$5,000 more. Hjalmar was earning \$70 a week when he fell and he was 58 years old. Assuming a capacity to earn \$55 a week until 65, he could have earned \$25,000. Potentially, his loss is \$15,000.

A grand total potential loss of earning capacity estimated to be \$50,000 for three average construction workers!

What about the real costs paid out by the insurance company which, for the three cases, amounted to about \$25,000, and which, according to popular belief simply amounts to a credit to the "hard luck" side of the insurance ledger?

We all know that we pay in premiums a percentage of our payroll to reimburse the insurance carrier for his risk, and most of us know that that percentage varies generally directly as the number of accidents in our industry and particularly, as our own individual accident experience. The variations are often abrupt and extensive. Patsy Moreno's accident, for example, made an 8 per cent difference in the contractor's premium for a period of three years. Depending on the size of the risk, the contractor might well pay the total cost of this accident and possibly more.

If the employer would only recognize that as far as insurance goes, he is getting "nothing" for nothing; that he is paying the full cost of all his accidents, plus the operating cost of his insurer for doing the dirty work for him; that a bad accident experience is reflected in his estimates and might well cost him a job in competition, perhaps the thought would take root and flower that money spent for safety precautions and safety education might well be good sound business and might even reap some real profit.

## The Inclusion of Safety in Job Planning

By OTTO HOLMSKOG

Senior Construction Engineer, Employers Mutual Liability Ins. Co.

**Explanation:** The contractor, through experience, has become quite certain that a safety engineer can frequently help in job planning by giving useful advice. Often, however, the contractor becomes skeptical and feels that a safety engineer on the job is a nuisance and that he is too critical in his job analysis.

The superintendent, being of the planning-as-you-go-along type and usually having all his plans in his head, is convinced that action, although sometimes hasty, will more than offset careful planning. The safety engineer, a practical construction engineer, is very considerate of both the contractor's and the superintendent's problems. Using several different methods of approach, some good and some bad, he has learned how to get cooperation. Thus he has succeeded in selling "Safety in Job Planning." Now if we, as well as our contractor and superintendent friends, can learn a lesson from the following three skits, the job, no doubt, will benefit.

The same characters will take part in the three problems, and a discussion will follow each skit. (Sketches and photos referred to have not been included in these skits, but are on file in Library of National Safety Council.) *Sketches by C. A. 32*



## No. 1. Planning the Use of a Small Concrete Mixing Plant

CAST OF CHARACTERS:  
Cast of Characters:

- a) Mr. F. A. KNOX, President of the N.S.C. Construction Company, known as "Mr. Khone" (General Superintendent, Selzer-Ornst Co.)
- b) Mr. AL. WARREN, General Superintendent of the N.S.C. Construction Company, known as "AL" (General Superintendent, Huzzinger Construction Co.)
- c) Mr. F. J. CRANDALL, Safety Engineer, Casualty Insurance Co., known as "Frank". (Asst. Vice-pres., Liberty Mutual Ins. Co.)

**Locale:** Contractor's field office of the N.S.C. Construction Company, located at the job site, which is a new addition to the Fort Port Electric Company's power station at Fort Port, Illinois.

**Progress:** The excavation, which is now in progress, is subtle. Carpenters are making up form panels for footings and for concrete foundation walls. The concrete mixing plant will be located on an empty lot along railroad tracks and about a mile from the project. Concrete will be transported in ready-mix trucks.

**Time:** 9:00 a.m. - October 7, 1947 - Mr. Khone, who arrived on the job about 8:30 a.m., has finished looking over the mail and made several telephone calls. He has called in Al—who happened to pass by the office. They are discussing some job items when Frank is announced. Mr. Khone asks Frank to come in, and says:

MR. KHONE: Frank, I'm glad to see you. You know Al, of course.

FRANK: How are you, Mr. Khone. Sure I know Al.

MR. KHONE: What's on your mind, Frank, this early in the morning?

FRANK: Since this is my first visit to this job, I'd like to take a look at your plans and specifications. Now perhaps Al will tell me about his plans of procedure.

AL: Sure, I'll be glad to.

MR. KHONE: Since you are here and we were discussing some job procedures, you might as well sit in, and if you have any good ideas for preventing accidents and injuries, let's have them. Let me see, Al, where were we, when Frank came in?

AL: We had just begun to talk about the mixing plant.

MR. KHONE: (directing his remarks to Frank) You know, we can't buy ready-mix concrete in this town, so we have to set up our own plant. I've rented a piece of property along an Illinois Central railroad spur, about a mile from here. The cement will come in by railroad car, and sand and gravel will be trucked in from Jones Sand and Gravel Plant about 6 miles out of town. We'll have to use our own water tank, which we have placed on a truck. There's a corduroy road on the south side of this property running right up to the railroad tracks, which we intend to use. Al, you have pretty well in mind how you intend to lay out this little job. Let's hear it.

AL: Well, my idea is to place the mixing plant at the southeast corner of this lot, so that the ready-mix trucks can easily get to it and the cement can be unloaded right onto the platform. We'll use our small sand and gravel hopper and the F-go crane. I figured to place the F-go just north of the hopper, and with the sand and gravel piles within easy reach, we should have a pretty smoothly operating plant.

FRANK: If I place this property correctly, it is located about a mile south of here and the sand and gravel plant is about 6 miles south of there?

AL: That's right.

MR. KHONE: As far as I can see, your plans sound OK, but I don't think Frank got your idea. So why don't you roughly lay it out on this piece of paper and explain it as you go along.

AL: (Sketches the layout and talks at the same time. See sketch III)

Well, here is Fairfax Road running north and south. The job is a mile up this way, and the sand and gravel plant is 6 to 8 miles south. This is the dead end road running east up to the railroad spur, and this is the property. Now I intend to place the mixer and the hopper like this, with the concrete chute facing the road on the south side. The cement bags will be unloaded here on the west side of the platform, and I intend to build a roof over the cement. The sand and gravel, as I told you before, will be placed in this area within easy reach of the crane. Now, that's all there is to it.

MR. KHONE: (Has not been following Al's description. Now looks up and turns

toward Frank says) Frank, what do you think of it?

FRANK: It sounds good to me. But Al, will you now show me on this sketch your routing of trucks coming and going?

AL: (Evidently has not paid too much attention to the traffic problem) (See sketch I)

Well, you ask me the most embarrassing questions. In most cases we let the drivers use their own judgment, but here goes. The sand and gravel trucks come in from the south and turn right into our road. In order to dump their loads easily, they had better turn right onto this empty lot and then back up across the road and up to their piles. The sand trucks can back up here, and the gravel trucks there. After unloading they can turn out onto Fairfax Road and go south back to the pit. (See sketch II) The ready-mix trucks come from the north on Fairfax Road and make a left turn onto our road and then turn right onto the empty lot and back up to the mixer. In going back to the job, these trucks can go straight out to Fairfax Road.

MR. KHONE: I don't know, Al, if all that traffic at the corner is so good. We must remember that there are other cars on the road besides ours. What do you think, Frank?

FRANK: I think you've got something there. That crossing is a bad one. Perhaps we can do something about it. What do you say, Al, if we try to analyze for possible hazards and then see if we can't eliminate them?

AL: OK with me, but let's get going on it because I've a half dozen men out there now clearing and getting ready. I should run out there in a few minutes.

MR. KHONE: (getting ready to leave) You two work it out, and whatever you agree on is OK with me. I'm going out and will be back in 10 or 15 minutes.

FRANK: (offers Al a cigarette, lights it for him, and then says) Let's look at your sketch and mark the hazard points, where we think accidents can happen. (See sketch III)

AL: Well, there are several traffic hazards on the main road where our trucks will turn in or come out.

FRANK: All right, here's one point (A) where your ready-mix trucks turn in onto your road, and here is another point (C) where they will turn out.

AL: And here is one point (B) where the sand and gravel trucks turn out on the main

road.

FRANK: Let's mark those points A, B and C. Now I don't know whether you'll have any cars parked on Fairfax Road near the corner, but if you do, they would obstruct vision for incoming and outgoing trucks.

AL: There are several cars parked there right now, but I'll stop that and put up "No Parking" signs.

FRANK: Let's mark it (D) so we remember it. That seems to take care of the hazards on the main road.

AL: Wait a minute. The Southeast corner of the two roads is very sharp and the ditch is quite deep. If any of the trucks cut that corner too sharply, they may land in the ditch. I'd better put in a few posts along that corner.

FRANK: That's fine. I'll mark that (E) and now let's get in on the sideroad. You know, Al, I don't like that backing-in business, especially where they have to back across the road. Can't you do something about that?

AL: No, I don't see how we can do any better on that.

FRANK: Well, let's continue marking the hazards. At these points we may have collisions between aggregate and ready-mix trucks. Also, the truck drivers can't see whether men are behind their trucks unless you provide a signal man. I'll mark those points F, G, H and I.

AL: I hadn't figured on a signal man. The need for a man there depends entirely on how fast the trucks come in. Also, we won't be pouring concrete every day. I think I'll watch that and determine later what action to take.

FRANK: We'll leave that problem in your hands then. That, I believe, takes care of all the traffic hazards. So let's get over to the crane. As you have it laid out, the crane will have to make more than a 90° swing, and at one time or another, someone will be under the boom or under the clam shell. I suppose you'll instruct the operator not to swing until the area is clear, and I suppose you're figuring on a roof over the platform to protect the men working on the platform from falling gravel.

AL: I'll tell the operator, but some time or other no doubt someone will be in that area and we can't stop unloading because some damn fool walks through. That applies mostly to visitors. But we'll try to keep them out.

FRANK: Anyway, will you put up some

"Keep Out" signs around the crane? I have some in my car and I'll bring them over.

AL: OK.

FRANK: Are you still using that old fellow on the crane—that fellow you had last year?

AL: You mean Ted. Yes, he's still with us.

FRANK: Yes, I believe that's his name. You know, I think you should have him examined by your doctor. Last year he had a very close call when he didn't see the signal clearly. I think he needs glasses.

AL: You'd better talk to Mr. Khone about that.

FRANK: How about guard railings on the platform and a good ladder up to the hopper?

AL: Railings will be on. That's standard with us, and we use an iron ladder up to the top of the hopper.

FRANK: Don't you think we have covered just about everything now?

AL: Yes, I think we have.

FRANK: Now the question is, "How are we going to eliminate those hazards we have marked on your sketch?" (See Sketch III)

AL: You know, as we've been talking here, I've been thinking. How would this be? (See Sketch IV) Our ready-mix trucks can make a right turn a block north of the mixing plant, turn left on the next street going south, and then turn left again on the street leading into our dead-end road. Both Fairfax and the next road are arterial streets with stop signs on all side streets. So that would work swell. The aggregate trucks can come up on Fairfax Road, turn right on our road. From there on, we would still have the backing up hazards, but we just can't get rid of all of them. In leaving, these trucks can turn right and go around a couple of blocks, where there is no traffic to speak of.

FRANK: Now you're talking, Al. By changing the routing you will eliminate the hazards on Fairfax Road, but we still have the backing up hazards. Now if you could only have a man available to direct the drivers when they back across your road, you'd be all set.

AL: I need a straw boss or someone to be in charge there. Maybe that can be one of his duties. We'll ask Mr. Khone.

MR. KHONE: (returning) Well, have you two come to an agreement yet?

FRANK: Yes, Mr. Khone, we have. We located a few possible hazards, and Al has

changed his plans a bit so that most of them have been eliminated.

AL: (to Mr. Khone) I think I'll need a man at the mixing plant who can sort of take charge down there. How would George be? He's an all-round handy man and could make any repairs necessary.

MR. KHONE: George is fixing the P. & H., but he should be through in a few days. You can have him then.

AL: That's fine. I know he'll watch the trucks when they back across the road.

MR. KHONE: Let me see your sketch.

(Pause). I think that you can eliminate the backing of the trucks across the road. AL: The sand trucks can follow the ditch up this way. (See Sketch V) and back into the pile. When the driver has dumped his load, he can drive out the same way. The gravel trucks can come down a little farther and back up to the gravel pile in a similar way. Do you think that that will work, Al? Have you got enough room for the trucks to back up the way I pointed out.

AL: I don't know, Mr. Khone. Perhaps it can be worked out, but it depends on how large the stockpiles have to be.

MR. KHONE: With the sand and gravel pit only 6 miles away and the largest concrete pour only 68 cubic yards, I should think that we could get by with minimum stockpiles.

AL: I'll figure out how much sand and gravel we'll have to have on hand, and then I'll try to arrange the piles so that we'll have enough room for the trucks.

FRANK: That eliminates the truck hazards. I wonder if you couldn't do something like that with the ready-mix trucks too, Al?

AL: Well—let me see. If we have solid bearing, the concrete trucks can drive out on the lot to the south and then make a swing to the mixing plant. (See Sketch VI.) They will then face west and can drive straight out.

MR. KHONE: It's about time we get back to work now. I think a discussion like this helps considerably in cutting out some of our problems and thanks a lot, Frank, for giving us some ideas.

(At this point Mr. Khone, Al and Frank are preparing to leave—picking up papers, cigarettes, pipes, etc.)

FRANK: By the way, Al, wouldn't it be a good idea to give your man in charge at the plant a copy of your sketch so that he can carry out your ideas better?

MR. KHONE: Ask Jack to lay it out for you, and ask him to get a couple of prints made.

FRANK: Thank you, Mr. Khone and Al, for a most interesting morning. I know we've accomplished what we were after.

## No. 2. Concrete Placement in High Wall Forms

(By means of a 60-foot boom and a 3½-yard bucket, ready mixed concrete brought in by trucks is being poured into a high wall form. Mr. Crandall, safety engineer, has been out on the job and has analyzed the operations so that he can give constructive suggestions. He has in his own mind established the hazards, what corrective measures should be taken, and also how he should approach the management and supervision. Knowing them quite well, he walks into the job office where he finds both Mr. Khone and Mr. Al. Warren, contractor and superintendent respectively.)

MR. KHONE: Well, Frank, we've had a pretty good record since we were here last. No lost-time accidents and very few medical cases. We haven't had even one nearly bad accident. So I'm knocking on wood and trusting to luck.

FRANK: That's fine, and congratulations on a very good-looking job. The housekeeping is good, your foremen are on their toes, and they cooperate very readily.

AL: You certainly have the foremen well trained.

AL: Thanks, Frank, but I'm cocksure that when you come around with compliments you have something on your mind. So let's have it.

FRANK: You're a mind reader, Al. I do have something on my mind. If you and Mr. Khone can spare a few minutes, we can go over one of our operations, which in my opinion has several hazards. I'm talking about the way concrete is being poured in the high forms.

MR. KHONE: But, Frank, we've followed this procedure now for over a week. It seems to be safe, and I know we're staying below our estimate.

FRANK: You may be right, Mr. Khone, but may I point out to you what I observed? As far as I could see, there were no hazards created by the men themselves. Every man is needed where he is now placed. But just the same, they're exposed to several possible hazards. First, the two topmen are standing

MR. KHONE: Come again, Frank, and don't stay away so long.

AL: You know, Frank, I've always tried to do all my planning in my head, but from now on, I'll try using pencil and paper. It's so much easier.

AL: Wait a minute. You taught me a lesson last time and that was to use pencil and paper. So you go ahead and sketch as you talk.

FRANK: All right. (See Sketch VI.) Here's the high form with a platform on each side and handrails on the outer sides. The crane is placed so that the swing to the point of pouring from the ready-mix truck is approximately 45°. The ready-mix trucks come in from the south and swing around to the point where the bucket can be filled most easily. At this point the truck has to do a little backing up so that the chute can reach the bucket. Naturally, you don't want to change the radius of the boom. It's easier and quicker to back the trucks. After the truck is empty, the driver circles around and drives out the same way he came in.

MR. KHONE: I can't see how we can improve on that layout. Can you, Al?

AL: I don't know yet, but Frank has surprised me before. Go on and show us your hazards.

FRANK: All right. Usually you have two or three men around the bucket when it is being filled with concrete. One man, usually directing the chute as the truck is backing, is located at "A." This man can be pinched or even crushed between the rear end of the truck and the bucket.

One man is placed here at "B," and the ground bucket man is at "C." Both these men are in precarious positions in case a boom failure. The bucket man also may be struck by a spinning bucket. On top of the forms you have one man stationed at "D" and one at "E." Both the man at "D" and the bucket man at "E" may be struck by the swinging bucket. These are the five hazards.

MR. KHONE: For crying out loud, man, we've got to have men working at the points of operation. This isn't a factory where automatic machines do the work of men. On construction jobs some risks must be taken in order to get the work done. Why, we have selected those men carefully because we know that these operations are important, and one slip on somebody's part may cost us a lot



of money.

FRANK: Wait a minute, I'm not criticizing you. I'm just pointing out that several hazards do exist and that Al and you, Mr. Khone, will have to watch them very closely. You know that even the best men can make a slip.

AL: Do you have any better ideas on how this can be done?

FRANK: No, I don't think so, but let's see if we can't work out something together.

MR. KHONE: Well, if you're smart enough to eliminate these hazards without increasing the cost of concrete per cubic yard, I think you're on the wrong payroll. (See Sketch VII).

AL: Looking at the sketch, I can see now that the men at "D" and "E" could just as well be on the other side of the form away from the crane and bucket.

FRANK: There are two of the problems solved.

MR. KHONE: Wait a minute. Can the operator see the signal man when he is on that side?

AL: We'll have to try that out.

FRANK: Well, anyway, it's a possible solution, and the bucket man, at least, can be on the side opposite the crane. But we still have the three men on the ground when the bucket is being filled.

MR. KHONE: You know, even if you found a solution for that problem, I'd hesitate to make the change because our present plan has worked so smoothly. After all, we have to put some faith in our men.

FRANK: Of course. But even if you don't make a change, let's see if something can't be done.

### No. 3. Stripping of High Wall Forms

(Explanation: Concrete was poured 5 days ago into a wall section 10 feet by 10 feet and 24 inches wide. The second section was poured 3 days ago.)

The concrete has set, and preparations are being made to move the first form section. The superintendent and the contractor have decided on procedure, but the contractor has begun to think of hazards and has decided to call in Frank Crandell, insurance company safety engineer, to see if he has any suggestions. This time Al, the superintendent has made a layout of procedure (See Sketch VIII). At this point we find Mr. Khone, Al Warren, and Frank Crandell in Mr. Khone's

office.)

Would you lose too much time if the rig made a 90° swing instead of the 45° swing it now makes?

AL: Of course, there'd be a loss of time, but how much I don't know.

FRANK: What I mean is this: would that loss of time be so much that we couldn't consider it?

MR. KHONE: Let's hear what you have in mind first.

FRANK: The crane would operate from the same spot, but would swing to a 90° angle. The trucks would go straight ahead and swing in from the north, so that at the point where the bucket would be filled, the truck would face southeast. If this could be done, the three men working around the bucket, truck, and boom could all be outside the danger area. The backing of trucks would be eliminated, the bucket could easily be handled from outside the boom radius, and the signal man could easily be seen from any position outside the boom radius.

MR. KHONE: Having the boom swing 90° would make the bucket swing sideways considerably more than it does at present.

FRANK: That swing could be reduced by using a tag line controlled by the counterweight.

MR. KHONE: What do you think, Al?

AL: Well, it's worth trying. It looks OK on paper, and I don't see anything out there that may be in the way. The extra 45° swing shouldn't make so much difference in the cost as to be prohibitive. Who knows, we may get more work out of the men this way.

MR. KHONE: Although I hate to admit it, I believe you have again given us something we can use. Let's try it, Al.

AL: OK, boss.

MR. KHONE: Frank, this time I'm a little ahead of you. I've asked you to come here because Al and I want you to show us how to move the first form panel section on that high wall pour so that we won't have any accidents.

FRANK: You're putting me on the spot, Mr. Khone. After all, I'm just a safety engineer. I haven't run a job in years. There's another thing I'd like to point out. In the past we three together have tried to make what I would call analysis of the locations where accidents may occur, and then in each case we've worked out a system of control

so that many of the hazards have automatically been eliminated.

If I were to come up to you and say bluntly, "If you don't move those men from under that boom, you're going to kill somebody some day," you would pull in within yourself and nothing would be done. I know that's true and you know it. Or, because the layout of the job requires the men to be there, you might just laugh at me or tell me to go and run my own business. However,

if I pointed out the hazards at these locations and either you, Al, or the three of us found a solution for the problems, then you'd accept them, and without any comment, the changes would be made.

MR. KHONE: I know, Frank, and this time we'll see if we can't find those hazardous locations and make the changes before we start. By the way, Frank, on that last job, you remember that we reversed the ready-mix truck route and changed the boom swing from a 45° to a 90° angle? Well, we finished that concrete wall at a 1¼ per cent lower cost than the cost of the previous pour. Now why this happened, I don't know.

AL: I think the men worked better and faster when they knew that they were out of danger.

MR. KHONE: That must be it. I can't think of any other reason. Al, will you show Frank your sketch and explain your plans to him?

AL: (See Sketch VIII) This rough sketch has been made on a scale of ¼ inch. We've made two pours and are now ready to move the first form section toward the east where the next pour will be made. The crane travel area is on the south side of the wall. The north side can't be used. The crane will travel eastward, and the boom will swing toward the center of the form panel, about a 90° angle from the direction of its horizontal travel. We'll use a double sling with safety snap hooks. The sling will be held in place by mousing on the hook.

After the panel is loose, the crane operator will swing it free from the wall, set it down in order to steady it, and then move it about 15 feet parallel with the wall. At that point the men will place it in position, connect it to the form in place, and brace it. Now, do you have any questions, Frank?

FRANK: Yes, how many men will you have removing bracing and tie rods?

AL: I figured on two men on the top and two men at the bottom. The two men at the

top will move all along the panel and loosen it with bars. The two men at the bottom will work only at the ends, and I'll instruct them not to move in towards the center of the panel.

FRANK: Is it very hard to pull out the tie rods?

AL: No, because we use sleeves, which also act as spreaders. Later, these sleeves are removed from a swingstage scaffold and the holes are filled with concrete.

MR. KHONE: As you've asked us to do in the past, the two men on the swingstage will use safety belts with the safety lines hitched to the life lines.

FRANK: You seem to have covered all the points I had in mind, but let's see now. The panel is loose, and you prepare to move it to its new location. No doubt the crane operator will swing his boom a little away from the wall. Will your two men at the bottom guide the panel so that it won't swing?

AL: Yes, and they'll be doing this with ropes, so that they'll be away from the danger area around the panel and the boom.

FRANK: Then you swing into position and place the panel.

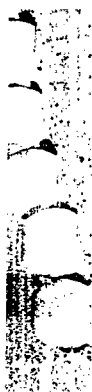
AL: Yes.

FRANK: Will you tell me how you place it, and what the men do?

AL: Well, I usually use three men at the bottom and one man on the top. We'll have blocks on each side at the bottom so that once the form has been set down it'll be in the correct position. The man on the top will bolt on scale to the walers as far down as he can reach, and one man at the bottom will do the same, reaching up. Later one of the men will climb up the walers and bolt on the rest of the scale. The bracing will be put on just as this sketch shows.

MR. KHONE: I remember an accident we had several years ago on a job similar to this. When the form was being placed at the bottom, a fellow tried to bar the panel a little away from the dowels, and just at that moment Jack, (he was the foreman on that job) gave the operator a signal to give him a little slack in the line. He did so, the panel leaned inward, and the fellow barring got his right arm broken between the dowel and the panel. So on this job, if we have to do any moving away from the dowels, let's use wedges.

FRANK: Now, during all this time the crane is keeping the hitch taut until your



bracing is completed, and then the man on the top walks out on the top platform to unlock the sling.

AL: That's right.

FRANK: Then you move back for the panel section on the other side and place that one in the same way.

AL: That's right.

FRANK: So far as procedure is concerned, everything seems to have been planned with a high safety factor. Now let's try, if we can, to find those points of hazard.

MR. KHONE: I have one hazard, or let's call it a mistake in procedure. Let me see now (looks at the sketch—and then smiles): No, I'm not going to tell you what I see. I want to find out how smart you fellows are.

FRANK: OK, Mr. Khone. If we find it, you owe us a cigar apiece. Well, Al, the area around the boom and the lift is a danger area, and everybody should be kept out of this area, including the foreman. When foremen examine the panel and the points where it won't loosen, or look at the places where the panel won't fit when it's being placed, they usually disregard the overhead hazards. Do you agree on that, Al?

AL: Yes, I do. There are times, though, when it's necessary for a man to get into this danger area. However, I'll instruct the foreman to allow that only on his instructions.

FRANK: Now we come to two items which we haven't mentioned. One is the hazard that men may fall when they're taking off the bolts on the tie rods and then again when they're tightening the bolts after the panels have been set and sleeve spreaders and tie rods are in place.

MR. KHONE: There's plenty of room for the fellows to put one leg between the water and the panel. We're using 3"x10" for uprights and 6"x8" walers, aren't we, Al?

AL: Yes.

FRANK: Don't you have any safety belts with short safety lines you can hook around the walers, something like a window cleaner's belt? The men can then stand on the water below and hook the belts around the walers at waist line height. Then they'll not only have both hands free, but also have better leverage on the wrench. (See Photo IX).

MR. KHONE: Al, let's see if we can't fix up a couple of belts for these men.

AL: OK—What's the other item?

FRANK: Usually you place the reinforcing rods when only side panel is in place, and the fellows tying the rods together stand on

the horizontal bars, putting one arm around either the upright bars or the horizontal bars. In that position they try to tie the bars together (See Photo X). I have a photo here which shows 5 ironworkers using a regular ironworker's belt with a swivelled snap hook fastened to it. They just snap this hook onto a horizontal or vertical bar, and then they can stand and work with both hands free.

MR. KHONE: Where can we get those swivelled snap hooks, or where can we get the whole thing, belt and all?

FRANK: When I get back to my office, I'll look it up and call you.

AL: What else is there that we should consider, or is that all, Frank?

FRANK: I believe that's all. I don't know how the ground is out there. Is it solid enough for the crane to travel on or should you use mats?

AL: No, the ground is solid this morning, but it's solid and well packed, and we've had a bulldozer grade the travel area.

FRANK: Mr. Khone, did we cover that hazard you had in mind?

MR. KHONE: No, you didn't, and if you two intended to go ahead on the basis of your discussion here, I believe I'd fire both of you.

AL: I don't know what we could possibly have slipped up on.

FRANK: You mean we've got to give you that cigar?

(See Sketch VIII).

MR. KHONE: Not only one cigar, but two, one from each of you. You've told how you're going to move and place the form panel on this side and then move and place the panel on the other side. If you proceed along those lines you're making it hard for yourselves. Reverse the procedure: place the panel on the other side first and then the panel on this side. The operator and all the others can then see what's being done. Simple, isn't it?

FRANK: Well, I'll be damned.

AL: This proves that three heads are better than two. I think we have all points clear now. I'll go out and tell Joe (the foreman) how to go ahead. The tag lines and the safety belts I'll take care of myself. Thanks, Frank, for coming over.

FRANK: Don't thank me. It cost me a cigar. As soon as I get back to the office I'll call in regard to those belts.

MR. KHONE: OK, Frank, and don't forget I smoke La Palina specials.

## The Story of a Contractor's Experience Resulting from an Accident

By COMMODORE ROBERT C. JOHNSON  
Executive Vice-President, Siesel Construction Company

In the early stages of the recent world war, there was such a tremendous demand for heavy equipment operators that half trained men were often placed in charge of cranes and other complicated pieces of machinery. In one three months' period in 1942, a small naval station in the southern United States suffered the loss of three cranes all from the same fundamental and well-known cause. All units were tipped over, because outriggers were not used, and the supporting material failed on the loaded side.

The first accident occurred when an apprentice operator tried to pick up a load with a steam locomotive crane while the regular operator was gone for a few minutes. The crane was standing on an unballasted side track, and the ground had been softened by several weeks of rain. The outriggers were not in place. When Jones picked up the load, the track on the loaded side started down and he froze to the controls instead of releasing the load. He was buried under the boiler. The crane was a total wreck.

Two weeks later a young sailor was operating a crawler crane in the same area when he made a side lift and tipped over. Fortunately, he was more frightened than hurt, but the crane was out of operation for three weeks.

In the meantime, the station put on pressure to obtain delivery of a diesel locomotive crane that had been ordered during the previous summer. When this unit arrived, the manufacturer sent down an operating engineer to test it out and instruct the local operator. The Navy had just completed a new 1000 foot wharf, but due to a shortage of funds had relaid old rails in spite of the protest of the local civil engineer. While the wharf was under construction, it had been impossible to lift out and properly service the station's small boats, so the skipper was impatiently waiting for the new crane and the new wharf. Unfortunately, they co-jointed at the waterfront while the civil engineer was absent from the station. After the first accident, orders had been issued to all the local operators not to make any heavy lifts until the set-up had been approved.

The conjunction of the skipper, the new crane with foreign operator, and the relaid rails all on the new wharf at the same moment proved fatal. The wait had been so long and the moment seemed so propitious that the skipper naturally asked for a demonstration of his new toys. The operator being unfamiliar with Navy ways, proud of his machine, and anxious to please, started his lift. A split second on the outboard rail gave way and the crane most providentially landed on its boom and two barges 17 feet below the wharf. The operator escaped from the crane, the skipper disappeared from the wharf and the civil engineer was sent to look at his \$60,000.00 wreck and get it back on the wharf. Fortunately, the crane could be rebuilt and was put in operation one month later, when new rails had been laid. The skipper never talked to an operator again.

Outriggers would have prevented all three of these useless accidents.

After this rather dark view of one Navy experience, I would like to paint another picture. The following remarks are a necessary preliminary to the health and safety record made by 8,000 Sea Bees on the island of Iwo Jima, during the first half of 1945. The Sea Bees went into Iwo Jima with the Marines and remained for six months to complete necessary construction work.

In early amphibious operations in the South Pacific, as many as 90 per cent of the Sea Bee personnel had to be evacuated in the first few months because of disease and fatigue. The equipment did not fare any better, due to a lack of spare parts. As a result, much thought went into the advance planning of equipment operation and the preliminary training of units going to Iwo Jima. Since this was an isolated operation to be followed immediately by the assault on Okinawa, it was understood that no shipping would be available for replacements of either personnel or equipment. Great emphasis was placed upon health and safety.

The work to be done consisted of building two 6,000 foot fighter strips, two 10,000 foot bomber strips and all auxiliary appendances to house and service 30,000 men. The follow-



ing is quoted from the History of the Ninth Naval Construction Brigade:

"There were no major obstacles to overcome in the construction of the base. As originally surveyed from the air, it was anticipated that there would be a considerable amount of rock excavation. This was not the case as the material was consolidated volcanic ash that could be removed with rippers, scrapers, power shovels and similar construction equipment without the use of explosives. The character of the terrain presented no unusual difficulties, and the soil characteristics were such that construction progressed faster than anticipated. The only difficulty encountered consisted of steam pockets. Steam would emit from fissures in the surface without causing any material damage. Once the steam outlet was obstructed by paving, water would form and saturate and soften the sub-grade, thus causing pavement failures.

The primary mission of Iwo was the establishment of fighter bases and a refueling base for bombers on their Japanese raids. Considerable use was made of the fighter facilities and until the cessation of hostilities in mid-August, more than 2,000 heavy bombers (B-29's) had used the bomber fields for emergency landings."

To give some idea of the construction risks, the following quantities of work completed are listed:

Dirt moved—5,104,400 cubic yards  
Rock crushed—318,900 tons  
Roads built—40 miles primary  
40 miles secondary

Concrete poured—17,844 cubic yards  
Hot Mix Asphalt placed—705,600 square yards

Penetration Asphalt placed—238,150 square yards

Fuel Storage Built—11,000,000 gals.  
Fuel Storage Lines Built—15 miles  
Water Distilled—12,151,800 gals.  
Wells Drilled—17 units  
Housing and Storage built for—30,000 men.

At the peak of operations there were some 650 pieces of equipment being operated, exclusive of jeeps and personnel carriers and at no time did the deadline list exceed 9 per cent of the total. Land mines damaged nine tractors and kept them inoperative for long periods of time as spare parts of the type required were not available.

The 8,000 construction personnel were worked 10 hours a day, seven days a week, in two-eleven hour shifts. The equipment was serviced between shifts. The highest number of sick and injured personnel who could not work occurred on June 29th after four months without a day off, and totaled 144 officers and men out of 7915. Fifteen per cent of the men were over 45 years of age, and the average age of all men was 38.

The total man days lost due to sickness and accidents, but exclusive of enemy action, amounted to 2/10 man days per 1,000 man hours worked. This is considered an example of what can be done by planning, education and cooperation between management, supervision and workers all from the construction industry.

### WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: LLOYD A. BLANCHARD, Chief, Safety Div., Corps of Engineers, Washington, D. C.

## How Can We Get What We Need When We Need It?

By ART MATTHIAS

Safety Coordinator, Wisconsin Vocational School System

The cause of accidental injury has always been an interesting study to experts in the injury prevention field. National statistics indicate the causes of injury in two general categories. One category involves the personal factor and the other the mechanical phases of industry. The division of the two in percentage figures, reveal that personal causes are responsible for approximately 88

per cent of all accidents, and the mechanical causes for approximately 12 per cent of all accidents.

We who function in the field of human relationships in industry recognize these divisions as authentic and do not contest them, but we are also aware of the fact that machinery does not guard itself, clothes do not dress the individual, nor do lights etc. attach

themselves to the ceiling without human ingenuity, therefore it becomes necessary to accept the challenge that accidental injury causes are 98 per cent human failure and probably 2 per cent an act of God. A statement of this kind can be contested, but somewhere in the accident that caused the injury, some human being failed. This evidence has been proved over and over again once the accident has been thoroughly analyzed. The failure may have been on the part of top management, the foreman, the worker, or other worker. All are human however, and the corrective measures must be applied at the basic cause, or accidents are going to continue.

The problem that confronts us as top management is to develop our supervisors as teachers, so that they will be able to cultivate human beings as well as develop a project from a blueprint.

To do this, every supervisor or foreman must be aware of the fundamentals involved in good teaching. As I see it, there are three:

1. Understand the human being.
- a. Biologically
- b. Sociologically
2. Know the rules of good teaching and be able to apply them.
3. Know the method of teaching and develop it to a perfection that never fails.

Let us consider the first fundamental of the instructional process—the human being. The human being is biologically and sociologically a potential injury. He is the result of a mother and father and has by heritage acquired all the equipment with which to fit himself into society. He has been born with a mind, he has senses, muscles, a nervous system, reflexes, inner drives, and ability to react emotionally. He has been born with many other factors much too numerous to discuss in so short a time.

From the day he is born, his biological mechanism is being conditioned by his social surroundings which also tend to make him

a potential injury. He develops a personality, certain habits, he is plagued with fatigue, he cultivates certain instinctive tendencies, attitudes and emotions. All added together he becomes a challenge to his supervisor or foreman and a constant threat against one minute of relaxation on the part of the foreman, as far as safe practices are concerned.

One thing is certain, however, man is a complicated machine biologically and the alarming record of accidental injury is probably due to lack of knowledge by supervision in knowing, handling, controlling or shaping the human machine. We place skilled artisans to operate a machine that has no mind, no muscle, no senses, no nerves, no inner drives or emotions, and then often turn an about face and permit the most complicated machine on God's Universe (man) to be run by any person who seems to have administrative (doubtful) qualities. What a fallacy. Supervision is more than an art, it must be learned, it must be taught and until it is, accidents are going to happen.

Suppose we list just a few of the more common instincts of man which may be fitted into the safety program.

There is not an individual alive who does not possess the following to some degree.

1. Ambition
2. Responsibility
3. Pride
4. Good will
5. Competition
6. Urge to follow
7. Self-Preservation
8. Others

If workers have them, then the question arises as to what we as foremen can do to cultivate them to advantage. There are many things we can do if only the emphasis is placed where it should rightfully be. One could go on and on in offering ways to cultivate man's instincts. The following are but a few suggestions in this direction.

#### Urges—Instincts—Tendencies

#### How to Cultivate

|                   |                                 |           |
|-------------------|---------------------------------|-----------|
| 1. Ambition       | 1. Rewards                      | 4. Praise |
|                   | 2. Bonuses                      | 5. Time   |
|                   | 3. Cash                         |           |
| 2. Responsibility | 1. Assign important jobs        |           |
|                   | Safety committees               |           |
|                   | Safety drives                   |           |
|                   | Help the other fellow on safety |           |

|                      |                                                                                                                                                    |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 3. Competition       | 1. Safety contests                                                                                                                                 |
| 4. Pride             | 1. Certificate awards<br>2. Pat on the back<br>3. Articles in plant paper<br>4. Credit for good work<br>5. Recognition                             |
| 5. Good Will         | 1. Importance of other fellow<br>2. Treat him as you would be treated<br>3. Fit him into the other fellow's place.                                 |
| 6. Self-preservation | 1. Show dangers to him when he commits unsafe acts<br>2. Have him try to tie shoe with one hand<br>3. See with one eye<br>4. Be sincere—don't joke |
| 7. Urge to Follow    | 1. Set a good safety example<br>2. Train properly<br>3. Be sincere—fair                                                                            |
| 8. Fear              | 1. Tell about plant safety record<br>2. Follows rules he will be safe<br>3. Come to you for help                                                   |

Rules of Teaching—Safety can only be accomplished by learning and all learning is acquired by good teaching. To do a good job of teaching, the rules of the game must be understood and applied. What are these rules that are so important? Suppose we list them in their proper sequence:

1. Readiness
  1. Attention
  2. Interest
  3. Desire
  4. Make it easy
2. Effect
  1. Commend (good)
  2. Critical (bad)
  3. Commend again
3. Repetition
  1. Establish habit

All foremen are teachers, and it becomes essential as teachers to make the laws of learning a part of his mental makeup. Each time he instructs a worker in a new operation the application of these simple rules must express themselves with a minimum of conscious effort. Failure to attain the four factors under the readiness rule, or any one of the four, results in a poor job of teaching and possible injury. The effect rule is the application of human relations to the teaching function and unless these are cultivated the teaching effort is useless. If habit is not established by repetition then all is lost.

How to Teach—This is the next function

the foreman must be expert in if he is to succeed and accomplish a good safety record. After all there is an art associated with good teaching.

Fundamentally it is based on three factors:

1. Analysis
  - a. What and How To Teach It
2. Instruction
  - a. The Actual Teaching Routine
3. Supervision
  - a. Follow-up—Check

Suppose we consider analysis to begin with. What factors are involved certainly is the first essential. The following are but the major ones in any teaching program.

1. Division of job or operation to be taught
  2. How to spot hazards
  3. How to spot unsafe or unhealthful working conditions
  4. How these factors, "B" and "C", can best be included in job instruction.

Analysis of the mechanical phases of a job which are to be presented to a worker are important to accomplish a satisfactory safety record. Foremen must be taught how to make an analysis of an operation in order to become an efficient teacher. Analysis of the job to be taught is essential so a plan of presentation can be accomplished later.

Instruction—How to present the material in the analysis is the next step in the teaching process. No foreman is a born teacher and certainly must be taught by top management how to teach others. The four step method which follows is an old technique and yet an effective one.

- A. Preparation
  1. Prepare subject matter
  2. Prepare himself
  3. Prepare the worker
    - a. Put worker at ease
    - b. Find out what he knows
    - c. Develop interest
    - d. Position properly
- B. Presentation
  1. Establish mental habit pattern
    - A. 1. Do the job—tell—show—illustrate
    2. Step by step
    3. Stress key points
    4. Worker listens and observes
  - B. 1. Do the job—worker does telling
    2. Correct mistakes
    3. Stress key points
- C. Practice the job—application
  1. Establish muscular habit pattern
    - A. 1. Worker does job—foreman tells
    2. Stress key points
    3. Correct errors
  2. Establish habit—coordinate mind and muscle
    - B. 1. Workers do job—tell—show—illustrate
    2. Step by step
    3. Stress key points
    4. Foreman questions—corrects errors

5. Continues until foreman knows worker knows
- D. Put learner to work—follow up
  1. Size of job
  2. Accuracy first—speed later
  3. Who to go to for help—where to find
  4. Supervise

How to instruct must be included in every training program for administrative personnel. The four step method of instruction has been accepted as the only effective technique for the teaching of mechanical skills. It is a combination of all the teaching methods used. The method must be taught to foremen so that its use requires no stimulated mental effort. The value of it must be stressed continually so that its use will tend to be habitual. Safety of the worker must always be included as a key point in the four step method.

Supervision—The third phase of teaching, of course, is supervision. That is the final check or examination, and the maintaining of human relationships which will not result in accidental injury. The subject of supervision would entail many hours to present. The art of supervision must again be taught.

A good supervisor is one who is able to put the workers heart in the right place and keep it there by exercising the fundamentals of good human relationships and in this way accomplish:

1. Quality
2. Quantity
3. Low Cost
4. Good human relations
5. Meet schedules and above all—Safe Practice—

## A Construction Training Program in Operation

By ROBERT A. HYDE

Safety Director, Peter Kiewit Sons' Company

The following will be an outline of Peter Kiewit Sons' Co. Training Program; why it came into being—how it works—what it has accomplished.

Knowing that modern construction is largely dependent upon the performance of construction machinery, the initial basis of the training program was devised to promote better understanding of the care and utilization

of our equipment. We feel that manufacturers build, into all pieces of equipment, a certain amount of usefulness and productivity. We also know that, if our employees are not fully familiar with the use and maintenance of that piece of equipment, if they do not know the performance limitations and if they do not know the details of proper servicing and repairing, we are not going to receive from that piece of equipment all the



performance the manufacturer built into it.

When a D8 Tractor had to be brought into the repair depot for a \$4500.00 overhaul job, just because some mechanic did not realize the importance of making a certain adjustment and because the job superintendent was not familiar enough with the equipment—that was a pretty good argument for the establishment of some sort of program for training the interested parties in a better understanding of their jobs. The saving of one \$4500.00 tire will pay for a large portion of any training program, and the saving of several hundred dollars in replacing a bearing that has been incorrectly lubricated will pay for more training.

Construction machinery is not 100 per cent automatic. Men must be hired to operate the equipment. Also, men must be hired to direct other men. Following a parallel line of reasoning, why then is it not desirable to coach supervisors in those things that will enable them to better understand the problems of handling the men in their crews, as well as the machines? Cognizance of the limitations of human efforts and a more complete knowledge of the principles of sound supervising, without a doubt, results in better employer-employee relations, higher morale and greater production. Thus, a study of supervising methods and techniques was made a part of our training program.

Hand in hand, with the problem of full utilization of equipment and complete understanding of the problems of handling men, goes the responsibility of acknowledging the loss that attends accidents. Equipment involved in an accident means lost time, lost money and production slow-down. A human being involved in an accident also means lost time, lost money and production slow-down. There is a difference, however. The machine that has been damaged can be repaired or replaced. A human body that has been damaged cannot always be repaired, and a life can never be replaced. We feel that training in safe construction practices is entitled to a very important place in our training curriculum, and have included in our program a plan for carrying an intelligent accident prevention campaign to every employee on every one of our varied jobs. While the angle of human suffering is, of course, paramount, we also stress the fact that accidents involving damage to equipment and to property can be of vast significance, and can result in needless waste of money and time.

Perhaps it will be well to explain a bit about our training program in general, before I go into the workings of our safety program.

The nucleus of our program has been a formal 10-day school session, based upon the three things I have just mentioned—equipment preventive maintenance, supervisory training and safety training. The schools were conducted at our Grand Island, Nebraska, Repair Depot. Jim Symonds, our equipment superintendent, has been responsible for the arranging and the directing of our training program. Under his supervision a regular school classroom was constructed in one of the buildings at our Grand Island Depot.

Comfortable desks, and chairs have been provided for the students. Blackboards and facilities for displaying charts and models are available. Fluorescent lights provide good lighting. A platform was built for the sound motion picture projection equipment, and for the film strip and slide projectors. We have tried to make full usage of all types of visual aids in our training methods. A person who sees the actual workings or application of the subject matter being presented, by means of scale models, motion pictures, sound film strips or slides, is much more apt to remember the subject, and will, in all probability, obtain a much more complete understanding of it. It has been demonstrated, not only in industrial training, but in military and naval training during the war, that the use of visual aids will turn out better trained men, and in less time.

During the winter months of 1946, four 10-day schools were conducted, and during January and February of this year we conducted two more sessions. Each school had, as scholars, 25-30 of our key men—superintendents, master mechanics, engineers. Our theory is that, if the top men on the job are thoroughly aware of all the little things that enter into efficient production, they will in turn be able to apply this knowledge, and to pass it along to the foremen and sub-foremen who are working under them. The men came from all of our operating districts throughout the Middle West and Mountain States, and from the West Coast. Enrollment was made prior to the school, so that each district could arrange to send a quota of men upon a basis that would not delay or hinder construction operations. The school day opened at eight a.m. The periods were fifty minutes in length, with a ten-minute break

between classes. The lunch hour was from twelve to one, with all the students eating together in a private dining room at the local hotel. This lunch hour proved to be a good fellowship hour, and was very valuable as a medium for better mutual acquaintance of the men in attendance. Afternoon classes terminated at six p.m. Thus, you can see that the school was no picnic—no ten days away from home to play around.

A typical day's schedule had the men in their places at eight a.m. The first five or ten minutes were given to announcements for the day and for review of problems or unfinished business of the preceding day. The first period might be given to explanation of the fuel systems on diesel engines. The entire group would receive preliminary information about the subject and see motion pictures or slides, explaining in detail the fundamentals of the systems. The second period

would see the group split into two sections—one half getting further classroom instruction, while the other section actually got their hands on the piece of equipment in the shop, making adjustments and manipulating the controls, so there would be no misunderstanding of the subject under discussion. The third period would see the sections changing off. The final period before lunch might be given to supervisory technique. The subject could deal with the proper method of a foreman making a reprimand, or with a practical way of starting a new worker on his first day on the job.

Following the lunch hour, one section might be in the classroom regarding the fundamentals of ignition systems for the first two periods of the afternoon, while the other section continued with its shop work. Period three might see the sections combined once again for a study of job safety practice. The last two periods would then be the reverse of the first two post-lunch periods. By following this system throughout the school, we were able to break the monotony, thus maintaining interest without sacrificing efficiency, and without giving the men an opportunity to become bored. Of course, realizing that we are all human, enough fun was injected into the schedule to maintain enthusiasm.

The preventive maintenance part of the course was as comprehensive as the 10-day session would permit. Individual subjects received one to five or six periods, depending upon the minimum time necessary to put across the material presented. In general, all

of the major pieces of construction equipment that we use merited some time at the school.

Diesel engines, draglines, patrols, tractors, bulldozers, ignition systems, tires and lubrication are some of the more important subjects covered. Mr. Symonds, our equipment superintendent, carried the major share of the instructing. He was assisted by some of our district mechanical superintendents and from time to time, when we could obtain their services, by factory experts thoroughly qualified to explain the workings of their products. The students were free at all times to ask questions and to ask for further explanation. Sound motion pictures, slides, charts, blackboard diagrams and working models lent further interest to the teaching procedure, and were of untold value in driving home the items of discussion.

Each subject was usually followed by a short, written quiz, which was designed to show whether a student really had absorbed the principles of the subject matter. This quiz was in the form of a true and false test, or of the multiple choice variety. The men generally carried their own papers at the time, thus eliminating any uncertainty of understanding. The quiz papers were filed in their class notebooks, which also contained previously prepared outlines of the subjects covered in the classes.

In general, this same procedure was followed in teaching the supervisory subjects. Most of us are aware that the old star system of construction supervising based upon the loud voice and the tough attitude is a thing of the past. Today's construction supervisor is not vastly different from the supervisor in any other industrial field. If he is to be successful as a boss, he has to know the best ways of handling the men in his crew.

Disatisfied or indifferent workmen certainly do not contribute to getting the job done well, and within the contract time. Accordingly, we tried to present to the men attending the school only practical aids that would be easy to apply when they returned to their crews. Film strips and charts were used to drive home the fact that foremen can boost production and increase the morale of the men in their crews if they use a sane method of handling grievances; if they are familiar with the best way to reprimand workers; or if they are conscious of the fact that, if they display interest in the man and in his problems, he is going to be a better workman for it. Here, too, we used brief quiz tests to



good advantage. The discussion time that followed each of these film strip presentations permitted the men to bring out their job problems, and enabled us to find satisfactory answers which, in actual application, would increase the spirit of job pride, and would be displayed by a spirit of cheerful cooperation among the workmen and crews on the various jobs.

**Job Safety:** Please do not think that, because I mention this subject last, we regard it as the least important subject in our schools. We know that just as we are able to effect a saving in time and money by giving instruction in the care of equipment, so are we able to save time and money by promoting concern and interest in a good, carefully planned safety program. Each of the school sessions had several periods devoted to the study of ways and means of reducing accidents. Here again we made good use of sound film strips. Some of the most satisfactory results were obtained by the use of ordinary 35 mm. slides, showing actual occurrences on our various jobs. We take these slide photos on ordinary 35 mm. film, mostly in color, as we travel about our respective districts.

The men prefer these slides, as they are able to recognize some of our jobs, and at times see themselves projected on the screen. They are, of course, more familiar with details when it is a scene from one of our own jobs. Slides, too, are more flexible. Subject coverage can be restricted to building construction, heavy construction, shop work, and so on. The class room periods devoted to safety were conducted in open forum style. The material was presented, and the men were free to ask questions, make suggestions and to hold a round table discussion.

We made sure that each man thoroughly understood the basic workings of our overall safety program. This program, which we established a year and a half ago with the aid of recommendations from our insurance carrier, provides the home office with a written monthly report from each of our jobs, giving pertinent information as to the types of accidents, lost time cases, etc. These reports enable us to prepare district standings; thus, we are able to promote a friendly spirit of competition between the various districts, resulting in better safety records. Each issue of our employee magazine, *Kie-ways*, carries a full page devoted to job safety. We try to keep all of our employees conscious of the fact that we have a definite planned program

of effort in accident prevention, and that it is to the interest of each individual employee to give complete cooperation at all times. In other words, we try to present it in terms of, not what we want, but what the worker wants and what he gets out of it.

The last day of each school is devoted to a general review and to a comprehensive written examination in each of the subjects covered during the school session. These examination papers are carefully graded and returned to the district manager under whom the men work. In strict confidence, he discusses with each individual his performance in the school, and points out his weak spots, giving suggestions for securing a better understanding of the subjects in which he appeared deficient. All during the school we impressed upon those in attendance that it was very important, if our program of training was to be effective, that they, not only apply the things they learned, but that they pass along to others on their job the things they learned, so that we could obtain maximum benefits from the time and money expended for the schools.

Two other phases of training round out our efforts in the direction of better-informed and better-equipped employees. These are apprenticeship training and the field follow-up. In regard to the former, we are all aware of the fact that, during the war years, the number of youths entering the various building crafts dropped to nearly zero. This meant that the average age of journeymen engaged in the various construction trades steadily mounted, and that the supply of competent trained men did not increase. The post-war boom found a shortage of skilled men, and a volume of work that cried out for somebody to do something about it. *We did.* With the cooperation of the Labor Union and the Vocational Training Department of our Public Schools, we assisted in the organizing and conducting of training schools for apprentice bricklayers. Nearly 100 young men, most of whom were veterans of the war, entered the courses and emerged from the training well on the road to becoming full fledged, competent masons. The intense two months course of bricklaying and masonry work was the equivalent of two years' haphazard training under the old time apprenticeship training methods. The school has proved that. The men who completed the courses are now working for various contractors in the Omaha area, and are demonstrating the school was well worthwhile.

At our Grand Island Shops we have conducted two training courses for apprentice, heavy duty mechanics. Operating under the educational features of the GI Bill of Rights, about fifty young men, who were chosen to participate in the schools upon the basis of past experience, mechanical aptitude testing and interviews, entered into the course of instruction that covered all phases of heavy construction equipment maintenance. Part of the school time was spent in classroom work and part of the time was spent in the shop, tearing down the equipment, making repairs and rebuilding. Field maintenance work was stressed as a practical answer to keeping all of our equipment on the production line, and out of the repair shop. At the close of the 11-week school, the apprentices returned to their respective districts and went to work in the field as mechanic helpers. In a few months some of these men were able to assume full mechanic responsibilities.

The field and follow-up training is perhaps the most important of all, as this is the place where we find out if the training material is actually being put into efficient practice. Through the construction season, the jobs are visited and checked for the effectiveness of our training along the line mentioned. By inspecting the equipment, it can be found whether the equipment preventive maintenance training was driven home. The sure way to test the effectiveness of the training is to glance at the repair cost sheets. Machines formerly overhauled at six-month intervals may now go a year or more before a repair job becomes necessary. Evidence of

more cheerful cooperation on the jobs and efficient production output, which permits jobs to be completed ahead of schedule, is a sure sign that improved supervising methods have been responsible for better understanding between workers and supervisors and management. Fewer accident reports and lower compensation costs are the yardstick for measuring the success of our safety program, which includes constant field promotion with our sound film equipment and slides.

Is all of this worthwhile? Is all the time and hard work that goes into arranging a training schedule and the research that is required to prepare effective study outlines worth the effort? Has the investment of thousands of dollars, which it has cost to conduct such a program, been wise?

The answer is a great, big, definite yes! It has been a good investment from the standpoint of the financial report—true; but the real investment return is in the increased amount of satisfaction that we get out of being in the construction business. It's the dividend that's in the look of triumph on the sweat-streaked, grimy-covered face of a "Cat-Skinner" who knows that he has licked a tough operation; it's in the grin on the face of the tired concrete crew who have just completed the last pour on a great building. Yes, it's worth the time and money all right, and there is a return in dollars and cents—but the real return is in the increase in pride and happiness in human beings, which comes with knowing they have done their job—and have done it well.

## Controlling the Missouri River—A Real Safety Job

By MRG. GEN. LEWIS A. PICK

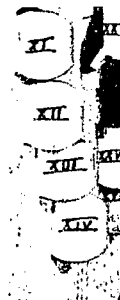
Division Engineer, Missouri River Division, Corps of Engineers

The Corps of Engineers learned a good many years ago that an organized and continuing safety program pays dividends.

In the Missouri River Division we have under way today a comprehensive flood control and river development project which is in itself a public safety program. Safety factors are basic in the design of many large structures already being built and to be built up and down the Missouri River from Montana to St. Louis.

The safety organization of the Corps of Engineers was first established in July, 1939. The policy then adopted required each Division Engineer to organize a safety section in his office and to direct and supervise the establishment of safety sections in each district office in his division.

The purposes of these sections were to prevent accidents and sickness among employees, increase their morale and efficiency and decrease the costs to the Government arising from lost time and employees' compensation.



Today, the Corps of Engineers maintains a full time safety organization in each of the Division and District offices, with a qualified safety engineer in charge. In 1935 the functions of the safety organization were extended to include contractor operations as well as operations conducted by Government forces.

Available records indicate that the accident frequency rate for contractor operations in the Missouri River Division in 1935 was 95.59 and the severity rate was 7.48, as compared with a Government frequency rate of 30.33 and a severity rate of 2.77.

These rates were progressively reduced by cooperative effort to a low frequency rate of 6.58 and a severity rate of 1.65 for contractor operations, and a frequency rate of 4.15 and a severity rate of 0.71 for Government operations in the Missouri River Division of the Corps of Engineers in 1945. In 1946 these rates rose to a frequency of 14.83 and severity of 5.05 for contractor operations. A frequency of 5.89 and severity of 0.99 for Government operations was noted in 1946.

Our safety function with contractors previous to the war years of 1942 consisted of incorporating a standard accident prevention clause in all contracts and Government specifications. Safety inspectors made periodic field safety inspections and served as advisors to the construction supervisory forces. Safety magazines were published in each District office and the comparative record of each unit of the organization was published, serving to stimulate competition between various units, both contractor and Government.

First aid classes were organized. Classes were held on the employee's time and produced very satisfactory results. National Safety Council posters and publications were used extensively. Periodically, safety meetings were held for both supervisory and labor forces.

Prior to 1942 little attention was given to the inclusion of safety features in the special or technical conditions of plans and specifications. No effort was made to develop safety consciousness in upper echelon engineering design, construction, operations and administrative personnel.

With the advent of the war and the tremendous expansion of construction activities of the Corps of Engineers, it was necessary to employ personnel inexperienced in field construction. Consequently, a safety training program, "Accident Prevention for Supervisors," was developed by the safety Division of the Office of the Chief of Engineers. This training

course is still being used with good results in the Missouri River Division in both military and civil works.

The application of the principles of safety is basic to good planning, and our people who work in design and planning accept these principles as a part of design criteria and good engineering practice.

The main projects being constructed within the Missouri River Division are essentially safety projects. A dam constructed across the river is in itself a safety measure to control the river by impounding flood waters, thus preventing loss of life and destruction of property downstream.

Each individual feature of the dam, in addition to being a component part of the over-all safety feature, has individual safety purposes of its own. The sliding conduits are safety devices placed in the dam to safely release flood water. The spillway is the safety valve for the entire project. The spillway gates and gate hoists are safety features. To further extend the safety of the structure, additional features are built into the hoists, and, in some instances, an emergency hoist is added to serve as a final safety feature. Built into the hoists in addition to the design safety factors, are guards, guard rails, gate travel limit switches, etc.

In machine design, safety features also are provided. For instance, the emergency gates at the Fort Peck Dam, built by the Corps of Engineers in Montana, are safety devices which serve to control the overflow of water in the event of failure of the main control gates.

The emergency gates and the emergency gate hoists are designed with ample safety factors to insure against failure. The emergency gate hoist in turn is equipped with many safety devices including a slack cable limit switch to stop the hoist in its downward travel should the gate become wedged in the gate slots; an emergency brake to retard the hoist should dynamic braking and electric braking both, in turn, fail; a travel nut limit switch to limit the upward or downward travel of the hoist, which is further safeguarded with an upward limit switch to take control in case of failure or maladjustment of the traveling nut limit switch.

A study of the 1946 accident experience involving employees of the Corps of Engineers in the Missouri Basin revealed that laborers were involved in 31 per cent of personal injury cases, supervisory personnel in

20 per cent, equipment operators in 19 per cent and survey crews, floating plant crews and guards and firemen were tied with 7 per cent each. In the severity of accidents sustained by government employees we find equipment operators with 24 per cent of the lost time, administrative and supervisory personnel 21 per cent, laborers 17 per cent and floating plant crews 14 per cent.

The study of contractor employees' accident experience indicated that laborers were involved in 39 per cent of personal injuries, carpenters 18 per cent, equipment operators and steel workers in 8 per cent each. Analysis of the severity of accidents involving contractor employees revealed that equipment operators were involved in 67 per cent of the lost time, carpenters 26 per cent and laborers 2 per cent.

Equipment accident experience in 1946 revealed that light equipment was involved in 35 per cent of all accidents, from which 48 per cent of all time lost resulted. Heavy equipment was involved in 5 per cent of all accidents, from which 33 per cent of all lost time resulted.

In order to reduce cases of accidents in structural design for new work, frequent reviews of existing designs are made to ascertain the best methods of eliminating causes of accidents that have occurred. Studies are made by the safety and structural engineers concerning accidents resulting from structural design features in order to correct such conditions. Features on existing projects that are found hazardous are eliminated or revised in the new designs.

Our safety program in the Missouri River Division includes such training aids as motion pictures, sound slide film, models and posters. Executive, administrative and operations personnel periodically are called in for conferences which keep them advised of the current accident problems and the progress

being made toward their solution.

But the program is much broader and all-inclusive than this. It is the policy of the Corps of Engineers to make safety a part of the job responsibility of the entire personnel from the top engineer to the truck driver and the man with the shovel. Safety personnel in our organization is maintained only for the purpose of safety engineering.

Safety engineering is the act of applying certain controls to planning, designing and operating procedures. Accident prevention is the physical act of preventing accidents. It is evident that the safety engineer does no actual accident prevention. Accident prevention must be done by the supervisors and by the people who actually do the work.

Accident prevention work can be accomplished through many approaches, only one of which is safety engineering. A complete accident prevention job can be brought about only through the application of safety engineering by safety engineers and accident prevention by the supervisors and the people who perform the work.

Our safety program takes cognizance of both functions and requires appropriate operating personnel to perform them as part of their basic job responsibility.

We believe that our present plan of integrating accident prevention into all operations is a sound approach to the over-all problem of making the job safe. This applies to all of our work in the basic-veterans' hospitals, military construction and the flood control and river development work.

In reality control of the Missouri River is a pyramid of safety measures which will eventually result in what may well be described as multiple safety devices—dams, levees, floodwall and other structures which will contribute to the safety and progress of the Missouri valley and the nation—a real safety job.

## Accident Costs in Relation to Prevention Costs

(A Symposium)

Discussion Leader—WALTER J. BYRNE, Consulting Eng.  
General Contractor  
D. W. WINKELMAN, Pres., D. W. Winkelman Co., Inc.  
Engineer-Estimator  
ROBERT HART, Sept., Steel Construction

Co.  
Safety Engineer  
WALTER J. BYRNE  
Company Nurse  
HELEN REISCHL, R.N., Industrial Nurse,  
Employers Mutual Liability Insurance Co.



MR. WINKELMAN: This meeting was called for the purpose of finding out what certain services are costing us. Did Doctor Brown give you those cost figures, Miss Reischel?

MISS REISCHEL: Yes, Mr. Winkelman. MR. WINKELMAN: Good, Dr. Brown is on an important case this afternoon, so, Miss Reischel will represent him at this meeting. We will discuss two cost subjects. The first is "Accident Cost" and the other is "Prevention Cost."

If you have your data lined up, we should be able to come to some worthwhile conclusions.

I think we should discuss "Accident Costs" first, and let's begin with minor first aid cases.

Miss Reischel, what is our experience over the past 6 months on minor injuries and precautionary treatments and what is the average number per week?

MISS REISCHEL: Our first aid treatments average about 5 per cent of the force per week. In other words, we have 5 first aid treatments per 100 men employed. Now, Mr. Byrne thinks that this is too high and should be reduced to about 2 1/4 to 3 per cent.

MR. WINKELMAN: How do you figure that, Walt?

WALT: Well, when a job is less than a year old, 5 minor injuries per 100 employees is not so bad, but as a job gets older and the safety program has become a part of procedure and progress, my experience has been that 2 to 3 accidents per 100 men employed should be the goal we should strive to reach.

If we had lower percentages than that, I would be of the opinion that minor injuries are not being sent to first aid. This is something to guard against because any unreported injuries may develop into complicated lost time cases.

MR. WINKELMAN: I believe in first aid and it's better to have 5 or 10 or more minor cases than one lost time case. So let's not worry too much about that 5 per cent. In my opinion it is more important to check on the frequency of similar types of injuries. You do furnish Art with a weekly report on the types of accidents we have and also the names of the foremen in whose crews the injured men work, don't you, Miss Reischel?

MISS REISCHEL: Yes, we do, and if there is an obvious repetition of types of injuries due to the same cause, we do not wait until the end of the week to inform Mr. Schallack.

We send him an inter-office memo immediately.

MR. WINKELMAN: That's fine. Now let's get the cost facts. Miss Reischel, what are the unit costs for first aid treatments and re-treatments?

MISS REISCHEL: Our cost per treatment is \$4.35 and we have broken it down as follows:

1. Average time consumed in going to and returning from first aid is 1/4 hour.
- The average hourly wage rate is \$4.80 so we will have half of that or a total of \$1.20.
2. Average time in the Dispensary is 15 minutes—or 1/4 hour x \$4.80 or a total of \$1.20.
3. Medical supplies per case .35
4. Medical Department overhead per case .42
5. Administration overhead and medical equipment per case .50

Total cost per case \$4.35

MR. WINKELMAN: Now—that cost is for our job with complete medical facilities and a doctor and a nurse employed. What would the cost be, if we had just ordinary first aid and only a nurse employed and what would the cost be if our job would not require anything but a first aid kit?

MISS REISCHEL: Let me explain that the total cost per case of \$4.35 is only the minor injury portion of our medical overhead cost representing approximately 25 per cent of the total. The other 75 per cent represents the treatment of lost time cases, pre-employment examinations, and health and medication work.

As to your questions Mr. Winkelman, if a job would only require a nurse and medical facilities, I believe we could deduct about 25 per cent of the items of medical department overhead and administrative overhead and medical equipment.

If only a first aid kit would be required, naturally the cost is reduced considerably but the risk is much greater.

The big point about the minor injuries is that each one costs the job \$1.00 in lost time. This includes an average of two falls at the field hospital.

From this phase alone, the job lost approximately \$450.00 a month for the past six months or at a total of over \$1500.00. Our insurance company may pay 40 or 50

per cent of this amount, because, if we didn't have a complete medical set up on this job, no doubt, many of the cases, we call minor, would have to be sent to an outside doctor and that cost would then have to be born by the insurance company.

MR. WINKELMAN: Of course, you must realize that we gain considerably by having our own medical set up. Think of the additional lost time, not only by the injured man but frequently by those who have to go with him, if we have to send our injured man to town. It's 8 miles to town, the doctor may not be in, he may be busy and so on. That's additional cost. How about the lost time accidents, Miss Reischel?

MISS REISCHEL: Mr. Byrne has informed me that he has made a study of 1000 cases in our company over a period of 10 years and he estimates that the cost of lost time accidents and fatal cases average about \$480.00 each.

MR. WINKELMAN: Before we go any further, didn't you say a few moments ago that it takes 15 minutes to get to the field hospital? Why?

WALT: Because of its location and the way the job is spread out, it takes that long to walk there.

BOB: Why can't we move the first aid building closer to the work areas?

WALT: If we put skids under the building, we can probably move it up to building 200, where about 75 per cent of the force will be working until the job is finished. Art can—no doubt—get us running water over there.

MR. WINKELMAN: Let's be sure this is done as soon as possible. Now then—why is there a 15 minute waiting period at the hospital with as few treatments per day as we have?

MISS REISCHEL: Well—the 15 minutes includes treatment time, seats, bunks and so forth, and besides—these are only the minor treatments. We handle a lot of other cases such as colds, headaches, hangovers, and the like. We are also busy with pre-employment examinations and due to a great labor turnover, this work is almost continuous.

MR. WINKELMAN: Thank you, Miss Reischel. I think I understand your work quite well now and no doubt, if we did not have you and Doctor Brown here we would have a much higher percentage of absent workers. Will you please go on now, with your data on lost time cases.

MISS REISCHEL: Well—as I started to say before \$480.00 represents the direct costs per lost time case. I can not give you the cost per lost time case on this job, because too many cases are still open and the cost cannot be determined until the insurance company closes the cases or makes final settlements. So we have to use Mr. Byrne's average cost of \$480.00.

Now—under this direct cost we have:

Medical treatment  
Compensation  
Rehabilitation costs  
And, under indirect costs we have:  
The injured man's loss to production  
The replacement cost

Time lost by field supervisors in caring for the man at the time of the accident  
Time lost by other workers, for various and obvious reasons

The cost of the investigation, witnesses, etc.

The clerical work involved

Work spoilage or damaged equipment. This can be a very big item.

Management's time lost in legal, accounting and follow-up on claims

Our experience and that of many others have indicated indirect cost averages about 4 times the direct cost. Now that means that if only one \$480.00 accident can be prevented out in the field, the actual saving will be 4 times that amount for a \$1920.00.

MR. WINKELMAN: Walt, what is our severity rate on this job?

WALT: It is 1.35 which means that we have lost 1.35 days per 1000 man hours worked, which is about one half of the national average for the construction industry.

MR. WINKELMAN: What does that mean in dollars and cents?

WALT: As Miss Reischel said before, our cost figures are not final. They may be less and they may be more, but my figures show an estimated compensation and medical cost of \$16,750.00 up to date. This includes the fatal case we had in June, which will cost us \$7,000.00.

MR. WINKELMAN: Bob—do we have any money in our estimate for accidents or for safety?

BOB: No. We just have an insurance premium shown, which is based on two quarterly audits.

MR. WINKELMAN: Why doesn't the home office allow some money in the estimate for accident prevention, Bob?

BOB: The general practice among contractors is to include nothing for safety. I hardly know of a company that sets aside a certain amount for accident prevention, unless it is specified in the specifications, when all bidders would have to include it. Personally I believe it should be in there, because the lack of it may be the cause for an accident with very high direct and indirect costs.

The high indirect costs may involve items such as: collapsed trusses due to lack of proper lateral bracing, buckling of booms, capsizing of mobile or railroad cranes, trucks rolling off ramps, poured concrete walls or floors collapsing due to inadequate or improper bracing and supports, retrenching and re-excavating due to lack of shoring or due to improper bracing and of course property damage and injuries to the public, due to improper protection or in many cases no protection at all. Walt mentioned that the average indirect cost is about four times the direct cost. Well, I know of many, many cases where the direct cost was very small, but the indirect cost was tremendous.

However, let us use Walt's figures of \$10,000 in direct losses. On the basis of your national averages, we should have an indirect cost of about \$40,000. That kind of a loss is a big portion of the profits anticipated—and in many cases more than the estimated profits.

MR. WINKELMAN: I want every injury, no matter how minor it is, taken care of and I don't want to put fear into our foremen, for the sake of a good record on paper, as they might hesitate to send their men in for first aid. One infection can spoil our record more than a 100 first aid cases can. But I do believe, that if our foremen are properly instructed and told on accident prevention, the calls at the field hospital will automatically be cut down.

If it is a matter of equipment, such as hard hats, goggles, safety belts and whatever else we should have, let's have them on hand and let's use them whenever and whenever they are required. Now that will start with me and I'll expect you, and the foremen to do the same.

Also let's see what we can do to improve our educational program. Our foremen are our keymen and Walt, will you work out a plan with some new ideas for our foremen's meetings.

Now, in regard to accident prevention costs and as I understand it, by that we mean the dollars we spend on prevention. Walt, let's

hear what you have to say.

WALT: I would certainly welcome that opportunity. I know that management would be agreeably surprised after the experience on several jobs had been completed, and the money set aside for accident prevention had resulted in a monetary saving due to a reduction in direct and indirect costs, but I would like to ask Bob to tell us about an accident which illustrates our problem very well. Bob, you recall the power failure accident that nearly resulted in a fatality at the Brown Motor Car plant. Could you give us the details as you remembers them?

BOB: Yes, I certainly do remember that accident; it seemed so unnecessary. That was one of those Plancon jobs. We had completed the main building, which was approximately 600 feet wide x 2000 feet long. The plant was in operation and motors were being built for our B-29 Bombers. Shortly after the main building was completed, we received the contract to put a go foot addition on both sides of the building, running the entire length of the 2000 feet. All the utilities, which had been put in by our sub-contractors, were to be relocated and tied in by these same men. We even used the same excavating sub-contractor. Some shallow shovel excavations were being done alongside the existing building when the shovel dipper dug into a power duct, which carried the entire power supply into the plant. There was a shower of sparks and the power going into the plant was shut off for several minutes until the auxiliary power was cut in.

WALT: You have emphasized the points just as I had hoped you would. Of course, a fatality could have occurred; the operator certainly was endangered, as well as these laborers working around the shovel. Fortunately, the electrical contact was broken shortly after the dipper dug into the power duct and, no one on the ground was in contact with the shovel.

BOB: Yes, I'm glad no one was injured, but this accident was indeed a costly one even though there was no personal injury. I am not going to try to give any figures on the indirect costs here, but visualize the total loss of time and money while over 500 plant employees were idle even those few minutes, to say nothing about the cost of repairing the power cable.

WALT: True enough, the costs of this accident are tremendous, but when we stop to analyze what the prevention costs would have

been, we find them surprisingly low by comparison.

BOB: Yes, I'll agree because you and I have discussed what those prevention costs would have been.

WALT: It sure would have been a mighty simple matter to refresh the minds of the men engaged on this operation by first calling the attention of the top men to the location of existing underground utilities. Then when the spread footings had been laid out, the line of the underground utilities could have been located by a row of stakes, the men in the field could have been advised that the row of stakes meant electric line duct, water line, gas line, or other important lines vital to plant operation.

BOB: Yes, the prevention costs would have involved the time spent in examining the plans, possibly in holding a meeting of our top men and those of the subs involved, and in having the survey crew lay out the line, and then in notifying the men on the job.

MR. WINKELMAN: I hope I haven't shown a lack of interest in the discussion of this accident, but I want to go on record as favoring the advance planning that has been shown to be necessary in accident prevention work. When such planning is done, there can be included in the bids an intelligent estimate of money needed to cover prevention costs. This is just as necessary as pre-determination of the various job details. It is definitely part of the step-by-step procedures to be used on the job, and I can see that prevention costs can be very low by comparison to accident costs. It naturally follows that if money for accident prevention is made available in the original estimate, the costs of accidents will be materially reduced.

WALT: At this point I'd like to mention that money labor and material prevention items have been charged to the accident prevention costs, which do not belong there. In most cases this has been done because of confusion or thoughtlessness, but it makes the cost item look out of proportion.

BOB: You mean to tell me, that the cost section pass charges against safety that don't belong there?

WALT: That's right, Bob, and I mean more than that. Many on this job secretly presume that anything done for safety's sake costs too much and is bound to run the job over the estimate.

The accident prevention cost items that are safety items are very few and involve only:

personal protective equipment, and then such equipment should be charged only if the work or job could possibly be done without it.

For example—a roofer, without goggles, could reap hot tar on a roof, but an electric welder cannot weld an inch without a welder's mask. Both devices are safety items, but the former is strictly for accident prevention while the latter item is a tool requirement—just as the clamp which holds the welding rod.

Just one more example: A kick back apron for carpenters is strictly a personal protective item and the cost of this item should be charged to safety, but, on the other hand, when trench shoring is required for holding the sidewalls in place, that cost of purchasing and installing the shoring is an expendable job item just as much as the sling or the pipe hook which is used in lowering the pipe into the trench. The point is that the pipeline should not be constructed without the shoring.

Now, if the shoring is called for where it is not needed either for the excuse of protecting the man or guaranteeing the work then it is a waste either way.

So, I say, true accident prevention costs will reflect the cost of only such equipment, labor or material which cannot honestly and fairly be charged to the work itself when doing that work according to best practices.

MR. WINKELMAN: Walt, I agree with you. I also feel that such job items should not be charged to safety. Will you proceed now and specifically give us your cost data on safety items.

WALT: After the cost of personal protective equipment is properly segregated from expendable items, we should charge directly to our accident prevention cost all the salaries of those who work directly for the safety department. In this item all supplies should also be charged.

And the only other principal item in this cost data is the time used in working out plans for accident prevention involving the time of management, engineers and supervisors, and the time spent at safety meetings, involving all supervisory forces. The three principal items in the accident prevention cost approximate the following percentages of the whole:

Salaries of safety section—5 per cent.  
Personal protective equipment and service costs for items made available by cash sales



-15 per cent.

Time for short but frequent meetings--80 per cent.

Safety shoes, hard hats and gloves are purchased by the employees at cost. With this application of cost keeping, excellent safety performance has been had at about one half to one per cent of payroll dollars. A one half to one per cent cost for safety means all the personnel, personal protective equipment and time and facilities for educational meetings. It does not include any part of the medical expenses, because medical treatment is 99 per cent cure-not prevention.

BOB: Walt's analysis of what to include in our accident-prevention costs is logical. Now if we will take the time to make a job analysis of the prevention system, we will get our correct cost items, and then we will know what to allow in future estimates. In an unorganized way, accident prevention has been taking a licking by being blamed for a lot of cost which is only assumed.

MR. WINKELMAN: I wouldn't admit this 10 or 15 years ago, but Walt has really opened my eyes. I have learned that a good and sensible accident-prevention plan can do wonders for a job.

Somehow the foremen take an interest in keeping their areas in good order, they use better and safer methods in getting the work done, they seem to handle the men with more understanding; we have less spoilage and the jobs show better progress. Safety is no more than doing the job right, and we ought to be willing to spend one half cent to one cent out of every payroll dollar to insure a job that we can be proud of.

By the way, Bob, what is our average insurance rate on this job?

BOB (hesitatingly): I don't know, sir. We haven't even received the policies from the main office.

WALT: It's \$4.15 per \$100.00 payroll. I called Indianapolis two weeks ago and got it from Mr. Williams. Incidentally, that rate was reduced this year from \$4.85 because of our performance last year.

MR. WINKELMAN: Walt, how much would we have to reduce our severity to get a reduction next year?

WALT: I believe, that if we can cut our present 1.35 lost days per thousand man hours worked to about .8 or .9, we would get a \$3.00 rate, and for the work we still have to complete this year, a reduction like that would mean a \$25,000.00 premium saving.

MR. WINKELMAN: What do we have to do in order to bring our severity down?

WALT: Well, that's hard telling. We may be very fortunate and by trusting to good luck, we may lower that rate without any further effort. But that is usually not the case. We usually get what we want or are after only if we put some effort into it.

I think that my department is short staffed and I ought to have that extra man I asked for four months ago, and we'll have to buy about \$1500.00 more equipment and have more time allowed for foremen's safety meetings. These three items would reduce the \$25,000 insurance savings to about \$5,000, but it certainly would keep us out of a lot of grief and the chances for some of those expensive indirect costs would be lessened.

MR. WINKELMAN: Those savings sound good, but I am just a little bit on the doubtful side. However, I have no figures to disprove yours, Walt. We will go through with it, and, Bob, I want you to keep a close tab on our direct and indirect costs as well as on our insurance costs. Will you give me a monthly report on it, Bob?

BOB: Yes, I will. But it might take me a little time to set up a schedule for it, so the first report may be a little late.

MR. WINKELMAN: Of course, the big item is that we may save some men from being disabled and permanently injured. That is the main reason. We have not had any of those indirect losses that Bob mentioned a while back.

BOB: You are mistaken, Mr. Winkelman. We have had two accidents which really cost us some money, when we start to figure it out.

MR. WINKELMAN: What do you mean? Which accidents are you referring to?

BOB: Well, the Bill Schulte case is one. He was killed in a 30' fall. We know that the direct cost will be about \$7,000.00 but we do not know what the indirect cost is.

MR. WINKELMAN: I may not know in dollars and cents how much that accident cost us, but I do know that my progress curve went way down that day and it did not come back to par for four days. However this is the first time it has been made clear to me that the decrease in progress was a direct result of that accident.

I think I have found out what I wanted to know. So let me summarize: Bob, will you get the insurance policies over here, and get in touch with the home office estimat-

ing and inform them that we want accident prevention costs included in all future estimates.

Miss Reischel, will you remind Doctor Brown to arrange for moving the field hospital closer to the work.

Walt, I think you can put on that extra man, but make sure he is a good one. Get that extra equipment you need and pep up our foremen at your safety meetings.

I'll talk to Art and some of the others and we'll see if we can't get a little more interest built up in this accident prevention business.

MISS REISCHEL: I have enjoyed this meeting immensely and I am quite sure that with such wonderful backing, you can't help but win, Mr. Byrne. But I am a little worried now. When you get going on this program, I may not have so much to do. You may feel that a nurse on the job is not necessary.

MR. WINKELMAN: In the past, Miss

Reischel, you have kept us on our toes by keeping us informed on what kind of accidents we have had. In addition, to taking care of patients, you keep up your reporting to us. I am sure you'll be kept busy. Anyway if Walt fails, or let us say, if we fail in our efforts to reduce accidents, you Miss Reischel, will be good insurance to fall back on.

Now, I am going to ask Art to check and give me a weekly report on the foremen's compliance as to the use and I mean proper use of personal protective equipment. If we are to spend more on prevention, we also want to see how that money is spent and how it is used, and will you Miss Reischel let me have a daily log sheet of all injuries according to foremen.

As final information to you people, I want you to know, that from now on, Walt will change his organization status and report directly to me--and that will be permanent.

*Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME XI

FOOD SECTION

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## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

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## Food Section

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## Food Section

### TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: CHARLES F. MORRIS, Safety Director, Kraft Foods Co.

### Diseases of the Skin Due to Foods

By LEONARD F. WEBER, M.D.

Dermatologist, Associate Professor of Dermatology, University of Illinois

Food, clothing, and shelter are the three necessities of life. Of these, food is the only one that is unconditionally essential; animals and primitive men have successfully dispensed with clothing and shelter but never with food. One way or another, man is busy most of the day filling his stomach.

It is important to know which foods through direct contact cause diseases of the skin of workers engaged in industry. They are fruits, vegetables, meats, fish, milk, pastries, and candies.

Fruits and vegetables are handled by housewives, grocery clerks, canning factory workers, and truck gardeners. The inflammation of the skin caused by fruits and vegetables through direct contact is contact dermatitis. It is characterized by redness, papules, vesicles, swelling, oozing, crusting, scaling, fissures, and pigmentation. The location of these lesions is on that portion of the skin which comes in contact with an irritant to which the skin is sensitized. In order to save time only those fruits and vegetables are mentioned which have been known to cause trouble in the past. Only a few workers are likely to become allergic to one or more fruits or vegetables. Experienced physicians must be consulted to decide what is causing your trouble.

Fruits and vegetables that cause cutaneous irritants:

- |               | Comment                                                                                                  |
|---------------|----------------------------------------------------------------------------------------------------------|
| 1. Angelica   | Extensive dermatitis if the plant is cut green.                                                          |
| 2. Artichokes | Dermatitis in canneries where it is peeled, cut dried, and where juices remain in contact with the skin. |
| 3. Asparagus  | Canning plant workers and cooks in hotels have trouble from the juice.                                   |

- |                    |                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------|
| 4. Carrots         | The juice causes irritation in occupational workers. Circumoral dermatitis occasionally.           |
| 5. Celery          | The washing of the hearts of celery. Limonene is the irritant.                                     |
| 6. Cinnamon        | Often escapes suspicion.                                                                           |
| 7. Corn            | Cornstarch causes urticaria (hives) through direct contact.                                        |
| 8. Figs            | Juice is the irritant. Stem of fig causes photosensitization. Housewives are affected.             |
| 9. Garlic          |                                                                                                    |
| 10. Grapes         | Arsenic poisoning in grape pickers.                                                                |
| 11. Grapefruit     |                                                                                                    |
| 12. Irish Potatoes |                                                                                                    |
| 13. Lemons         | Left hand usually affected more than right because it holds the fruit.                             |
| 14. Mango          |                                                                                                    |
| 15. Mint           |                                                                                                    |
| 16. Mushrooms      | Dermatitis and conjunctivitis.                                                                     |
| 17. Black Mustard  | Crushing of seeds liberated a volatile oil from the glucoside.                                     |
| 18. Oranges        | Sorting and picking causes trouble. Erythema of housewives may be involved after handling oranges. |
| 19. Parsnip        | Juice of the foliage of mild parsnip irritated field workers.                                      |

20. Peaches Fuzz acts mechanically at first and later a true sensitization.
21. Potatoes
22. Radish
23. Spinach Circumoral dermatitis.
24. Tomato Vines irritate hands and forearms. Feeling of tomatoes causes a dermatitis of hands.
25. Turnip greens
26. Vanilla Sorters, pickers, and cleaners of the pods suffer.
27. Water cress
- Raw eggs Is mentioned although it is not a fruit or vegetable. Urticarial eruption following mere contact with egg white while opening raw egg.
- Chicken blood Contact dermatitis.

People should eat garden truck grown in clean dirt and not in soil polluted with human excrement.

#### Meat

The meat industry begins out on the ranges of the West, for two-thirds of all meat eaten in the United States comes from west of the Mississippi although two-thirds of the meat eaten is consumed in the East. Meat is the American's principal item of food. Buyers are being educated to demand flesh from healthy animals, cut up and handled in a careful manner by butchers free from disease.

Anthrax is an acute infection sometimes a fatal disease, which is less frequent than years ago. It begins with a lesion resembling a carbuncle and suppurative adenitis, developing metastatic abscesses, and constitutional symptoms, which are often grave. Human infection generally comes from the handling of hides or animal products from stock which has died from splenic fever. Butchers, cattlemen, wool-sorters, and tanners are liable to infection.

Brucella eruption is contact dermatitis due to the secretions of cows and pigs. The lesions are limited to the forearms and they run their course in about three weeks.

Butcher's pemphigus is a rare disease.

which occurs chiefly among butchers and other persons who handle dead animals. A septic wound of the hand is followed by bullae which arise from the clear skin 24 to 48 hours later.

Foot and mouth disease is transmitted from domestic animals to man. Of the domestic animals, cattle are the most susceptible, hogs, sheep and goats being less affected. The disease is an acute febrile one in which vesicles occur in the mucous membranes of the cheeks and the skin of the digits. The disease has occurred following the eating of butter.

Erysipeloid is characterized by an erythematous, bluish, marginated swelling on the hands caused by an infection with the crysipelothrix of swine erysipelas. Its habitat is apparently dead matter of animal and plant origin.

Hog itch is an inflammation of the skin occurring among abattoir workers who sort the intestines of hogs which are infected with *erythroglycydes lumbicoides*. The hands and arms come in contact with round worms and their ova which accounts for the localization of this disease.

"Sweetbread" or the pancreas causes an erosion of the finger nails when it is removed out of the carcasses.

Actinomycosis of the skin may follow an infection from external sources as infected animals, cereals, hay, and straw. The disease is characterized by the formation of lumpy tumors on the jaws and tongue.

Tularaemia is both cutaneous and systemic and occurs in two forms. Rabbits are a common source of infection.

The zoonotic wart (*verruca oecrogenica*) often follows the handling of tuberculous meat; butchers, slaughterhouse workers, and handlers of cattle are subject to this disease.

Sheep "tick" or ked tick crawls in the wool. Wool-sorters and sheep-herders are attacked, causing hemorrhagic papules, nearly always with a central punctum. Favorite sites are on the abdomen and hips. Occasionally this disease occurs in small lots or municipal parks where sheep graze.

#### Sheep-pox

The fowl mite (*Demanyssus avium*) is a red parasite which lives on poultry and birds. Those who handle poultry are especially liable to the disease, called gamasoidosis. The bite of this mite on man produces an inflammatory, itchy papule. They are located

chiefly on the hands and arms, although any site of the skin may be attacked. This disease is often confused with urticaria (hives).

#### Fish

Down through the ages countless fishermen have risked their lives to supply the world with food. Occupational diseases of the skin are not uncommon among fishermen.

Fishermen are subject to bites from fish. Erysipeloid sometimes follows a puncture wound of the hands.

The acid juices of the mackerel's stomach are strong if it contains a small crustacean after the death of the mackerel, the gastric juice will eat through the stomach and flesh of the fish. This acid juice is irritating to the worker's skin and causes a dermatitis. Dermatitis of the wrists and necks of fishermen is due to friction of sleeves and collars of rubber coats.

#### Milk

There has been one report of dermatitis caused by contact with milk.

Milking sometimes causes callosities on the fingers and palms.

Cheese at times irritates the hands if the "cheese mite" is present.

#### Dried-Fruits

Dried dates, prunes, figs, apples, and pears may be infested with mites which cause dermatitis.

#### Nuts

Brazilian nuts and peanut oil have been reported to cause dermatitis. There is a hazard in the handling of dried coconuts and copra while unloading it from ships if infested with a mite. The eruption has the localization of scabies.

### Stimulating Safety in Local Operations

By HOWARD E. WAUGH  
Coordinator of Training and Welfare  
Anchor Hocking Glass Corporation

It is a definitely proven fact that more accidents are caused by human failure than mechanical failure.

Since man is usually the unsafe factor in every accident situation, it follows that our

#### Bread and Cake

There is and has been considerable controversy of the cause of dermatitis in bakers. The combination of flour, bleaches, and persulphates are factors. It is difficult to find the cause of dermatitis in all cases. Recently, several bakers had handled anise oil for years without having trouble. After it became their duty to measure anise oil for Christmas cookies they had linear redness on the hands and forearms. Contact with the full strength oil caused their dermatitis, but if it was diluted in the cookies they were without irritation. One of the workers had consulted many physicians during twenty years. I found the cause of his trouble because of my knowing his exposure to occupational irritants.

#### Pickling

Acetic acid (vinegar), strong brine, and pepper are some of the irritants used in making pickles.

#### Spices

The manufacture of spices and flavoring agents is a hazardous occupation if the workers' skin becomes sensitized.

A recent unusual cutaneous irritant was crotone bush which was being used as a substitute flavoring agent. In the southwestern part of the United States it is a common weed similar to our poison ivy.

#### Candy

The burns caused by hot candy are common, often irritating antiseptics are applied to the burns which cause a contact dermatitis in some workers. Keloids or hypertrophic scars are fairly common following candy burns. Chocolate causes a dermatitis. Recently I found oil of cassia a frequent cause of dermatitis in one candy plant.

problem of "Stimulating Safety in Local Operations" concerns itself with the developing in each employee of an attitude of sympathetic, cooperative interest toward the safety program. In other words, safety mind-

ness must become a sort of "sixth sense," and the employee must be brought to believe in accident prevention to the extent that his cooperation with all safety activities is assured. Efforts toward this end should begin during the immediate pre-employment period.

When an individual applies for a job his mind is pliable. He wants to work. He has made application because he's heard something good about this particular plant, whether it's good wages, or working conditions, or a opportunity to learn a trade.

Everything possible should be done to direct his attention to safety. Jumbo signs can be used outside the plant on blank walls, billboards, water tanks and stacks to put across some brief message of safety.

An application of this which creates much interest is the erection of a ladder outside a plant upon which a lifelike figure of a man, called Safety Sam, is mounted. Each accident-free day he climbs one rung. After an accident occurs he starts from the ground again.

Inside the employment office safety pictures and framed safety slogans can be hung on the walls where they are easily seen and several items of safety literature can be placed in racks or on a table to be read during the time the prospective employee waits for his interview.

During the interview he should be given an opportunity to tell of his previous safety experience, whether or not he suffered any injuries, and, if he served on any committee, something of his activity in that regard.

During the physical examination, the examining physician has an excellent opportunity to emphasize safety and back up the Safety Director in stressing the importance of reporting all injuries to the First Aid Room.

In our plants we go one step further and before actually reporting on the job the prospective employee is given a special interview with the plant safety director who explains:

1. Safety Organization—(its personnel and committee)
2. Personal Protection—(equipment needed on the job)
3. Importance of reporting small injuries and potential hazards to the proper persons.
4. Advantages of Safety Program to him. (Ex. Full paycheck and family security.)

#### 5. Safety Rules of the employee's particular department.

The Safety Director appeals to the employee's sense of fair play in telling him that safety is a cooperative effort and in spite of the fact that management is doing everything in its power to provide guards and safety equipment as well as competent leadership, the success of the program depends largely on the enthusiastic support which he along with other employees will give it.

If each person so far, employment interviewer, doctor, nurse, and safety director, has done his or her work well, we have developed in our new employee a sympathetic, cooperative attitude, which we have already stated is the first and one of the most important points in "Stimulating Safety in Local Operations."

We at Anchor Hocking work under the assumption that the foreman is the most important individual in the safety picture. More than 900 of our foremen have completed the National Safety Council's 30-hour "Safety Management Course for Foremen," and in each of our plants foremen meet regularly with the Plant Manager and Safety Director to discuss not only hazards but ways and means of bettering the program.

I should like to suggest four phases of activity open to all foremen.

In the first place, every employee has the right to expect his employer to provide him a safe place to work. This means that foremen must be constantly on the alert to detect and remove all physical hazards before they result in accidents. Inasmuch as most state regulations represent minimum standards, it is not too much to ask that all plants conform to prevailing codes of specific requirements for eliminating unsafe conditions. Many plants go well beyond these requirements but the annual number of amputations and other permanent disabilities indicates considerable work to be done in some plants toward the more effective guarding of machinery. A foreman whose men are alert to their safety responsibility will have no trouble in getting them to help him keep his department hazard free.

There is, however, grave danger that this phase of our safety work be overemphasized. In fact, some safety programs stop at this point.

I have said that to show management sincerity the guarding of machinery and the

removal of physical hazards is fundamental and should, by all means, be taken care of first. This is not, however, the most important part of safety work. At the beginning we made mention of the fact that human failure was all important as a cause of accidents.

Our second point, then, in the foreman's safety program is a conscientious effort toward the elimination of unsafe methods and practices. It follows then that foremen must exercise some control over the behaviour of men as they go about their daily work if they are to work safely.

For example, many hernias could be avoided if men were shown the proper way to lift or mechanical lifting means provided. Proper attention can be directed to other unsafe practices, such as failing to use safeguards provided, distracting attention of fellow workmen, running up or down stairs at the end of the shift, horseplay, and so on. Foremen must make a real effort to know their men. Very often some phase of an employee's life at home has a real bearing on his plant behaviour.

When the proper relationship exists between the foreman and his men, each person becomes a contributor of one to watch for and help control unsafe practices.

A foreman should make sure that each of his men knows how to perform his job safely. This is the third point in our program and opens up the problem of safety training.

Regardless of how much experience a new man may have, every department has its own special rules and he should be told them at once as he starts his work. He should be told that here is a plant that considers safety as important as quantity and quality. He should be told that, in the words of the Bell Telephone Company slogan, "No job is so important and no service so urgent that we cannot take time to perform our work safely." To do the job right and to do it safely, he must not only know what to do but how to do it, and why it is done that way.

So far as actual job safety training is concerned, the old familiar J.I.T. method, i.e.

Tell Him  
Show Him  
Let Him Try It  
Correct and Commend

when combined with a full explanation of hazards, is very good.

As soon as a new man is placed on a job,

considerable thought must be given to making good safety performance a habit. Just as there are good and bad habits of all kinds, so is safe activity lived in our scheme of things as a good habit, and unsafe activity as a bad habit. Therefore, safe practices must be built or learned as habits. If the immediate scene is set so that he sees and repeats only the safe way of doing a job, then his stimulus pattern has been fixed to the extent that he learns the safe way as a habit.

However, sometimes certain psychological factors interfere with the formation of safe habits and so preoccupy the employee's mind that adherence to safe practices is almost impossible. The subject of safety psychology could well consume the entire afternoon but I refer to such factors as:

Fear

Worry and Anxiety

Undue emotionalism such as anger or grief

Mental and Muscular fatigue.

These psychological factors are responsible for a large per cent of the so-called "human failure" accidents and in a good many cases the foreman is powerless to prevent them, but good foremen and supervisors try to know their men so well that they learn to recognize these emotional factors in time and make allowances for them.

The last way of stimulating safety on the job, and the fourth point in our program, is by capturing the interest of each employee by means of an educational and promotional program full of surprises. We can guard machines, we can issue rule books, we can train men in safety; but our biggest job is to get the safety story across in such a way that each employee will develop an enthusiasm for the program which will become contagious enough to spread throughout the plant.

Our success will be measured in direct proportion to the interest and enthusiasm we arouse. Programs should be varied frequently to keep up interest. Many companies have found that contests carried on over too long a period of time prove ineffective.

By shortening the period, interest is maintained for the duration at a high level. In our company our interplant contest runs six months. Any type of promotional idea carried on too long loses its effect. I remember hearing one foreman say "I push safety as often as I can think up different ways of doing it."

Take for instance the Wooster, Ohio, plant



where there had been installed a neon-lighted safety sign board. Each morning the safety slogan was changed and each morning the Safety Director walked out through the plant with a silver dollar in his pocket.

He would inquire of someone, "What is the safety slogan for today?"

If this individual knew the slogan, the bright shiny new silver dollar was his; if he did not, the safety director walked on to another group.

"Bill, what's the safety slogan for today?"  
"Why—it's 'WORK CAREFULLY TODAY AND ENJOY TOMORROW.'"

Imagine how you'd feel if you didn't know the slogan.

It wasn't long until all 800 men and women in that plant knew the safety slogan for the day and the total expense to that company was six dollars a week.

There are a number of other ideas which can be used to promote safety, some of them perhaps a little off the "beaten path" but which we need to use occasionally to interest some of our "lokewarrs" people—the ones who seem to be the hardest to sell on safety ideas.

Cards such as candidates use at election time can be printed, using the word "Safety" in place of candidate's name with the usual "X" in front of it and the words "Your support and influence will be appreciated" at the bottom. There have been cases where the safety director has lined up outside the plant along with actual candidates and passed cards like this out to employees as they leave the plant for home.

Many plants are successfully using slogans stamped at the top of time cards, placed so that the employee sees them at least twice a day when he or she rings in and out.

Any brief slogan can be used, such as:  
"Make this a safe day."

"Be careful today, on the job and on the way home."

"Make safety first and make it last."

"Think—make your head save you from injury."

and many others.

The presentation of a glass eye to an employee who neglects to wear his goggles is an effective way of illustrating what an eye injury might mean to him.

Safety posters to be effective must have three qualities:

a. They must be brief—tell their stories quickly.

b. They must be attractive and catch the eye.

c. They must use positive psychology.

Ex.—"Wear your respirator and protect your lungs from dust."

Never—"Anyone caught not wearing his respirator will be discharged on sight."

This latter type only builds resentment for the safety program.

Our use of motion pictures and sound slide films is based on the theory that over 80 per cent of our learning comes through our eyes. All of our plants have motion picture projectors and we follow a plan of previewing films monthly in our Central Office and passing the information along to the plants by means of monthly preview reports.

The best and most complete safety film catalog is the "National Directory of Safety Films" published by the National Safety Council.

Many insurance companies and firms like General Electric and General Motors have excellent safety films available to industrial plants for transportation costs only.

There are some instances, particularly in training sessions, where sound slide films are superior to motion pictures.

The best examples are the National Safety Council's revised edition of the 30 Hour Safety Management Course for Foremen and the recently completed 10 hour course for workers. We expect to have the 10 hour course in full swing in all our plants this fall.

Nothing can compete with a good film to whip up interest in safety and fire prevention and after repeated use we can definitely subscribe to the old Chinese Proverb. "A picture is worth a thousand words."

One thing to always remember in selling anything comes from an old essay on salesmanship. *Don't sell things—sell the effects of things.* That is, don't sell books—sell the joys of knowledge. Don't sell advertising—sell a short cut to profits. Then we should say: don't sell goggles—sell eye protection. Don't sell respirators—sell lung protection. In short, don't sell safety—sell a man his future, free from the pain and suffering that preventable accidents bring.

## WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: GEORGE H. STREET, Safety Director, Ralston-Purina Co.

## The High Cost of Motoring

By R. C. SALISBURY

Director, Safety Division, Motor Vehicle Dept., State of Wisconsin

Hardly a day passes without our hearing bad news about the continuing rise in prices. It's no news to most of us that the cost of living has practically doubled since 1939. Some economists say that increased production is our only remedy. Others recommend a buyers' strike. Others want a return to price controls. Although we as individuals may not be able to do much about the situation, we seem to get some consolation in talking about it.

A part of the rising cost of living which we don't hear so much about is the *high cost of motoring*. The cost of driving automobiles—measured in terms of human life and limb, and property damage—is going up. Increased motor vehicle traffic, combined with careless driving habits on the part of some motorists, is resulting in an increased number of accidents. And the cost of these accidents is more than we can afford to pay.

I believe it is worthwhile for us to think seriously about this rising cost of motoring. For, in the long run, it may mean more to us than the rising cost of food or housing. Our very lives—and the lives of our loved ones—are involved.

Here is the latest news with respect to the rising cost of motoring in Wisconsin: The Safety Division of the State Motor Vehicle Department reports that more persons were killed in automobile accidents last month than in any other month this year. Eighty-eight persons lost their lives in August, as compared with 73 during the same month last year. During the past eight months, a total of 488 persons lost their lives on Wisconsin highways, as compared with 437 deaths during the same period a year ago.

This increased death toll means that there is also an increased number of injuries, and an increased number of wrecked automobiles, as the result of motor vehicle accidents on our highways.

But—you may say—the increased cost of mo-

toring doesn't affect me. It just affects those who are foolish or careless enough to get involved in an accident.

While it is true that most persons involved in accidents are guilty of having violated one or more traffic laws, it is equally true that the innocent often suffer with the guilty. Our lives, and the lives of our children, are not safe as long as there are ignorant and negligent drivers on the road... even though such drivers are in the minority.

Nobody expects to lose his life in an auto accident! Yet, in the first eight months of this year, 488 persons lost their lives on Wisconsin highways!

All of us—sooner or later, and in one way or another—pay for our failure to solve the traffic accident problem.

But is there anything we can do to reduce traffic accidents? Won't we continue to have traffic accidents, no matter what we may attempt to do about them? Has any good come out of all our efforts to promote safety on the highway?

The reduction and elimination of traffic accidents is not an easy job, but there is no reason why we should become discouraged in our efforts. Not only can we do something about the problem, but the records of the Safety Division of the State Motor Vehicle Department clearly show that we have done something about the problem.

It is true that Wisconsin had 88 traffic deaths in August. It is true that this is a greater toll than we suffered last year during the same month. But there was a time when we experienced 116 deaths during an August month. One other year, Wisconsin suffered 111 August deaths.

The records show that, although we are paying dearly for our motoring privileges, there was a time when we were paying more. Even though there has been a greater volume of traffic this year than ever before in our history, this year's accident toll is by no

means our worst.

This is encouraging news, and it tells us that all our efforts on behalf of accident prevention has not been in vain. Many persons are alive and well today because some folks were concerned about highway safety, and because they did something about it!

This doesn't mean that our job is complete. The fact remains that traffic accidents and traffic deaths are again on the increase.

These are days when the growing volume of traffic on our highways will take an ever-growing toll in human life, unless we all take an increased interest in the job of controlling that traffic, and preventing the accidents which result when motor vehicle traffic goes out of control.

The state-wide program to prevent traffic accidents is being carried along on three fronts. We fight accidents through engineer-

ing, enforcement, and education. Engineering and enforcement are largely the job of highway engineers, enforcement officers, and the courts. But in the field of safety education we all have a responsibility.

First, we must learn. Learn the traffic laws. Learn how to do things the right way. Learn how to keep our vehicles in safe motoring condition. Learn the habits of watchfulness, and the demand is of highway courtesy. Then, we must teach. Teach our children the precepts of safety. Take an active part in our community's program to protect lives. Make ourselves an influence for safe driving, by giving others an example of safe driving.

The fight against the tragic cost of highway accidents is a job for all of us. We must do the job as if our lives depended upon it.

Because—as a matter of fact—our lives do depend upon it!

#### THURSDAY AFTERNOON SESSION

October 9, 1947

Presiding: E. G. QUENNEL, Director of Safety, The Borden Co.

#### HUMAN ENGINEERING

(Panel Discussion)

Discussion Leader—CLIFFORD F. McBRIDE, Personnel Mgr., Palm Beeching Co.

Speaker—R. C. HAVEN, Safety Eng., Continental Baking Co.

##### Board of Experts:

R. C. LARSEN, Industrial Relations Div., Libby, McNeill & Libby.

V. L. McMULLEN, Employment Supvr., Clinton Industries, Inc.

C. C. RUMACK, Supvr., Training & Safety, H. J. Helzer Co.

RAY M. SKEWER, Dir., Plant Personnel & Safety, Anheuser-Busch, Inc.

CHAIRMAN QUENNEL: I think you will agree that the large percentage of the failures in life can be charged to poor judgment or poor human relations. Likewise, the large percentage of our accidents can be charged to the same causes.

The trouble with most of us, in discussing the subject, is that we are too general in our approach.

People are people—that's true; and by and

large they do pretty much the same things. However, when you study these people, you find that they are individuals and, further, that each is a different individual.

Now, while there may be many who agree to certain fundamentals, in most cases they do not agree on how these fundamentals are to be interpreted.

Therefore, it would seem if we are so interested people, guide and control their thinking into constructive channels, we have got to be specific in our presentation and individual in our application.

MR. R. C. HAVEN: Of course, I can only touch the very "high spots" and a very small part of this whole problem.

I want to leave just a little formula with you that I have used in our plants that has worked out very well.

Before I give you that very simple formula, which perhaps some of you have used, I would like to prepare your minds to receive it by reading a few references pertaining to

the trend of managerial thinking and potent thoughts bearing directly upon the subject.

Now, the first thought that I have gleaned from Carl Heyl's book HOW TO CREATE JOB ENTHUSIASM—

First of all, the thing that struck me: He was speaking about the old "hard-boiled" type of bosses as compared with the present-day type of foreman and supervisors. This is what he says:

"In terms of practical business operation this means that executives and foremen and others in positions of authority are having to borne in upon them with increasing force that to get work done in today's world calls for much less bossing and much more leadership than it did in the old days."

"But we need not rest our case upon comparisons. There is a second and stronger line of reasoning, and it would be valid if our economic world were not so radically different from what it was yesterday. It is simply this: Concern for human relations is good business. It has taken enlightened management some time to realize that this is so, and, judging from their actions, many people with executive authority must still be convinced."

"Concern for human relations is good business because it translates itself into job enthusiasm on the part of employees. There is a tremendous opportunity for profit, as yet only partially realized, available to management in the idea of making people want to work rather than merely giving them a chance to work or compelling them to work."

And a little further on in his book he says this:

"Employees are people. By and large management is shockingly unimindful of this very elementary idea."

Heyl points out that many of the supervisors' and foremen's troubles stem from the fact that the employees under them have no chance to express their views regarding company policies.

Then, of course, he speaks of a reverse procedure; that is, transmitting orders and requests to employees.

How many times do we talk about the benefits to the company? But the average individual isn't interested in the company. He is interested in himself. Now, if you can show him that by helping the company, he helps himself, you have taken a step forward.

I personally feel that the point we should

always keep in mind is that, under our form of economy, the basis of discipline in business is the exact reverse of the basis of discipline in an army. In an army, the emphasis is negative: soldiers are punished if they do not obey, and so they may often do what they are told because they do not like what is apt to happen to them if they refuse.

In business, the underlying force is positive: People work for rewards and not to avoid punishment.

Heyl feels orders and policies can best be transferred to employees through the supervisors, but explains that:

"Many companies, however, were shocked to find through surveys that supervisors and foremen were poorly versed in the details of company plans and policies which they were supposed to interpret to workers."

He goes on to say that:

"Related to this idea, of course, is that of the proper selection of foremen in the first place, not, as one executive put it, to make foremen out of good workmen who can handle the loudest, swear the strongest, and threaten the most."

That is the old school.

I can remember, as a kid, in Pittsburgh, in the Homestead Mill, when I used to go through there "my hair used to stand on end" when some of those fellows used to talk to some of their helpers around there.

And we still have some of that.

Now, before getting to my so-called formula, I just want to quote a few paragraphs from another book written by J. J. Evans, Jr., General Personnel Manager of the Armstrong Cork Company. The book is entitled A PROGRAM FOR PERSONNEL ADMINISTRATION.

He brings out this very important point that people do things well only because they want to, not because they have to.

"For short periods, perhaps, human effort can be regimented, legislated, forced against its will, but not over any great length of time. Men will remain enthusiastically associated with any project only so long as they have respect for its administration, pride in its accomplishments, and personal satisfaction from their own individual contributions to the group endeavor."

Now, I would like to emphasize that he says: "It is an individual, not a mass job."

You know, some people take issue with that idea.

Way back in 1920 in Milwaukee I heard the superintendent of schools say that mass action defeats your purpose; and my experience so far has proven that statement.

Mr. Quenel, you mentioned that in your opening remark. There are no two men alike. So, my friends, your job as supervisors is not a job of dealing with your men on mass but one of dealing with them as individuals. I think we have got to realize that.

In these preliminary remarks I have tried to convey to you these four points:

1. Management is becoming more human.
2. The supervisor should be given an opportunity to learn Human Engineering.
3. In the eyes of the worker, the supervisor is the company.
4. Your problem is one of handling individuals.

Now, let's just turn for a minute to the thought of the supervisor—and I am now getting down to my simple formula.

I have always had the belief—and I still think it is true—that a supervisor is the builder of men.

If he is going to build men, he must know men.

If he is going to know men, he must study men.

And then, what is perhaps as important as anything, he must write down what he learns about his workers.

If you have 50 or 100 men working for you, you cannot remember the characteristics of each one well enough to deal with them. You must put your thoughts in writing.

The success of your plan of dealing with the individual depends principally upon two things:

1. The extent to which you learn each one's characteristics.
2. The thoroughness with which you plan to use what you learn.

Now, I said you must write down what you learn. This is important.

The manager says to me, "My foreman doesn't have time to keep books on this fellow's accidents."

I said, "If he doesn't have any accidents, he doesn't have to keep books, does he?"

"No; that's true."

"Well, listen, if that fellow is having a lot of accidents, he better begin to keep books on them and find out how, when, and where they occur, and determine the cause because that is the only way you can correct the

situation."

Of a hundred men, you don't have to worry about 95 per cent. There are two and a half per cent that you must worry about a little, and then you have that inevitable two and a half per cent that are giving you trouble all the time.

That two and a half per cent takes in the fellow I have in mind when I give you this little formula to use.

Now, suppose we pick out one of these two-and-a-half-per-cent fellows. You have got to talk to him. What are the steps?

1. What are you going to say to him?
2. When are you going to say it?
3. How are you going to say it?

That is very, very important.

I would like to draw just a little parallel between the foreman and a surgeon.

There are nine very basic procedures that should be followed:

1. A surgeon will not operate on you unless he has a case history.

That is No. 1 here too—case history. A surgeon knows a great deal about you when you go into the hospital. He has your case history before he "wicks the harpoon in you."

2. Before he operates on you he consults, if it is a serious operation, with somebody else.

Now, how many times do we operate on our men without knowing them or without having a case history before us and without talking to somebody else about this man?

3. A surgeon will not operate on you unless he is physically and mentally fit himself, if he can help it.

We had better check ourselves before trying to operate on somebody else.

4. Have the patient ready to be operated on.

When you find that man's mind is not clear and he has a lot of trouble, to worry him, help him over that trouble. Forget what you were going to say to him. Help him over the "hump." Tomorrow you can talk to him, or the next day, but today help him over his troubles.

If you want him to respond to certain things, you should first get him in the proper frame of mind.

5. Then you must know how to operate. You will know how to operate, if you know on whom you are operating.

6. Then you must know where to operate. You should know the things you want to talk

to him about, and have them all written down in chronological order.

7. Be prepared for an emergency.

Perhaps, when you are operating on this fellow, he will "get his back up" and "get mad." A good surgeon is always ready for an emergency. He has the adrenalin ready.

You, too, must "dip out from under" such emergencies.

Once you "get mad" at your man, and he "gets mad" at you, you are leaving a scar that will never be erased.

8. Then you have the post-operative treatment.

After you operate on him, you have got to watch and see how he is getting along.

9. Then you have the repeat operation, when it is necessary.

I don't suppose you folks have any of these people that have to have the second operation. I suppose most of you fellows just tell him and he goes ahead and does it.

CHAIRMAN McBRIDE: I think that we should start off by asking Mr. Clyde Ruddick of H. J. Helat Company to offer a few comments on the talk we just heard from Mr. Haven.

MR. C. C. RUDDICK: If I were given the responsibility of the selection of supervisors, I would select men after thoroughly rating them to make sure that their qualifications include more than just the ability to work hard or to know the technological phases of their jobs.

Among the many phases of this pre-foreman training program would be the subject of Human Engineering, which would be a very important phase in the final selection of candidates for foremanship.

If the candidates went through the entire program and didn't qualify in human relations or Human Engineering, call it what you say, they would be politely but firmly disqualified from any future progression in the supervisory ranks.

In this general course of training, I believe I would set up a course of training which would tie in definitely with a good book on the subject.

A series of conference or discussion meetings would be set up, and they would be based on the entire text of this particular book.

One book of the dozens or possibly hundreds which have been published on the subject would be selected, and without discredit-

ing any of them, because they are all good, I would select one very recent publication entitled LET'S BE HUMAN; and I select that because it appeals to the fundamental interests of supervisors, executives as they are.

It isn't thick, but it is a semi-humorous, cartoon type of presentation. But within the confines of the covers of this particular book I think you would find enough good points in Human Engineering upon which to base your particular discussion meetings.

In the presentation of the material, I would include the seven basic points which the book covers:

1. Perfect your self-control.
2. Appreciate and praise.
3. Stress rewards and avoid punishment.
4. Criticize tactfully.
5. Always listen.
6. Explain thoroughly.
7. Consider your men's interests as you would your own.

Now, each of these rules would be developed much more fully than I want to take time to develop them here, but the following about these seven points will give you some idea of the contents of what this particular part of our training program would cover:

1. Self Control.
- The control of ourselves would include the control of vanity, temper, tongue, likes and dislikes, emotions and thoughts.

2. Appreciate and Praise.

It is not sufficient to appreciate, but we must express that appreciation and do it tangibly in praise.

This rule could be aptly expressed: Recognize, appreciate, praise—conditions, individuals, families, abilities, hopes and dreams.

3. Stress Rewards and Avoid Punishment.

Repeating the words of our main speaker—people work harder for reward than they do to avoid punishment or the consequences of a rule violation.

Rewards, advantages, advancements carry the most weight with the most people.

4. Criticize Tactfully.

Everyone loves to "dish it out," but few can "take it or give it" properly.

Avoid criticizing if possible to accomplish your ends in any other way.

If necessary to criticize, try to keep yourself off a pedestal, and always in private.

Use praise first as your "opening gun" and instill confidence in his future accomplishments after the interview is over.

5. Always Listen.  
A good listener rarely says the wrong thing. A good boss is always a good listener because he encourages talking. It gets the little grievances out in the open, which generally make up the background for the main topic of discussion.  
A good listener never interrupts, contradicts or forces advice.  
A good listener has time to think, weigh facts and search for the underlying causes.  
6. Explain Thoroughly.  
Give your associates all the information you can about the company.  
Make your men feel like full-fledged partners in your particular work.  
Give everyone the feeling of importance, of being more than just a cog.  
Give information promptly and thus spike grapevine rumors.  
If you can't answer questions at once, don't stall, but get the facts and then supply them.  
7. Consider your men's interest as you would your own.  
Have the sincere interest of the men at heart.  
Be progressive for deserved pay increases and promotion of your subordinates.  
Give credit when credit is due.  
Quickly remove the physical hazards under which your people may be working.  
Keep an eye on the health of your group and be concerned about it.  
Be sure your men know all the benefits possible for them from the company.  
Make people eager to work for you by working for them.  
The above-mentioned book, or any comparable publication, would serve as the basis for a good training course in Human Engineering.  
Incidentally, each prospective supervisor would be given a copy of the book upon which this little training package would be based at the end of the course.  
CHAIRMAN McBRIDE: Mr. McMullen, would you care to add a few comments?  
MR. V. L. McMULLEN: I was particularly interested in one phase of Mr. Haven's talk, and that is the effect of a good employee relations program on a public relations program.  
To me, that is very important, and I am really surprised that some companies hold public relations so lightly.

For example, in order to make my point, let's consider Company A and Company B. We will call them, both operating in the same community and sum up the end results of their operations.

Company A is a company with poorly defined labor relations policies, poorly defined company policies, poor means of communication and interpretation of the policies to the whole organization; working conditions unfavorable, sanitary conditions unfavorable, poor lighting and all the other things that go into that which comprise those unfavorable conditions—and apparently they are not doing a great deal in the line of safety to safeguard the health and the welfare of their employees.

It is only logical to assume, setting wages aside entirely, that that group of employees is going to be a disgruntled group, with never a kind word for their company nor the products they manufacture. Whenever you find them in public, they generally are "knockers" and the "knocking" is generally done against the company by whom they are employed.

Such an attitude and such a front cannot help but have very detrimental effects not only to the company but to the community as a whole in which the operations are carried on.

Now, let's consider the case of Company B. They have operated for years not on a particularly high wage standard but on perhaps a standard wage scale which would be considered adequate for the community, but they have very definite policies by which they conduct their business and their relations with their employees.

These policies are clearly defined so that every member of the supervisory staff is able to interpret them intelligently to the rank and file.

Naturally the employees feel they are a part of the organization. They are receiving due consideration from their management, and from their supervisors.

Then, in addition to these things, they have done a great deal in the manner of making working conditions better. They have adequate washroom facilities; adequate lighting; wherever possible they have eliminated manual handling of materials; and, in addition to that, they undoubtedly have been very careful with regard to their equipment, keeping it in safe operating condition and doing

everything possible to advance their safety program.

These employees, when they are out in public, are going to have nothing but kind things to say about the company. They are going to take pride in the products they manufacture or help manufacture, and they are going to let the world know they are working for a good company.

Now, what is the result of that on the relationship of the company in the community?

Let's take, for example, a community federation. You may not attach much importance to that, but I believe sincerely the extent of participation in any community endeavor in any organization is a very good barometer of just what kind of relations that company has among its employees; and if you have a company where the employees come to the support of some such drive for funds, such as community federation, without any compulsory measures being taken or any browbeating, it is a very good indication that these employees are satisfied. They want to go along. They want to do what they can to make their company look good.

I say again the effects of a good employee relations program has a very definite and decided effect upon not only the company's operations in the community but possibly they stem still further into the sales field.

MR. RAY M. SEEKER: Mr. Haven said "boss days" are over. I grant him that is true. But you still have plants where that type of boss is left. I think you will all agree to that. You have the "drive driver" to beat the men into submission to keep the old production going high. That is the plant superintendent's job—"Get it out; let's get going."

On occasions, where you have a man working in a department, he just won't work. He doesn't care to work—he doesn't care if he ever goes to work—but he goes there because he has got a family to support. So he doesn't like his job. But it's not his job that's at fault, it's his foreman. The reason it is his foreman is because top management didn't have a training program. That is the answer to it all.

You will find that if this man is moved from one department or transferred from one department to another department with

a foreman he likes or can get along with, who is not bull-doing him, constantly "driving" him, he will put out production.

CHAIRMAN McBRIDE: Mr. Leitner, would you add a few comments, please?

MR. R. C. LEITNER: Now, this is a safety conference. I suppose many of you men wonder why such emphasis has been placed on personality adjustments.

We all know that industrial safety when it first came out placed its major emphasis upon adequate safeguarding of machinery, proper working conditions, and so forth; and it has only been within the last few years that such subjects as accident proneness and how to eliminate the employee who continues to repeat an accident have been studied.

In studying that individual we found he is subject to a certain group of factors, and these factors cause him to respond in a different manner at different times. We know that they don't all exist in the same individual to the same degree. Yet, we have to study them if we hope to improve our safety records in our individual plants.

I would merely like to emphasize that individual safety can never be fully attained if we devote ourselves exclusively to improving working conditions, safeguarding equipment, and so on. It has to be done on the basis of individual study, on the basis of individual human employees.

MR. NIXON DYTAROWSKY (F & M Schaefer Brewing Company): I would like to ask Mr. Haven and Mr. Raddick a question in regard to rewarding the employee for good work rather than imposing discipline for doing the wrong thing. How do they feel about awards for safe work, individual safety awards? I don't mean a plaque for a department or something like that, but an award to the individual for working safely during the period. How do they award them, if they do, and is it a cash award or something of that sort?

MR. HAVEN: We heartily believe in the award plan. We don't believe in the penalty plan.

For inside the plant we have our inside contests to reduce lost-time accidents. The reward for that would be in the form of individual prizes to the employee plus a dinner to the winning bakery.

There was no money involved. We do not believe in cash awards, but we do believe





in recognizing a good record.

Our foreman got a six months' card, a one year pin—one year, however; 1—125, silver; three years, gold, costing for 1—500 years, a diamond pin; seven years, a gold watch; fifteen years, a portable Omega radio.

So we do believe in prizes for accomplishment.

MR. McTARROW: Are these safe-driving awards, Mr. Haven?

MR. HAVEN: The second group are safe-driving awards.

MR. STEEL (The Rabon-Parkin Company): What kind of awards do you give to the employees in your plant and laboratory? Are they individual awards? What type are they, Mr. Haven?

MR. HAVEN: Is anyone acquainted with the Campbell-McDonald House that gives prizes of radios and all that kind of stuff?

They have a catalog they get out for prizes. We use that particular group, and let them select the prize they would like to have.

It is all based on a point system, but they can select any prize they want, and then the bakery having the best record gets a dinner, to which the employees bring their wives or husbands, whichever the case may be.

CHAIRMAN QUESNEL: I think it would be interesting to know if anyone has worked out a satisfactory award to employees from a personal injury basis, where they award these men every year for working safely in their plants.

It has been a question which has been discussed pretty widely at every conference, and no one has brought up a satisfactory answer yet.

MR. CARL CLEMENTS (National Dairies): We don't know yet—we are just starting on a program of awarding safe workers in the plant. For years the drivers have received safe-driver buttons, watches, rings, radios, and the poor fellow in the plant who has worked safely over a period of years has been getting absolutely nothing, absolutely no recognition for his safety achievements. Yet, your compensation costs, if they compare with ours in our company, will run about four times what the cost of our automobile accidents are running. So we have worked out a program. As I say, I don't know if it is satisfactory or not. We are to give the employee a button for one year of safety working; at the end of two years, he gets a two-year button.

Now, our accident records go back to sixteen years, and most of our companies are reverting the safe workers back to sixteen years, and they are receiving these bonuses or pins, only in the form of recognition. As Mr. Haven said, it is not an award or reward; it is recognition for safety achievement.

MR. W. A. HORN (Wrigley Company): Does the responsibility for good employee morale rest entirely with the foreman or can the personnel office help on this?

Take for example, a man who has stepped out of line and the foreman has gone as far as he can. Would you feel that perhaps the personnel department should step in and have a little conference with him and "bump him out"?

MR. SEEKER: You clear could be handled in this way: If the man is already on your payroll and the foreman is having difficulty with him and he with the foreman, I think it would be well to send the man into the personnel department and let the personnel man talk to the employee in private and get his reaction as to what the trouble is.

The man may have some difficulties with the foreman which he thinks are the fault of the foreman. If you had the foreman it would be a "cat and dog" fight right now. So get the man in there alone and get his side of the story. Maybe his home life isn't too happy, or he may not like the work. He takes the job just because he has to make a living.

If the man doesn't fit in, I would even suggest a transfer to another department, but I would first find out if the foreman is at fault.

When a new employee comes in, he is interviewed by the employment man, who should find out then if he is going to be happy. He should have explained to him the job he is going to take, and find out if he is going to like the job even before he starts. There is no use to train him for a job and then find out that the man is not "cut out" for it.

MR. RUDDICK: The modern concept of industrial management leads me to the opinion that the good safety man, the good training man, the good personnel man is strictly in an advisory staff spot. He should not take over the functions of the supervisor. If he is good in that job, he will enable the supervisor to handle his problems and, at the supervisor's request, possibly handle the more

complicated cases for him—but only at his request. And I would divert all the activity to the supervision line, because you are going to draw them away from the feeling that they are a part of management. I think this has been the tendency in the past—to "draw" men to them and develop their ability to handle problems as they come up.

MR. STEEL: We are hiring or bringing into our company a group of young college graduates, engineers, to train them for supervisory jobs.

Every supervisor in our plant thinks he is a good supervisor. He thinks he knows his business and doesn't need this training. But we want him for a while and you will note his deficiencies. How are we going to tell him about these young fellows?

MR. LEITNER: Your problem is one of having new supervisors brought in and yet you must meet the feelings of the old line supervisors.

We had a case in which one of our superintendents from the Chicago office made a visit to one of our plants. When he noticed an operator on one of the machines not going so rapidly as he thought the ought to be, he got her aside and said, "Here is the way you ought to do it"—bing, bang, bang, moving both arms like this (demonstrating).

It so happened that the cost control department had spent a long time developing the best method for that particular job, and it called for the operator to use one hand to flip the item. His hand and relay it that way (demonstrating), but the superintendent wanted her to go like that (demonstrating).

Here was a top level supervisor disrupting the morale at the plant level.

In going through the plant, the industrial relations man happened to catch sight of this incident. He is an aggressive fellow. He realized, "I've got to do something here. I have got to save face somehow." What he did was to go over and tap the superintendent on the shoulder and say, "Have you met the foreman in this department? If not, I would like to have you meet so and so."

He got him away from this operator, and he said, "Incidentally, this foreman is charged with the responsibility of all these women. If anyone is not doing the job properly, it is his job to tell that woman how to do that job."

Well, imagine the look of astonishment that

came over that superintendent's face. But be remembered that you should preserve your line of supervision. He recognized he was "off base" in trying to show an operator something that he was not too sure about himself. If he did have anything to correct he should have talked to the foreman about it. That foreman relationship must be kept sacred.

MR. CHARLES MOBERG (Kraft Foods): Since foremen are selected as foremen for a very special reason, why does Mr. Ruddick recommend training foremen?

MR. RUDDICK: That is one that is often asked because adults don't like to be educated.

Maybe our approach should be in a little different direction, but toward the same goal.

I firmly believe that you should base your training on the premise that the supervisor will be helping you to set up your program. Show him that he will be assisting you by his discussion—helping you to solve problems. If you approach your supervisor in this way I think he will be more inclined to cooperate and not get the feeling he is being educated. Get him to help you and offer to help him. I think if you do that, some of the reluctance to be educated or trained will be removed.

MR. NELSON (St. Paul, Minnesota): Most of the talk here this afternoon has been about foremen treating their employees in a little more humane manner. What I want to know is where does the safety man fit in? How does the safety man help the foreman or supervisor treat these individuals and act a little more humanely to them?

MR. McMULLEN: I don't believe that is the safety man's duty.

I think that is definitely a matter of training which should come through the training department for supervisory training.

I don't believe the safety man in any plant can direct or even attempt to direct the activity or the handling of the employee.

That may sound a little blunt, but I believe if he attempts to do that he is going to find himself in a "kettle of hot water" all the time.

He can advise on safety problems and try to work with the foreman in that way and perhaps try in a persuasive manner to get the foreman out of the frame of mind of saying, "Oh, the hell with that. If he is dumb enough to do an operation that way,



let him get hurt." He should at no time attempt to take any part of the actual supervision of that foreman away from the people who need supervising.

MR. MAY (Mars Incorporated): Should he then direct his intentions as an influence on the training department and put pressure there for proper training?

MR. RUDDICK: I think he would certainly be justified in asking for the cooperation of any training that he might develop out of a situation of that kind.

I believe it is generally true in most plants that the safety director does not have any actual authority. He works with every supervisor and every department in the plant and also with the employee. Therefore, any problem he has should be taken up with the department supervisor concerned. He should consult with him, and from there on out it is the supervisor's "ball."

MR. HUTCHES (Campbell Soup): To get back to how a safety man can help a foreman, I should like to add that you find many times that people in the plant will say something to the safety man that they will not say to the foreman.

MR. PARSONS (Carnation Company): Do the same factors exist in causing lost time as those found in causing minor first-aid cases? MR. KRITNER: I don't believe they do. Frankly, the same set of factors are not brought into play.

I think if you check over the statistics in a plant, invariably you will find that the department with the most lost-time cases will probably have the lowest minor first-aid injuries, and the department having the highest minor first-aid injuries oftentimes will have the lowest lost-time record.

In other words, it tends to show there are different factors in operation. Just how and what those factors are, I am not able to say.

MR. HAVEN: It seems to me that the potential is there. We used to have many lost-time accidents in one particular department. This situation has since been corrected. In that division we had a machine composed of a knife that slides over another knife. On the top there was a broad piece of steel with holes that would get clogged with dough. There were also holes on the under-plate which moved across the top plate. When these plates registered, the fellow who was digging the dough out would sometimes get his finger

all the way through. Then when that knife went back it would take his finger off at the first joint or second joint. Sometimes he would only get a little nip off the end of his finger.

I think you will find that many of these minor accidents are potentially serious accidents. The fellow didn't have a serious accident as he was just lucky. He didn't get his finger all the way through.

MR. QUESNEL: I think you are absolutely right.

I think fundamentally the causes which result in first-aid cases are the same causes which result in lost-time accidents. It is just the question of severity, and I don't think we should get severity and frequency mixed up.

We have in our company a policy of having all the first-aid cases reported on a first-aid blank prepared for that purpose. We want the cause of that first-aid injury investigated by the safety committee and known to the manager of the plant in order to prevent a repetition of the accident, which in all probability may be a lost-time accident or a lost-time case.

So, fundamentally, I think the causes are just about the same; only it is a question, as Mr. Haven says, of luck as to whether one is a first-aid case and the other a lost-time accident.

MR. O'LEARY (Coca Products Refining Company): I would like to have the Board comment upon punishment of the injured for violation of a safety rule, or punishment of the violator of a safety rule in which a near miss is concerned.

I am sure that Human Engineering is a reward. I am sure that most of your companies have disciplinary actions written up in your union contracts or rules.

I just wonder what the Board thinks with regard to disciplinary action to take against the violator of a safety rule.

MR. RUDDICK: I believe the safety engineer or the safety director can be a good example. There is not much he can do in a direct way to help the foreman in this Human Engineering problem, but he can be an example himself. Certainly when he confers with the foreman and advises him on his problems, he can, of course, use the techniques which we know are correct. I believe in that way he can help the foreman to realize the better approach.

Now, as to discipline, I think if the safety engineer will utilize the means at his disposal—the forms he makes up for reporting accidents, the investigations which he tries to get the supervisors to handle so that they are taught causes—I think these devices, such as reports, can be so designed to work in Human Engineering and indirectly have a bearing on the foreman's approach.

For example, about three or four years ago a chap from Carnegie Steel introduced a cause code, which was the basis of cause forming accidents. Not one place in that cause code was there any room for carelessness on the part of an individual. It was based on the premise that if the employee does something they are liable and the company responsible. The employee is liable because he hasn't been properly trained in the correct method; he has not been supervised properly.

So I believe we can do away with the need in accidents if we gear our program toward cause classification. If we get to the basic causes, where possibly management is at fault, the supervisor, the other worker, or possibly the attitudes and the other psychological approaches in the individual, then I think we will do away with the necessity for discipline and reduce our frequency accordingly.

MR. O'LEARY: If you discipline the men for absenteeism, failure to report on time, leaving the job before quitting time, coming in intoxicated, and so on, why not discipline them for violation of safety rules?

MR. McMULLEN: In my opinion to discipline a man for a violation of a rule is quite another thing from disciplining him because he has had an accident because of a violation.

We are very much against penalties in case of accident. We feel that the man has already suffered enough by virtue of his accident, and anything that we might do in the way of further punishment is only going to build up resentment and ill will towards the company or towards his supervisor.

We feel that no individual is going to deliberately go into a plant and injure himself, although there might be a few isolated cases of that, and, therefore, penalty punishment for an accident which has actually occurred is a little bit out of order. But when it comes to insisting on observance of rules, that, again, is another thing. I think prob-

ably you would be justified in some sort of penalty for a willful violation of a safety rule or any other rule you may have.

MR. GROFF (American Malt Products Company): We had a case out at the plant concerning a young fellow about twenty-three years of age. He was too young to go to the Army or, rather, he got a job in order to keep out of the Army. He was cited about seventeen times for violation of safety rules. He was in a truck one day with one of the fellows. Although he was not driving, he put his foot down on the gas and caused the truck to hit a construction shanty. There were about five fellows around that shanty. Fortunately they escaped injury, but it could have been quite serious.

Then, to give you another instance, this fellow was throwing snowballs one day, and he happened to hit one of the fellows in the face with one of them, a fellow who was in a truck.

The "pay-off" happened about a month ago. He was working in a special construction gang on the fifth floor of a refinery. While he was up there he took a hundred pound paper bag, filled it with water and threw it down on everyone who came up on the elevator. So we fired him.

MR. McMULLEN: I think definitely that the time and the use of the penalty for the violation of a rule depends entirely upon the degree of the offense.

I believe in our plants, after that first offense, the man would have been fired right there, because it was serious enough, and he was willfully endangering the lives of five other people. It was serious enough to indicate that he was an irresponsible person, and I don't believe we would follow it along very long on that basis.

Now, in the case of a minor offense, we would probably give him a warning and allow him to stay on. But when anything directly involves human life, I don't think we could "ride along" with it.

I think the attitude of the people who pay the compensation would have a lot to do with the case of a man who comes in intoxicated. Certainly they would not pay compensation on such a case without fighting it. By virtue of the fact the man goes to work when intoxicated, I think that is sufficient grounds for discharge in any plant at any time.

MR. GROFF: We don't let him work; we

send him home. But we can't constantly keep sending him home. On the other hand, if you fire him, they say, "Well, the fellow lost his arm here and that is the way you treat him."

MR. McMULLEN: In our case, we send them home. If they are intoxicated, we send them home before they get into the plant. If they should happen to get by our watchman and report on the job, we may even send them home once or twice. But the third time—I don't know, I think we would get rid of him.

Mr. Ruddick, you agreed with Mr. Haven that special training and selection should be given the foreman, and I believe it was your conclusion he should be made to read this book.

MR. RUDDICK: Of course, if you have a lot of foremen who are illiterate and can't read, I can't help it.

MR. BOND: Mr. Ruddick, the average level of education is possibly the sixth or seventh grade, and not one in a hundred reads anything more than the morning paper. To give a man something other than the latest novel or detective story and expect him to read this rather heavy philosophical exploration seems to me to be asking a great deal of the foreman, in our plants, anyway.

MR. RUDDICK: That is a good point. Our training man in one of our factories hit upon that idea, too, that foremen do not like to read. He asked the same question: How in the world are you going to get them to read the union contract and know what is in it?

I think the solution found was a good one, and it might help you. In all seriousness now, he devised three very carefully planned conferences with groups of foremen of the plant. There are about a hundred foremen in this plant, and he talked to them in groups of about fifteen to eighteen persons. He split up his contract booklet into three parts and broke it down into outline form. Some of us helped him with it. He had conferences, and he took it piece by piece in the meeting. He found the individuals who could read and had them read a particular point, and then he had the rest of the fellows listen and discuss that point after it was read.

The personnel manager did not conduct the conference, but he helped to make up the outlines and the conference leader was

instructed to inject the principles of good employee relations into the discussion about the contract. It proved to be very effective.

MR. BOND: That is one way to do it—break it up in easy "does"—give it to them little by little.

But let me ask you one more question about book reading. Are you going to force this on the foremen new in the plant or those whom we hope might be foremen in the future?

MR. RUDDICK: That is a good point. I guess maybe I didn't make that too clear, but I had only in mind the performance training, before they become foremen, selecting this group and putting them through their paces as a testing medium as well as a training medium. Do that before they become foremen. If they do not qualify, they are "out." I would get that level up a bit, if I were you.

MR. BOND: Because a man failed in one test, he is "out" as a foreman. How many of us have failed in some test but later came back and were able to do it because of the knowledge of failure? Are you going to disqualify him entirely because of this one failure?

MR. RUDDICK: Now, a person who fails in qualifying as a supervisor, seriously, may be a very splendid type of individual who would fit into the organization somewhere. I honestly believe if he does not have the qualities he needs for leadership and human understanding to be a supervisor, then he may have some other outstanding qualities—possibly ability in sales or advertising, and so on. You may be able to use him somewhere else. I would suggest, instead of "kicking him out on his ear" or telling him he is no good, that you help him as an individual.

Those of you who went to the early morning class on Tuesday must have been impressed, as I was, by the remarks of the speaker when he said, "You don't discipline a machine by refusing to oil it or grease it just because a part is not functioning, and you don't do that with men either."

You have got to consider men as individuals. First, select or find out who they are—and that is one way of finding them out. When they fail, there is something wrong with them as far as foremanship is concerned. Then work with them in a humane way. Consider them as individuals.

100-2-48-N

# Transactions

## 35TH NATIONAL SAFETY CONGRESS



VOLUME XII

INDUSTRIAL NURSING SECTION

NATIONAL SAFETY COUNCIL, INC.  
20 NO. WACKER DRIVE • CHICAGO 9, ILL.

## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

**THE NATIONAL SAFETY COUNCIL**  
20 North Wacker Drive  
Chicago 2, Ill.

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## MONDAY AFTERNOON SESSION

October 6, 1947

Presiding: HAZEL H. LEEDKE, R.N., Thilmann Pulp and Paper Company

## Introductory Remarks

HAZEL H. LEEDKE, R.N.

Thilmann Pulp &amp; Paper Company

When we stop to think that accidents took the lives of 99,000 individuals last year and injured some 10,000,000, we cannot approach this Congress in other than a serious mood and a firm desire to do our part in the coming year to spread the gospel of safety in the plant, in the home and on the highway.

This week more than 10,000 safety minded men and women will attend this Congress. If each one of the 10,000 would make it his or her first duty on returning home to win just one convert to safety and exact a promise from each convert to secure another, the reduction of accidents would be inevitable. As nurses you are in an enviable position in that you have access to contacts with industrial workers and their families and you are also in a civic position to carry considerable influence. Do not shed your responsibility when you leave the plant but participate wherever possible in community, county and state groups where safety is the keynote.

It is with deep regret that I announce to you the loss of a staunch and faithful friend of industrial nurses and this Section. Mr. Walter Paine, long a crusader for safety, passed away March 2, 1947. Miss Joanna Johnson and Miss Jane S. Weir have prepared a tribute to Mr. Paine which I shall

read at this time so that it may be included in the transactions of this Section as a public recognition of our respect for Mr. Paine.

## A Tribute to Walter S. Paine

The Executive Board of the National Safety Council has shown a great interest in the Industrial Nursing Section. The members of the Board of Directors have also shown a great interest in this section. Among the members of the Executive Board was a very dear friend of the Council, Walter S. Paine, who was Chairman of the Council's Executive Board from 1945 until 1947. On March 2, 1947, Mr. Paine passed away after a brief illness. The Executive Board of the Industrial Nursing Section wishes to pay special tribute to Mr. Walter S. Paine for his keen interest in the development of a section for the nurses and his great desire to see the section develop into a valuable service for the nurse members of the Council. In the words of our president, Mr. Ned Desbora, "In the death of Walter Paine, the National Safety Council and the Safety Movement generally have suffered a tragic loss. He gave unstintingly of his time and talents to the cause of accident prevention and at all times he showed a crusader's zeal for the welfare of his fellow men."

## Value of Various Sections of the National Safety Council to the Industrial Nurse

By JOANNA M. JOHNSON, R.N.

Supervisor, Industrial Nursing Division, Employers Mutuals of Wisconsin

So that we may know how the various sections of the National Safety Council can be of value to industrial nurses, let us briefly review the manner in which the nursing section came into being. The National Organ-

ization for Public Health Nursing organized an industrial nurse's section in the year of 1920, and that section was first represented at the National Safety Congress in the year of 1929. At each succeeding Congress, the

industrial nurses' meetings became more active, with an ever-growing attendance and increasing interest on the part of industrial nurses and lay persons. This finally resulted in the establishment of the Industrial Nursing Section within the council in 1944. The growth and popularity which this section has since attained is due in no small part to the effort and support given by the National Safety Council, members of its staff, the untiring work of the committee members, and the interest on the part of industrial nurses throughout the country.

Today increasing importance is being given the subject of health and safety in industry, both by employer and employee, who look for leadership to those in responsible positions. Here the nurse assumes importance as a key person in the program of human relations. The success of the health and safety program in a given plant is in direct proportion to the extent to which the program of human relationship has been developed.

Through the Council's Industrial Nursing Section it is possible for nurses in industry to mobilize and motivate their efforts toward a common preventive program.

As we depend upon our professional nursing organizations for counsel and leadership, we depend upon the National Safety Council to keep us informed regarding the latest accident information. We depend upon them for specialized information from the section in which we may be directly concerned. As an example, the Machine Shop Section can give us pertinent information on the control of eye injuries arising from certain operations, as well as methods of protection. The Chemical Section has a vast amount of information regarding the use of toxic solvents and hazardous chemicals and the necessary precautions to be taken. While the nurse in general is not responsible for the safety program, she is continuously on guard in observing symptoms which the employee may reveal. She interprets these symptoms in terms of the exposure involved in the performance of his job.

Should you be engaged in an industrial nursing position in a textile plant, the Textile Section is ready to extend its helping hand in giving unlimited material gathered from a practical and energetic membership. The objective of each and every section is based on the desire to exchange ideas on accident prevention within its specialized

field. With that in mind, posters, news letters, safety contests and various other activities form a part of these individualized services. Publications of these sections have passed the scrutiny of experts. The contents of the publications are based upon up-to-date factual information compiled and gathered from experienced members employed in a particular industry and as such, they serve as an invaluable guide to the nurse and to others within the plant.

The Industrial Nursing Section, while still in its infancy, has successfully published a News Letter, which reaches more than 1,500 members, including those of fourteen foreign countries. This one activity helps to foster good world relationship with our sister nurses and provides a basis for an exchange of ideas profitable to all of us.

The very fact that the National Safety Council has recognized industrial nursing by establishing this section gives to each individual nurse the feeling that she is part of a movement which is not only world wide, but at the same time is as close to home as the safety of its individual members. Membership in this great safety movement also gives to management the appreciation of the nurse's worth to the plant in which she serves, and increases his respect not only for the nurse within his own organization, but for nurses in general.

Off-the-job accidents are the cause of the greater percentage of our absenteeism. Home accidents alone cost the lives of 34,000 persons in 1946. Automobile accidents killed or injured 1,200,000 persons last year.

As nurses we have a keen interest in the homes of our workers. Good safety habits at work do extend outside the plant. They are carried into the home, on the highway and into our recreational activities as well. We need only to contact the Safety Council to obtain up-to-the-minute and detailed information as to how to conduct a home safety campaign among the employees. Bulletins, films, surveys and descriptive literature are available. Both employer and employee will appreciate any effort which will keep the wage earner free from injury.

The Employee Publication Section deserves special mention as from it one can gather unlimited information as to how to proceed in setting up a plant publication. In addition colorful and interesting literature is available. Films are available on all pertinent



subjects. They, of themselves, constitute one of the most direct methods of keeping the employer and employee interested.

There are various ways in which we may obtain the services offered. Most of us obtain these through our company membership. When this is not possible, there is available at reasonable cost individual membership to anyone interested in safety, whether or not connected with an organization which may be a council member. This enables all who are interested to affiliate themselves with and keep in touch with the safety movement.

The Food Section is well represented by leaders in the field of food production. There

is much to be done in industry to teach the value of a well-balanced diet. This section can well provide us with suggestions and ideas stimulating a desire to improve the food habits of the worker. Colorful posters, films, and a variety of data as to food values may be gained from this section as well as a knowledge of the hazards and corrective measures to be taken in the production of foods.

In this work we are our brother's keeper. None of us is safe until all put our desires into action so as to accomplish the utmost in protection and prevention. The life you save may be your own.

### The Value of a Health Service in Industry (A Symposium)

**Discussion Leader—M. E. INGOLDSBY, R.N., Industrial Nursing Consultant, West Virginia Dept. of Health**

#### a—Management

L. C. SMITH, Dir., Industrial Relations Dept., Thimms Pulp & Paper Co.

#### b—Nurse

Mrs. JOAN M. TIMKE, R.N., Supervising Nurse, Bell & Howell Co.

#### c—Safety Engineer

JOSEPH SEXTON, JR., Dir. of Safety Services, O'Rourke & Co.

#### d—Physician

DR. JEAN S. FELTON, Supt., Health Dept., Monsanto Chemical Co.

#### e—Attorney

FRANK R. PEREGRINE, Attorney-at-Law

**CHAIRMAN INGOLDSBY:** It is an honor and a privilege to participate in this symposium today.

While Industrial Nursing is one of the youngest sections of the Council, you can see by the attendance and by the great number of questions which have been submitted, that much interest has been created.

The first question has to do with the use of health histories.

Q. If there is no physical examination given in the plant and the nurses efforts to establish one have temporarily failed, is it advisable

able for her to interview new employees for the purpose of obtaining a health history to be used as an aid in health counseling?

**DR. FELTON:** The medical history is a very important document from which industrial nurses can get considerable valuable information. It makes no difference what form this takes, whether it is a written questionnaire form employed as part of the pre-placement physical examination, or if it is merely a series of questions asked by the nurse. By familiarizing herself with the past medical history of the employee, the nurse can offer sound advice, from a preventive medicine point of view, so that the same illnesses or injuries that appeared in the past will not recur. Not only is it advisable for her to do this but it is mandatory in a good industrial nursing service that she be familiar with the health history of the employee. The method of securing this history can be left to her own device but the procedure itself should be followed.

**CHAIRMAN INGOLDSBY:** What progress is being made in the use of chest x-ray examinations of industrial employees, either as pre-placement, periodic check-ups, or in the course of an industrial tuberculosis survey?

**DR. FELTON:** The use of chest films in industry is becoming more and more important, particularly with the development and use of new toxic materials. Many large industries today accomplish a chest film rou-

tinely as part of the pre-placement physical examination and repeat that film periodically, during the period of employment of the individual. It is important, from a medico-legal point of view, that the company know the condition of the chest of the employee when he hires in so that in later periods, in the event of law suits, specific information is at hand to challenge any claims of occupationally incurred chest illness. The United States Public Health Service has surveyed many industries where x-ray facilities are not available and, in view of the fact that the average findings of tuberculosis in such surveys have revealed 2.0 to 2.5 per cent of the employees showing tuberculosis, the industrial nurse should make every effort to have the chest film incorporated as part of the periodic check-up of all employees under her jurisdiction. She should exert her efforts in this direction whether the plant has x-ray facilities of its own, the consultation services of a private radiologist, or if survey facilities are available through the State health department or the United States Public Health Service.

**CHAIRMAN INGOLDSBY:** What does management look for in hiring a nurse?

**MR. L. C. SMITH (Industrial Relations Dept., Thimms Pulp & Paper Co., Kaukauna, Wisconsin):** First of all an industrial nurse must be technically qualified through education and training. That's very important and I am sure you have all been grounded in these phases of your work many times.

Good judgment. Keeps things to herself. One thing I would state again that applies to any classification—and personally, I have always felt that dependability is one of the most important factors in anybody's qualifications—if you can depend on them doing what they are supposed to, when they are supposed to do it. They should be accurate and all of those things that go along with that. Furthermore, it's very important, I feel, that a nurse present a very neat appearance.

She doesn't have to be beautiful. Of course, it helps to be good looking. I will grant you that, any time. (Laughter) But it is more important to present a clean and neat appearance. She should look as though she is careful about her own appearance, about the work she does, and careful about the plant she works in. Of course, you wouldn't know all this in hiring a nurse, but you can tell something about her personal appearance.

Those are some of the things that are important when trying to select a nurse.

We feel that we were fortunate in selecting the nurse we have. She has been with us for eight or nine years. She is, as you know, Mrs. Leetka. She embodies the things I mentioned, and those of you who don't know her very well, I suggest you get better acquainted with her.

**CHAIRMAN INGOLDSBY:** Thank you, Mr. Smith.

This is one for Mrs. Timke.

From your experience, to whom in the plant do you feel the industrial charge nurse should be administratively responsible?

We all know that we work under the doctor's orders, but who in the plant should she be responsible to?

**MRS. JOAN M. TIMKE R.N. (Supervising Nurse, Bell & Howell Co., Chicago):** Well, I personally have worked under this system, and I feel that it is the best, and I know there is going to be quite a bit of controversy over it.

I am really a little afraid to say what I think; that is, that the charge nurse should be responsible directly to a close representative of management or management, particularly the industrial regulations director.

In this way you have closer contact with top management and many times you can get things put through that way while if you are responsible to some one of lesser capacity, you can't get what you want because it never reaches top management. They don't hear about it, and it stops there.

I do know there are many other ways that are used in different plants. Sometimes in a lot of plants, the nurses are directly responsible to the medical director, and he in turn is responsible to either the plant manager or a general manager or maybe the president himself. But if you do not have a medical director or a full-time doctor who takes that responsibility, it's better if you do have a direct cooperation or have a direct line to top management.

**CHAIRMAN INGOLDSBY:** Thank you, Mrs. Timke.

Would you like to say anything on that question too, since you represent management?

**MR. SMITH:** I don't think so.

**CHAIRMAN INGOLDSBY:** Well, Mr. Peregrine, we want to call you back again. We have a nice one here for you.



Many of us in the food industry have been confronted with the problem of employing substandard employees because ours is a variable employment. Some of these prospective employees have physical defects. In the case of an injury are we not penalized because we accept these applicants knowing they were handicapped. When I say penalized here, I say, where an injury would have been perhaps a no lost time, but because the worker has varicose veins a slight bruise or bump developed into a case of long duration, with expensive hospitalization, further complicated by a diabetic condition. How can we avoid such compensation problems?

Now, that's a good one to tackle.

MR. FRANK R. PEREGRINE (Attorney-at-Law, Chicago): I can't help but remark that, not apropos of this question—but the thought that came to me was that Mr. Smith was giving a description of some one that would be the president of the company, I think, when he told everything they looked for in employing an industrial nurse.

She is supposed to be able to get any one to do anything with a smile and in these difficulties of industrial strain and industrial relations, that would be very valuable.

I think the industrial nurses are overworked and underpaid from my personal observation. [Applause] Now on this question that has just been asked.

This is really the \$64 question.

I spoke at a symposium at Rockford a couple of years ago in which one of the plant physicians who was present asked another one, to what extent his concern had lowered the pre-employment standards. He answered, "We feel 'em and if they are warm, we put 'em to work."

Now, the answer to the first part of the question, as to whether or not you are penalized by hiring people with diseases, lesions and infirmities—the answer is "yes," and the answer to the last part, how can we avoid such compensation problems—is that you can't avoid them except by not hiring those people.

Early in the history of the compensation laws the Supreme Courts of practically all of the states delivered opinions similar to that of the Supreme Court of Illinois which was to the effect that the law draws no distinction between the strong and the weak; the wise and the foolish; the healthy and the infirmed. All who are employees come within its protection.

The question is not what effect an injury would have had on a person more robust than the employee who sustained it. The question is always, what effect did the injury have upon the particular employee who did strain the walls of his pre-existing diseases, lesions, and infirmities.

Again I could draw on my own experience in giving you actual instances of claims costs which were out of line with the injury sustained and brought about by pre-existing conditions which could have been detected on pre-employment examinations.

On the other hand, you can't run American industry with physically perfect specimens and employees. There just aren't enough of them, and you do have to employ people who have things the matter with them, but who are still able to make a contribution to industry.

The only way in which an employer can be placed in the position of not taking on a substantial increased claims hazard in hiring such individuals directly is by legislation. The courts have long since burned their bridges behind them. The law is going to continue to be construed and applied as I outlined at the beginning of these remarks.

Legislation could be enacted, but, of course, such amendments to the compensation acts of the various states as would afford some relief in its nature such that it would have the effect of denying compensation or reducing compensation. Such amendments have in my experience uniformly been successfully opposed by the representatives of organized labor. Unless the representatives of labor and the representatives of employers can get together and formulate some amendment which will relieve the situation, it will continue to be as it now is. In the present situation, he who has varicose veins, perhaps certain types of heart trouble, perhaps chest films that aren't what the doctor would like to have, high blood pressure, diabetes, and what-not, can readily find employment due to the scarcity of labor. However, when things get to the point where several are waiting at the gate for each job that is to be filled, such individuals do have a tough time of it, and usually wind up in the employ of those who do not have pre-employment examinations.

Several years ago at one of the sessions of the National Safety Congress at the Sherman Hotel, I suggested, and I still adhere to that

suggestion, that it would be very easy to formulate a table from the statistics that the insurance companies have available—a table which would show the increased liability of a man not in perfect health.

I think 50 cents a week or less would cover such a case. I think it would be a very small sum. Amounts could be determined for each of the major conditions that are thought to militate against employment because of the added claim hazard.

I personally would be in favor of the formulation of such a table and the employment of these individuals at slight reductions from the normal wage scale.

This, it seems to me, would be a happy solution to this whole problem of pre-existing physical defects which do present additional liability and additional claim hazard, but which are not of a nature to be covered by any special provisions of the sundry workmen's compensation laws.

We do have in most of the states, some provision relative to second injuries where a member has been employed before the accident for which a compensation has been claimed.

We have one provision in Illinois that affords relief where there has been a prior loss of use in certain circumstances, but the main stream of these cases such as the cases of diabetes, varicose veins and certain types of heart trouble, high blood pressure, hypertension and what-not, are not taken care of in this or any other state.

That is the answer to that question.

I would like to make a comment, if I may, along the line of Dr. Felton's comments on chest films; that is, that while they are doubtless of great value in determining whether or not to employ, and if so, where to place of an employee, they should not be destroyed after they have served that purpose.

I had a case the other day wherein the employer had destroyed all films more than three years old. I think they should be preserved. I think they are very valuable, and I think they should be carefully compared with the periodical chest films that are taken later on.

I think each periodical chest film that's taken should be carefully compared with the last prior ones. An effort should also be made to have them taken by the same technician, with the subject in the same position.

On the basis of my experience with thou-

sands of litigated cases over the last twenty-five years and the actual trial of them, I have come to the conclusion that all of the medical records on an employee are very important and ought to be preserved.

A blood pressure of 160 may have an altogether different significance if it were 160 five years ago, than it would have if it were 100 five years ago. I believe all periodical examinations should be carefully checked with the previous ones that are available.

DR. JEAN S. FELTON (Superintendent, Health Department, Monsanto Chemical Company, Oak Ridge, Tennessee): I think we have a possible solution—at least it has been working with our plant.

We would like to recommend that you familiarize yourselves with the Office of Vocational Rehabilitation in the area where you are working.

This office is maintained 50 per cent through federal funds and half through state appropriations. When you have an individual who is held down in a specific job status or cannot secure employment because of a physical defect, the Office of Vocational Rehabilitation will finance and back his medical, surgical or psychiatric correction.

As a very startling example, we had a man apply for a job with us.

He had osteomyelitis of the radius for thirteen years. We could not employ him where radiation hazards were present.

He was turned over to the Office of Vocational Rehabilitation. He was sent to a competent orthopedist. It was corrected and the man returned to us in three weeks. They put him to work, and he is a valuable employee.

A man with varicose veins could be handled in a comparable manner. In other words, we don't reject these people permanently. We refer them for care through rehabilitation.

CHAIRMAN INGOLDSBY: Should the employee sign the accident report made by the physician or nurse?

MR. FRANK R. PEREGRINE: Well, of course, as a lawyer, I favor the employee signing the accident report.

I am in favor of anything that tends to fix the facts in the case. I believe that we all agree that there should never be any effort on the part of the industrial nurse or the industrial doctor or the industrial claim entity or the lawyer to in any manner misrepresent any aspect of any case or attempt to

make any records that do not speak the truth. Our main difficulty is to establish some degree of identity between the case that is passed upon by the nurse and doctor and perhaps the company lawyer, and the case that is passed upon in the litigated hearing wherein the stories have changed after it has been found that some other story than the original one would be highly desirable.

I think that anything that tends to fix the facts in a case while the facts are still fresh is good and tends to further the ends of justice. For that reason, where one is sure that what is in the accident report does truly represent what the injured employee or the claiming employee says happened, I see no objection to asking him to sign the report and I would recommend it.

**CHAIRMAN INGOLDSBY:** Thank you, Mr. Ferguson.

Mr. Sesto, have I done for you.  
For small plants where there is not much opportunity for home departmental safety contests, what can be done to stimulate interest? Could such a contest be developed by some other method? How can the nurse help?

**MR. JOSEPH SESTO, JR.** (Director of Safety Services, O'Rourke & Company, Insurance, Fort Wayne, Indiana): The safety program is the most difficult thing to sell that I have ever encountered.

It's easy to sell pictures. It's relatively easy to sell insurance which is an intangible, but when you come to accident prevention, you have got to use everything that's available to influence the worker towards living a safe life and working safely while at work.

Contests are difficult frequently in small plants. You have so little to compare. Oftentimes top management is also a functional administrator in other capacities. So the responsibility of doing this falls to the nurse, and there is no safety department or safety director or safety engineer.

In these contests you might use such things as posters, employee messages, etc. We used to try to write home-spun employee messages that were right to the point as it pertained to the employees in certain plants.

Pay roll insert messages were used, but we found that they are the weakest of all influencing media. Slide films, and motion pictures were also used. There is one insurance company that uses slide films exclusively. However, they can be coordinated with other media of influence.

We printed a calendar each month that had the same message as the slide film of the month. The supervisors and members of the committee group were sent a bulletin that synchronized with the film and calendar. After showing the films to the workers, we gave each of them a little folder that had some of the pictures from the slide film and also a digest of the lesson that was taught that month.

We also have seen very effective results in making a survey of the plant to find talent. It's amazing what talent will do. If you could find a cartoonist, a nurse or a woman who has a flair for it and feed them the ideas and bring your accident prevention messages to them as it pertains to their own plant, nothing would be much more effective. These people take personal pride in the opportunity of displaying their talent and the workers are very responsive because it's one of them that does the job.

We use such people in character as Mr. & Mrs. Mr. Scribble Safety Service, or Safety Zone Star. Another important thing is first aid, for creating and maintaining interest, and I wish that I could actually show you the results of having a first aid program in a plant.

They showed over a period of several years that as the increase of first aiders, these talking first aid, as that increased, frequency diminished. As the first aid program diminishes, the frequency and severity increased, and it was relatively the same where it was just relative to participation all the way through.

Now in the first aid program, in some small plants the nurse can actually be an instructor. She can be a key person from that point of influence.

I dare say that you are in the counterpart of a machine with many gadgets, and we think in turn that you can do the job.

There are many things we have seen that must be done. You can't do any one thing over a long period of time. You have to keep changing your pace, change the color of paper, change the type of your bulletins, devise another character to put on your cartoons, but carry a certain theme so that it does a job such as the I.S.M.T. Keep relating it to a theme—the conservation of losses, the prevention of waste, mistakes and spoilage, going down the line and picking up a theme, which is catchy, in your own plant.

Use that theme, but change your gamuts a little bit so you keep the people interested. I think you can go on for a long time about how you can create and maintain interest, but in essence, it's just a change of pace and keeping the color moving and keeping all the gamuts, etc., at work.

**CHAIRMAN INGOLDSBY:** Thank you, Mr. Sesto.

All right, the next question is to Dr. Felton.

**Dr. Felton,** what are some of the reasons for a practical program of industrial psychiatry and mental hygiene?

**DR. FELTON:** This question is one that is very close to me because I feel that both nurses and physicians are relatively untrained for understanding of the problems of psychosomatic medicine in industry. When you realize there are 1,000 psychiatrists in the United States, and relatively few working in industry, one can realize completely that the problems of the maladjustments in the working man are certainly not being cared for. Those of us who are not psychiatrists have to take upon us certain of the problems that we ordinarily would refer to a psychiatrist. In other words, every one of us has to be physician or nurse, must understand the various things that motivate behavior in the individual employee.

We cannot stress this too strongly because it is not the cuts, the diarrheas, that come into the dispensary that are the important cases. They are transients. They will be well in a few days and they will not recur, but the important cases from the point of view of lost time, of impaired job performance, of impaired industrial relations and of a bad family or community situation are those that are based on emotional disturbances.

We would like every nurse to be as cogent as possible in her appraisal of a set of symptoms when they are presented to you, so that when a man comes in and has a pain in the chest and everything is negative, you don't continue to feed him phony artificial for weeks and weeks and mark him down as a neurotic.

The case should be investigated as to what is causing that pain in the chest from an emotional point of view. Those of you who are in plants where they have staff physicians try to bring these cases to the attention of the physician and don't have the patients come in time and time again with a gastro-intestinal pain or the same pain in the chest

when these things actually are based on a disturbance in the emotional makeup of a patient.

At our particular plant—we mention it because we are familiar with it—we try to study these people in a detailed manner. We use for every new employee as part of the pre-employment—and I would like to stress pre-employment and not pre-employment examination—a questionnaire prepared by the New York Hospital in Cornell Medical School, wherein we get answers that tell us how the person reacts to his environment. I have referred to it before.

Is he nervous? There are many, many questions that come up from which you can understand how the person is pitched emotionally. Is he considered nervous? Do loud noises make him jump? Was he a bed wetter between the ages of ten and fourteen? Is he usually sad and quiet at a party?

Are your enemies trying to do things to annoy you?

They are specific questions that are charged so that you can detect a person who has nervous tendencies or the tendencies of a psychopathic personality.

We have got to find out who these people are in our plant. That is one way in which we find out these people who present problems.

Secondly, we will have the individual himself come into the department and state that he wants help.

In one week, two months ago, two men came in to see me, each with a complaint of suicidal tendencies. I will admit that one of them had a complaint of what do you do for falling hair, but he came to the wrong man. [Laughter]

These complaints are studied and the cases gone into in great detail. We came up with two schizophrenics. These are the people that present long standing, protracted difficulties.

Therefore, we beg of you to learn to recognize what the symptoms are that are presented, to determine whether they are psychogenic in origin, so that psychological or psychiatric guidance can be instituted in either the form of counseling on the part of the medical directors or staff physicians or in the form of help through communicating agencies, the function of which you should know.

You should know what the function is of the family service bureau, and what the



services of the social service agency in your community are, because they can undertake the solution of problems involving marital relations, financial difficulties and any one of the many things that cause distress on the job and impaired job performance. The little things you can take care of, but you should learn to recognize the potential long-standing absentee, and when you have learned to counsel the employee, you come up with some amazing things.

You find difficulties in the home. You find sexual maladjustments. You find a man has too many people to support, and is constantly faced with financial worries. You find that things aren't going on the farm as they should. He isn't going to have so many head of hogs this year.

Sometimes we have veterans who are reliving certain of their combat experiences. We have one boy who consistently gets a pain in his neck. It goes down his arm, and we know it dates back to the time he was in the service. He had another man substituted for him on a reconnaissance flight and that man was killed, and he was reliving the injuries that the man sustained.

There are many diverse reasons for behavior, for maladjustments in industry. Anything you can do to get yourselves pitched psychologically to understand these, we beg of you to do it because you have got to carry the guidance and the counselling roll that is simply too much for the very few psychiatrists who are coming into only the large industries. If you undertook any advanced work, we would recommend it in that direction because this is a most important field in industry.

**CHAIRMAN INGOLDSBY:** Thank you, Dr. Felton. That was extremely interesting. Considering variations in industrial medical programs, what is the average load limit for an industrial nurse? How many nurses are required to handle a pay roll of about 2,500 with 500 office employees?

**Why do they set off office employees?**

**MRS. TIMKE:** I don't understand that. I don't know why they set them off to the side. There are very many variations of opinion on the number of nurses that are necessary to handle—I mean the ratio to the number of employees.

In a lot of industrial plants, you will find 75 to 100 employees and they will have one industrial nurse.

Then again, you will find some plants in which they will have up to 200, with only a part-time nursing service.

It has been advised and is one of the recommendations, that for every 300 employees there should be one nurse, for 600 employees, two nurses employed, and three nurses up to 1,000, one more nurse for each additional thousand employees.

On this question I believe it was asked how many nurses would you employ for 5,000 employees. At that rate it would be around five nurses.

They also asked the question that 500 are office workers. Personally, you need just as many nurses, in fact, I am not so sure but what you need more when you have office workers. They seem to—I don't know whether it has something to do with the fact they are not on a bonus. They are on the office pay roll and they get so much a week regardless of whether they put out a full day's work or don't. I have found they make many more trips to the medical department than the factory workers.

The factory worker knows that his bonus is going to be cut down. He knows he loses money. He is worried about the financial end of it, while the office workers get the same. So, if you have a plant where you have a large percentage of office workers, I would say you might have to have even more nurses.

**CHAIRMAN INGOLDSBY:** I agree with you on that, Mrs. Timke. I have had that experience with both.

Should a nurse take the stand as a witness in a compensation hearing? If so, what effect will her statements have on the attitude of the workers toward management? In many cases she is really the individual who represents the worker to management and to whom he usually goes with his troubles. Example as follows: An employee confided in the nurse that he had a venereal disease. The nurse and records, which included a positive serological test, were subpoenaed regarding an injury to said employee. Upon being questioned by attorneys, was the nurse compelled to divulge this confidential conversation?

**MR. PEREGRINE:** The answer is that in the absence of a special statute of a state—we have no such statute in Illinois rendering privileged communications between patient and the nurse—the nurse must testify if subpoenaed.

## Industrial Nursing Section

In common law there was no such privilege appertaining to communications between either a patient and a physician and surgeon or a patient and a nurse.

It's only where states have enacted special statutes rendering those communications privileged that they are so. They are not in Illinois.

Now, I do not see any reason why at request of the employer who desires to establish truth and fact or in response to a subpoena of the employer or a request of the employee, I see no reason why a nurse should not readily come down to testify if there is anything that she knows or has learned that is competent evidence that will shed light on the question in controversy.

In the particular case she is citing in the question, the individual apparently had a venereal disease. Apparently in some proceeding in which he was seeking to obtain money from some one he desired that fact concealed. I fail to see where there is any great equity in his favor. And again in that connection, I want to stress the necessity for getting your histories correct.

You are going to have to testify to them here and there—and you never know at the time you take them which ones will be the trouble makers later. As to the result from the standpoint of industrial relations, and from the standpoint of what the employee or employees think of the nurse, in the event she is called down to testify and does testify, that is not a question for a lawyer basically. I think perhaps the danger of an adverse influence on the relations with employees is overstressed in the minds of the questioner. If the nurse is truthful and fair as a witness, I see no reason why the employees in the plant should feel resentful toward her for having been called down and asked questions to which she was sworn to tell the truth and for having answered them.

I think that it is highly desirable—wherever the situation is such that it can be accomplished—that the nurse be not the one who requests an employee to sign an accident report or any other thing that may later be used against him.

I think that wherever possible, those things should be taken care of by some one else.

If there is insurance and questioning has determined that the case is questionable, the insurance claim department should be notified. The nurse's duty would go that far or

if there is self-carriage and there is some individual in the concern whose duty it is to take care of claims, I believe the nurse should pass the matter along to him rather than to act as an evidence preserver along lines perhaps not strictly professional.

I didn't say ethical. I said the matter of preserving evidence that is not purely medical in its character is not basically that of the industrial nurse.

It should be passed along to the proper individuals, because I do think it's highly important that the men and women in any plant think highly of the industrial nurse and of the plant dispensary and I think that the nurse can accomplish a great deal along those lines.

As to testimony, however, I feel that I can just answer that question in the affirmative, that not only does she have the right, but that it's her duty to testify truthfully and fairly concerning any matter that the rules of evidence permit the counsel to ask her about.

**CHAIRMAN INGOLDSBY:** Thank you, Mr. Peregrine.

**Dr. Felton,** do you have anything to say on that question?

**DR. FELTON:** Only to the extent that I think here is another situation where really it tests the loyalty of the nurse as it would the physician since she is both the representative of management and the worker. In other words, she is to protect the worker and at the same time be looking out for management.

I think here is another situation where it is difficult to straddle the fence, but the good individual will come through.

**CHAIRMAN INGOLDSBY:** Thank you.

**MR. SESTO:** I should like to point out that the claims department of the insurance companies get an opportunity to get in as soon as possible to make a thorough investigation.

These men are trained to take statements on injuries and can do you a good service along that line to get the facts.

I think that it's imperative that they be given the privilege to get in as soon as possible to do a thorough investigation.

**CHAIRMAN INGOLDSBY:** To what extent does a nurse have a valid objection to keeping records of minor first aid cases in a plant of 800 employees of both sexes where

she is the only nurse employed? The industry is a whiskey distillery—not a particularly hazardous industry.

MRS. TIMKE: We as nurses, to begin with, were always taught we had to keep records. We kept them from the day we first entered nursing and we have run into considerable difficulty. A nurse in the above situation would have so much to do that she wouldn't know which way to turn. The difficulty is that she might consider an injury minor, and it might be minor at that time, but how does she know what is going to become of it in a few months? And she doesn't know what that employee is going to claim a few months from now.

There have been such things as just a bruise on the leg and it showed just as a bruise, but a few months later the employee comes up with an osseous of the bone and the nurse by superficial examinations cannot determine that. You have no proof and you know that most of us can't remember that far back if we have that many employees. If you do make a record of it, you protect your company as well as yourself and the employee.

CHAIRMAN INGOLDSBY: I would like to sell a physical examination program to management. What arguments would be especially helpful in my endeavor?

Who wants to take that on first?

MR. SMITH: Well, it seems to me that the first argument the nurse could use would be the definite advantage, financially, in assuring management that they were aware of the physical condition of any new employee as was mentioned here before. It's very important that any company know the physical condition of an employee when he is hired so that in case something develops at a future date, something positive and definite is in the records to indicate whether or not the present condition has anything to do with the nature of his employment. I think that most companies in these days, are ready to listen to the advantages because many times one bad case can pay for all of the medical examinations for a period of five years. It doesn't seem to me that in these days it's too hard to sell management on a pre-employment examination. I know some places, especially the smaller firms, look at it as something unnecessary. They have gotten along without it for the last twenty-five years, and they don't know why they can't continue in

the future. However, that's the place the nurse has to hammer on as the definite financial advantage along with all these other things that do accrue to a company having physical examinations.

CHAIRMAN INGOLDSBY: Do you want to add anything to that, Dr. Felton?

DR. FELTON: I would go along with Mr. Smith completely. Apart from protection of the company, you are doing the individual a service so that you end up with a better employee in the long run. In other words, you are trying to estimate the physical capacities of that individual, and if he is placed in a job that he can handle physically, he will be with the company longer. He will have fewer accidents, and he will cut down labor turnover, if you are sure that you are hiring the right individual at that time. In other words, physical examinations allow a good program of selective placement, and you end up with better employer and employee relations and a longer term employee.

CHAIRMAN INGOLDSBY: Thank you. How long should injury or first aid cards be kept in the medical department? Is there a time limit before they are destroyed?

MR. PEREGRINE: My answer to that is to keep them as long as management will let you and will provide storage space for them.

So many cases year after year make one year for medical data on the same employee of a few years before. In so many cases we want to know what his blood pressure was fifteen years ago and what he was complaining of a few years ago, in order to piece the picture together of what's the matter with him and whether or not it's due to the thing that he claims it's due to.

I, for my part—I am in favor of keeping the information just as long as it's practically possible to keep it.

CHAIRMAN INGOLDSBY: Thank you, Mr. Peregrine.

In a plant employing approximately 1,000 people, is there any rule or law that gives permission to employ a person who is not an R.N., who had only a Red Cross First Aid Course?

MR. PEREGRINE: Well, from a strictly legal standpoint, probably, there is no law violated by having any layman do this or that under the immediate supervision of a full licensed physician and surgeon. From a strictly legal proposition, assuming he finds some one on the street with a broken leg, he

can have a lay person help him with the splinting of it, and that is true of various other things, but it would seem to me that any one who is not a registered nurse should be extremely careful in how far he or she goes.

I know of no law in Illinois that would be breached by having such people perform very rudimentary acts under the direct supervision of a physician and surgeon.

I think it should be frowned upon, however.

CHAIRMAN INGOLDSBY: Thank you.

What does an industrial hygiene survey include? Who should do it? Should a nurse working alone urge having one done? If the State Industrial Hygiene Division comes in does the plant expose itself to legal pressure to correct conditions?

I would like to say a few words on that since I come from the industrial hygiene division, and I think the nurse working alone in the plant would do a good job for herself and for management if she would have them ask that a survey be made. They don't have to pay for it, and in making the survey they point out hazards that could be corrected. We haven't found any management yet that, when told of these hazards, didn't want to correct them immediately.

DR. FELTON: I think the nurses' functions in so far as they are related to occupational hazards carry her to the point of trying to know the location and type of all vocational hazards in the plant. Admittedly, she cannot do anything about many of them. She cannot design local exhaust ventilation, but she should know where hazardous materials are being employed and should make an effort to go so far as to learn what is in the commercial preparations that are used in the plant that do not carry the ingredients on the label. When she is aware of occupational hazards, know there are hazards in the plant, she then should recommend to management that industrial hygiene surveys be accomplished and that can be handled either by the state facilities, or by the company itself, if equipped with industrial hygiene laboratory facilities to do it. It doesn't make any difference who carries out the survey if it's done by competent industrial hygienist. The survey constitutes an isolation of hazards, a measuring of the hazards quantitatively, in other words, through air sampling. And thirdly, it recommends for the institution the

corrective measures, ordinarily, local exhaust ventilation.

CHAIRMAN INGOLDSBY: Thank you, Dr. Felton.

This is just a pre-employment physical examination. The union stands for them against routine examinations. What can a nurse do to overcome this attitude?

MR. PEREGRINE: The industrial relations department and the representatives of the union should try to come to some agreement as to the value of it. If such an agreement couldn't be reached, I don't know what the nurse could do.

DR. FELTON: There is a point we might add here.

We grew up in an area where labor unions are strong—the Pacific Coast. This particular problem came up in dealing with the Longshoremen's Union when an effort was made to sell them upon a chest and serological survey. Through the very competent efforts of the health educator from the San Francisco Department of Health these men agreed to have a chest film taken and also a test made for syphilis. If they can be sold—the Longshoremen—I feel that any union group can be convinced of the merits of a preplacement physical examination but it must be approached intelligently and not emotionally and the advantages of a selective placement system pointed out to them.

It must be stressed that it is not a screening procedure. We are trying to place the individual where his physical capacities will match the demands of the job, and you are not trying to throw out people through the preplacement physical examination.

CHAIRMAN INGOLDSBY: Thank you, Dr. Felton.

If a nurse obtaining employment in a plant, where previous first aid services have been rendered by a first aid worker or another nurse, finds there are not any standing orders and the doctor is a "Not-on-Call" physician, what should she do to obtain written standing orders so that she will not be violating the Nurse Practice Act?

DR. FELTON: It would be incumbent upon her to scream as loudly as she can to management that she needs the protection of standing orders. The standing orders should be obtained from the doctor, irrespective of how much time he puts in.

MR. PEREGRINE: She should impress

upon management that the company needs the protection of standing orders too. There are many difficulties in cases that come up where a case goes bad and where it's found that no one but a nurse has seen the individual through a long series of calls. I think for the protection of any business house, they should have standing orders, by a duly licensed physician and surgeon. It should be covered because the business house that employs the nurse is subject to legal liability. Perhaps in certain cases the nurse might go too far and not be covered by standing orders.

**CHAIRMAN INGOLDSBY:** How should a nurse obtain management's permission to attend conferences?

**MR. SMITH:** I think the nurse should approach management with as many facts and figures as she can as to the benefits she can derive and her department can derive from

attendance at these various conventions. She must be able to sell the idea to her immediate supervisor in order to see that that's provided. I think that applies not only to the nurse, but to any other department of any concern these days. We all know that certain definite advantages come from our association with people that we meet at these places as well as from the prepared programs that we have. I think that there again she has to do a selling job in order to see that she gets to go to important places.

I think we all find there are so many things of vital interest to us that we would like to take in a great number of them. If the nurse uses judgment as to how far she travels, how often she goes, and uses good judgment in picking the things most important and doesn't overdo it, I can't conceive of modern management not permitting her to go to places she thinks she ought to go.

## TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: HAZEL H. LEEDKE, R.N., Thilmany Pulp and Paper Company

### Venereal Disease Control in Industry

By HERMAN M. SOLOWAY, M.D.

Venereal Disease Consultant, Division of Industrial Hygiene,  
Illinois State Dept. of Public Health

The health of the American worker is receiving new and well deserved emphasis in the United States. Less than 10 years ago industrial health was the recognized concern of health departments in only 17 states, whereas today more than 40 states are engaged specifically in the development of programs to render health services to industry. The worker and the employer are demanding these services as they become more conscious of the relation of health to earning capacity and to production.

An industrial health program should make provision for:

1. Communicable Disease Control, such as, Venereal Disease Control, Tuberculosis
2. Occupational Disease Control, Dermatitis
- Disorders due to chemical and physical

3. Non-Occupational Illness
  4. Environmental Control
  5. Dental Program
  6. Medical and Nursing Services
  7. Health Education
  8. Rehabilitation
  9. Handicapped workers
- A venereal disease control program, whether it is carried out on a national, state or local level, or in an individual industry, should be conducted on well known public health principles, designed for the detection and prevention of communicable diseases.

The objectives of a venereal disease control program are:

1. To diagnose as early as possible every case of syphilis and gonorrhea. (Case-finding)
2. To institute competent medical care as soon as a diagnosis is made. (Treatment provision)
3. To keep infectious cases under medical care until they are no longer a menace

to society or to themselves. (Case-holding)

4. To prevent new infections by medical, educational and legal measures. (Prevention)

The importance of "group blood testing" can be best shown by the number of positive blood tests reported by special surveys, such as the premarital, prenatal and industrial blood tests.

### Results of Premarital, Prenatal and Industrial Blood Tests (Downstate Illinois)

| TIME INTERVAL  | Industrial |          |      |  | Premarital |          |      |  | Prenatal |          |      |  |
|----------------|------------|----------|------|--|------------|----------|------|--|----------|----------|------|--|
|                | Number     | Positive | %    |  | Number     | Positive | %    |  | Number   | Positive | %    |  |
| Jan.-Dec. 1944 | 54,658     | 4,865    | 8.91 |  | 62,977     | 1,794    | 2.86 |  | 64,221   | 946      | 1.47 |  |
| Jan.-Dec. 1945 | 43,058     | 2,599    | 6.03 |  | 77,891     | 1,565    | 2.16 |  | 68,384   | 644      | 1.05 |  |
| Jan.-Dec. 1946 | 54,167     | 1,536    | 2.83 |  | 153,887    | 2,395    | 1.79 |  | 96,533   | 1,012    | 1.05 |  |
| Jan.-June 1947 | 28,244     | 478      | 1.69 |  | 61,145     | 1,006    | 1.64 |  | 47,335   | 465      | 0.98 |  |

Mass blood testing surveys for syphilis still remain the most effective method of case finding for all stages of syphilis. However, active contact tracing of early infectious cases of syphilis and gonorrhea will bring to light

many new infectious cases. An epidemiological investigation of such cases should be undertaken by the plant nurses, or, if none are available, should be referred to the local health authorities.

### Objectives of the Venereal Disease Control Phase of an Industrial Health Program

#### Employer

- (1) To enhance the productivity of labor by increasing the efficiency of worker.
- (2) To lessen work interruptions and labor turnover.
- (3) To prolong the active productive life of the worker.
- (4) To minimize personnel problems which arise from having suspected or known cases of syphilis or gonorrhea in the plant.

#### Employee

- (1) To improve the worker's physical condition and thereby prolong the individual's earning capacity.
- (2) To reduce loss of time through illness or injury.
- (3) To adjust the individual's work in accordance with personal physical capabilities, with profit both to employee and employer, and without risk to the individual, the fellow workers, or the public.
- (4) To assure the worker of receiving ap-

propriate treatment for syphilis or gonorrhea for as long as necessary.

#### Industrial, Medical and Public Health Agencies

- (1) To develop, as a part of an effective and continuous general health education program of the communities and the schools and the industries, a useful venereal disease education program in industry.
- (2) To prevent venereal infections.
- (3) To assist in the discovery and diagnosis of all existing cases of venereal disease in industry.
- (4) To see that all venereal disease cases found receive suitable medical treatment.
- (5) To see that all persons who have been in close personal contact with infectious venereal disease cases are given the benefit of medical observation, and of treatment if necessary.
- (6) To prevent the various disabling com-

plications of the late stages of the venereal disease.

- (7) To assist in the establishment of policies for the employment of applicants and for the continuation of the services of employees who have a venereal disease.

A venereal disease control program in industry should be part of a community wide campaign against venereal disease, and the whole plant and community undertaking should be an integral part of a broad continuous program of general health education. However, if no community wide program is in effect, then steps may well be taken by any interested group to get the help of the local health department and other agencies to develop one, so that the total health program of the community and the industry will ultimately be established. An industrial health program need not be delayed for such community action but may serve to stimulate and even initiate it.

The assistance and guidance of the local health department or the district office of the Illinois Department of Public Health may be had in arranging details of the program in industry. In each large industry in which a venereal disease control program is to be established, a joint labor-management committee will be of tremendous value in working out the details of procedure as well as establishing the policies to be employed.

Some of the functions of this committee would be to determine procedure of medical referral, to set up rules as to the confidential nature of medical findings, to establish the policy in handling recalcitrant cases as well as occupational readjustments, and other pertinent decisions and recommendations.

In large industries, the full-time medical personnel will be able to carry out all the functions of the program, whereas small industries may need to rely more heavily on the health department.

It is absolutely essential that a venereal disease control program in industry should, like all other phases of the industrial health program, be preceded and accompanied by a continuing educational program.

No attempt will be made to outline the specific steps, procedures or methods by which a well-rounded health education program for industry and the whole community may be developed. But guidance and co-operation in working out the details on a

custom-built basis may be had by labor-management and citizens' committees from the full-time official local public health agency.

The people of each community, and the employees in each industry, should be given a satisfactory general understanding of the nature of the leading venereal diseases, of the ways in which they are spread, and of the ways in which they may be prevented or cured. Both employees and employers should come to realize that not all cases of venereal disease are infectious, and that under suitable treatment infected persons may be employed safely and profitably.

Plant-wide and community-wide understanding and support of the health project can best be developed through appropriate committee organization and committee action, with the help of public health officials. The committees may well prepare, or obtain from the local health department, such educational materials as they wish to use. Educational motion picture films, in 16 mm sound version, are available through the local health department, as are educational leaflets, pamphlets, posters, and so on. In addition to such materials, the local health department can arrange for the provision of speakers and of consultant service in the planning and development of the industrial and community-wide program of continuous health education.

It is essential that all information pertaining to employees with positive blood tests be kept ABSOLUTELY CONFIDENTIAL between the person involved, the plant physician or plant nurse and the family physician. All such individuals may be designated by code or key number. The value of a single blood test is questionable. A physical examination and an accurate history of the suspected patient are very important. An effort should be made to determine any past history of infection or of earlier anti-syphilitic treatment. It is well to bear in mind that false positive serological reactions may be found in malaria, leprosy, yaws, tuberculosis, infectious mononucleosis, upper respiratory infections, and certain vaccinations and inoculations. Under no circumstances should treatment be started until an accurate diagnosis of syphilis has been made. Blood testing should be included as part of preplacement physical examinations, periodic physical examinations, general health surveys and serv-

ice available on request of employee.

The employability of a person with a positive blood test which has been definitely diagnosed as syphilis will depend upon the type of infection one finds. In the early cases of syphilis the same consideration should be given him as any other person with a medical condition responsive to specific treatment. In the early infectious cases such as primary or secondary syphilis or acute gonorrhea employment should not be interrupted since the advent of sulfonamides and penicillin renders these cases non-infectious and even cures them in a very short time by the intensive therapy method. However, in cases of late syphilis with complications such as cerebral, spinal, cardiac, or optic manifestations the chances for cure are greatly reduced. Such cases should be given individualized study. Only after a thorough and complete physical examination and an evaluation of the job requirements, should the employability of a person with late syphilis be determined. Provision should be made, whenever possible, for occupational readjustments of employees who develop disabling manifestations that do not incapacitate them for performing some type of useful work.

An employee or applicant whose initial blood test is positive should be called into the plant's medical office for consultation with the plant physician or plant nurse and should be informed as follows:

1. That his first blood test revealed a positive reaction indicating that he may have syphilis.
2. That there is some possibility of its being a "false positive."
3. That he is being referred to his family physician or clinic for a complete medical examination, including repeated blood tests to determine the presence or absence of syphilis.

That having syphilis need not interfere with his employment as long as he receives treatment and does not have some disabling manifestations which would entail a risk to himself or his fellow workers.

When the diagnosis of syphilis is established, the employer should be further advised:

1. To begin treatment immediately.
2. To bring a note from the family physician, stating that treatment has been started.
3. To bring a report from the family physician or clinic each month thereafter, showing that continuous treatment is being rendered.
4. To bring a statement from the physician or clinic, upon completion of the treatment, to the effect that the treatment has been completed.
5. To rest assured that all information regarding the infection will be kept confidential.

If an employee fails to take or to continue to take the recommended treatments, he should be reported to the labor management committee which will recommend final action to be taken.

A representative of the municipal, county or district health department will investigate all named sources and contacts of early infectious cases of syphilis and gonorrhea and attempt to see that they are examined, and that those found to be infected are placed under competent medical care.

### Tropical Medicine

By CARROLL LAFLEUR BIRCH, M.D.

Associate Professor of Medicine  
Department of Medicine, Univ. of Illinois

Theoretically the tropics is bounded by the two great parallels of latitude, the Tropic of Cancer and the Tropic of Capricorn. Actually the definition is by temperature and the tropics is bordered by two irregular lines, the north and south 68° F isotherms.

Tropical medicine includes all diseases en-

countered in the tropics. Some of these conditions are shared with the temperate zones, while others are limited exclusively to tropical regions. Some conditions that are mild and rare in the temperate zone may be severe and common in the tropics, while others which occur frequently and in severe form

in colder regions may be benign and exceptional in a hot moist climate. On the whole, the infections, bacterial and parasitic, occur in greatly increased intensity in the tropics, while the degenerative diseases are less severe and more infrequent.

In some rural, tropical regions sanitation, hygiene and preventive medicine are not well developed. Poverty is great; diets are poor; food is low in caloric and vitamin content. The climate is both the cause and the effect of these conditions.

In the temperate zone climatic fluctuations are great. These act as physiological stimuli, and life progresses on a high energy plane which increases combustion. The level of vitality depends upon tissue combustion. In the temperate zone the loss of body heat is optional and all measurable physiological indices are high. The blood pressure is higher; the pulse rate more rapid; the basal metabolism is elevated; vital capacity is greater; growth is more rapid; appetite is increased; and resistance to infection is greater than in the tropics. All of this is advantageous to the temperate zone dwellers. On the other hand, greater combustion increases the demand for oxygen. This augments the work load on the circulation. In these regions of greater metabolic stress and strain the degenerative and metabolic diseases occur frequently and in more severe form. These conditions include heart disease, vascular diseases, diabetes, pernicious anemia, hyperthyroidism, cancer, leukemia, and Addison's disease. These diseases occur chiefly in the older age groups after years of exposure to a stimulating climatic environment.

Conversely, in a hot moist environment heat loss is difficult. When these trying conditions are prolonged combustion is reduced. This in turn decreases the demand for oxygen and lessens the work load on the circulation. All physiological indices are diminished; growth is slowed; resistance to infection lowered. Metabolic stress and strain are less; degenerative and metabolic diseases are few and pursue mild courses. The hot monotonous climate makes man listless. The same factors which decrease man's activities increase the powers of multiplication of bacteria, parasites, and arthropod vectors of disease. Deaths in the tropics are caused largely by infection. Infections occur chiefly in the young.

In the United States, most rapid growth

and earliest maturity occur at the latitude of northern Mississippi. The highest conception rates are reached when the mean monthly temperature is 65° F. Fertility is decreased in the depleting summer heat, over 70° F, and in the exhausting winter cold.

From the viewpoint of health and longevity, it is wise to be born in the temperate zone in order to avoid the infections of the tropics, but to spend the later years of life in the tropics in order to avoid the metabolic and degenerative diseases of the temperate zone.

The tropics provides a sick man's environment. Malaria is an inevitable part of this life. Cavities and painful teeth are universal. Syphilis and gonorrhea are frequent. Surgery presents serious hazards because of infection. Life expectancy is shorter and death rates are high. Sanitary standards are lower. Water contaminated with typhoid and dysentery constitutes a great danger. An who thinks himself well may harbor malaria, syphilis, filariasis, and several intestinal worms. Tuberculosis, typhoid, or dysentery may cause his death. The children commonly have the bulging bellies of malaria and the nodes and abscesses of yaws, while worms add a physical and nutritional burden. Infantile paralysis, smallpox, diphtheria, measles, pneumonia, and influenza are serious problems.

In the tropics, air, soil, food, and water are sources of disease. Arthropod vectors fly in the air; hookworms and strongyloids lurk in the soil; the water carries flukes, leeches, typhoid, and dysentery; while the uncooked food may contain harmful bacterial or protozoa. Poverty, low civilization, poor sanitation, deficient personal hygiene, and dietary imbalance all add to the problems of the tropics.

The teaching of tropical and parasitic diseases has been neglected in the United States. Since no part of this vast country touches the tropics and since this is not a colonizing nation, the demand for knowledge of these subjects has not been great. Twice previously the United States encountered tropical disease during war. Disease and war have always gone hand-in-hand. In fact, disease has killed far more soldiers than has gunfire. Even if the disease does not kill, sick men cannot be conquerors. In early wars smallpox, typhoid, typhus, and plague decimated the armies. In the Mexican War (1846 to 1848) 1,549 soldiers lost their lives in combat while 10,991 died

of disease, chiefly yellow fever, malaria, and typhoid. The soldiers feared yellow fever more than the gunfire of the Mexicans.

The Spanish-American War (1898) really introduced the United States to problems of the tropics. Yellow fever proved a more potent enemy than Spain. There were seven deaths due to disease for every soldier who was killed in battle.

World War I was fought largely in the temperate zone. In World War II our armed forces defended the Western Hemisphere and fought in the tropics of the world. During this war the entire nation, professional and lay, showed deep anxiety about the diseases of the whole world, even the most remote tropical islands of the South Pacific.

Mass movement of people from one part of the world to another spreads disease. Non-immune persons entering endemic areas of disease are susceptible. The passage of the causative agent of disease through a non-immune body increases its virulence. This may cause an epidemic in a region where a balance had previously been established between the virulence of the organism and the resistance of the population. Not only armies but ships and planes may carry disease by transporting infected insects, rats, or other animals, as well as travelers.

The war is over and our armed forces have returned from all over the world. Many of them contracted malaria, filariasis, schistosomiasis, and amebiasis as well as a variety of intestinal worms. Most of these men were cured before being discharged from the services, but some still harbor these diseases. The danger of the spread of tropical diseases in this country has been avoided but still there are many veterans suffering from chronic tropical diseases.

Disease may be spread by the civilian population as well as the military. With the increase in the speed of travel, an isolated place of any disease might occur in any

place at any time. No point in the world is further removed from any other point than 72 hours by air travel. This is less than the incubation period of almost all infections.

The opening of the Pan-American Highway will shortly expose tourists to all the diseases of Central and South America.

If people are to have the cultural advantages of free, easy, and quick communications with the world, they also may be exposed to all kinds of diseases. If people are to be world-wide travelers, physicians must be trained in international medicine with a knowledge of the diseases of the world.

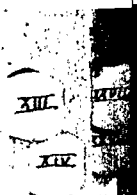
Besides the viral, bacterial, protozoal and helminthic diseases, the tropics is characterized by frequent fungal infection and nutritional diseases. There are many medically important animals of the tropics as well as poisonous plants. Heat stroke, heat exhaustion and heat cramps also are important.

So far our discussion has covered largely the disadvantages of the tropics. Much can be said in favor of the tropics.

Perpetual summer with abundance of sunshine is pleasing to many persons. Light, loose, washable clothing is comfortable. As there are few climatic changes there is little physiologic adjustment.

In the tropics degenerative diseases are few. Pernicious anemia is rare and mild, leukemia almost unknown. Diabetes and toxic goiter are seen seldom. Rheumatic and arteriosclerotic cardiac deaths are few. Carcinoma is less common and grows more slowly. Addison's disease, myasthenia gravis and neurocirculatory asthenia are infrequent.

The tropics has unlimited potentialities. Abundant fertility and great undeveloped resources give promise of a bright future for tropical lands. When infectious diseases are conquered the tropics probably will become the site of the most advanced civilization the world has ever seen.



## THURSDAY AFTERNOON SESSION

October 9, 1947

Presiding: HAZEL H. LEEDKE, R.N., *Thibaulty Pulp and Paper Company***Mental Hygiene Aspects of an Industrial Health Program**By **RUDOLPH G. NOVICK, M.D.**Medical Director, *Illinois Society of Mental Hygiene*

The change from agrarian to an industrial economy and from the guild system to mass production has necessitated vast adjustments of this nation's population. The need for the material and physical aspects of such adjustments became apparent almost immediately and the necessary steps to meet these needs were begun early and continue to the present day. These have resulted, for example, in the shifts of population, the growth of urban centers, the organization of labor unions and the development of corporations. The necessary psychological adjustments were, on the other hand, not so apparent and hence little or no attention has been paid them until relatively recent times. Lydia Giberson, in a war-time survey of industrial psychiatry, portrays the industrial worker's problems as follows:

"Due to complete absorption with the physical and mechanical problems incident to its mushroom growth, industry has tended to neglect the individual's hunger for personal significance and dignity. The industrial worker is faced with this paradox: outside the factory gate he is a fully rounded being, who is expected to like children, vote intelligently, understand our nation's foreign policy, and make every great problem his own; inside the factory gate he is too often expected to employ only a fraction of himself, to become an impersonal unit, hard and selfless, working through his best years with another man's tools on a product which will not bear his name and whose functions he rarely comprehends, looking forward to the pay envelope with which he, too, can buy what he wants in a market where 'labor is just another commodity.' This economical and engineering conception of a worker as a modified handle to a machine dies hard; only the statistical proof of a greater efficiency and greater savings because of a more human industrial attitude has become effective in eradicating it."

This statistical proof has been provided. That a more human industrial attitude will make for greater efficiency of workers and greater savings for industry is proved by the accumulated collection of research data from studies undertaken during depression, boom years, national defense and wartime economy. As a result we find that modern progress in management is attempting to recognize the human equation in business.

W. H. Woodrigger, Research Analyst for the Pan American Refining Corporation points out that:

"Within the usual organization structure there are three staff departments or divisions which have as their main purpose the maintenance of personnel; the medical, safety, and personnel staffs. The introduction of medical services in larger plants brought about better selection and placement; it also fostered a sense of security in the workers and encouraged more attention to working conditions. When safety programs were instituted, fuller appreciation of the human causes of accidents and of conditions which affect accident rates, came. Emotional conditions and factors in the life of the worker not directly connected with the work, were recognized as causes. Personnel departments provided better records, better placement, and investigation of labor turnover."

Although industrialists have for some time recognized the value of physical examinations and certain laboratory tests, it is only within comparatively recent times that they have shown an awareness of the importance of emotional and psychological factors in industrial adjustment.

One may wonder why industry should concern itself with emotional and psychological disorders. Are they prevalent enough to cause concern? How do they affect industry? It has been stated that approximately 40 per cent of the general practitioner's patients fall within this group. Selective Service figures, fur-

thermore, indicate that approximately 90 per cent of all medical rejections and 90-95 per cent of all discharges were on a neuro-psychiatric basis. Lydia Giberson estimates that at any one time in any large organization there will probably be 20-25 per cent of the workers who are unable to bear efficiently the stresses of industrial work. It is therefore apparent that industry has its proportional share of men and women who are susceptible to emotional upsets or are actually suffering from psychiatric disorders.

As to the question of the effect of emotional disorders on industry, I need only call to your attention that psychological factors may play an important role in or be responsible for:

1. Inefficient activity—which involves not only the worker affected but may spread in concentric circles to involve other employees about him.
2. Complaints of fatigue.
3. Increase in accident rate—accident proneness may be a neurotic manifestation.
4. Chronic hypochondriacal complaints—such complaints may be purely functional in nature, there being no organic lesion, infection or toxic condition; or more usually, there may be some organic basis for the complaints, but rarely of such severity as to account for the numerous complaints.
5. Increase in hospitalization rate, sick leaves and compensation claims.
6. Increase in absenteeism.
7. Increase in alcoholism.
8. Frequent job changes.
9. Unpleasantness between employees or between employees and employers.

The psychological disorders among industrial employees do not differ from those generally observed among the population in general. As is to be expected, there are among the employees, just as in any other large group of people, all degrees of mental handicaps or psychiatric problems. These fall into four major categories: (1) organic neuro-psychoses, and (2) psychoses, (3) psychoneuroses, and (4) maladjustment problems.

The psychotic, with his complete distaste for reality, as a rule, will present industry with no difficulty. The ill-neurotic is readily apparent. The individual's difficulties of adjustment are obvious and hence such an employee is promptly disposed of in one way or another.

Of greater importance to industry are the

two remaining groups, the psychoneuroses and maladjustment problems. Their greater importance stems from the fact that they are more numerous and their condition may go on unrecognized as symptoms of psychological disorders.

We will have a much better insight into the problems of emotional difficulties if we keep in mind the fact that these emotional disturbances are the product of personality and environment. It is well to remember that any individual, regardless of age, race, sex, educational or economic status will develop emotional disturbances if the environmental stresses are severe enough and applied over a sufficient period of time.

The war taught us much about human beings under stress. These war lessons are valuable for the understanding of the psychology and psychopathology of people under the stresses of ordinary civilian life which differ from the military stresses in quantity but not in quality.

When a man comes to work in the morning he is not merely a worker. His total personality comes to the job. He is a husband; perhaps a father. His health and activities outside the factory definitely affect his work. These may account for absenteeism, inattention on the job, accident rate and poor production.

In addition to disturbances in his outside life, the worker is affected by in-plant disturbances. Burleigh R. Gardiner, of the Committee on Human Relations in Industry at the University of Chicago has said that:

"As we watch the processes of adjustment within industry, we see that each individual brings to his job a pattern of attitudes and expectations—he has hopes and ambition, he is seeking certain satisfactions. All too often he finds that these expectations cannot be realized, he must change his goals and adjust to what satisfactions can be provided. And in many cases we find that the work situation creates excessive tensions and disturbances. We see individuals in agonies of frustration, we see the growth of feelings of persecution and the development of obsessive thinking, we see extreme apprehension of authority, and the growth of suspicion and antagonism throughout the organization. And, in many cases, we see these disturbances as a direct result of failures on the part of management to understand what the organization is doing to the people in it."



To correct this we can "apply ourselves to understanding the way the work situation can affect the adjustment of the individual, and management can take the lead in building the kind of organization within which people can make satisfactory adjustment."

To do this we must have some knowledge of human behavior and personality development and some understanding of the manner in which individuals cope with environmental stresses and strains. Time does not permit a long discussion of personality development or the defense mechanisms. A few words and some illustrative examples must suffice.

Our experience affirms the fact that the most important factor in the mental health of an adult is the patterns that were set during the first 10 years of his life. Thus, for example, an over-protective environment, an unwillingness or inability on the part of the mother to put the child "on his own" early and completely enough, and the fostering of dependent attitudes may result in emotional immaturity in an adult individual. Physically these people are mature, intellectually they may be below average, average, or even above average; emotionally, however, they are still children.

Although many people may fall into this or other groups to be discussed, it does not mean that industry need eliminate the majority of workers. It is a problem of proper placement, training, supervision, and all the other factors which make for good morale. Luther E. Woodward points out that:

"People who have mild conditions—the man who is anxious and worried and can't concentrate well, the person who is compulsive and has to do things in a certain way, the veteran who comes back highly sensitized to noise, or to specific noises—can be fitted into industry in exercising the same care as is taken in the placement of the physically handicapped. For instance, the man whose chief problem on his job is a feeling of tension and restlessness obviously should not be placed at a job where he has to stand or sit still for seven or eight hours a day."

As further evidence of the importance of placement we may consider the relationship of intelligence to satisfactory work. Dr. Matthew Brody, consulting neuropsychiatrist, Sperry Gyroscope Company says:

"It is as much a mistake to place too bright an individual as too dull a one on a job. The

bright one may become bored, careless and indifferent. The excessively dull may seek any of the compromises and escapes known to psychiatry to preserve his ego rather than acknowledge his inability to do the work."

"We had one veteran, a parachutist discharged for a back injury, whose mental age was nine. We recognized this and thought we had a relatively simple job for him in the packing department. Within a few days we were told that his conduct was bizarre. Upon investigation we discovered that what we had considered a simple job involved packing 25 different items in 15 different packages and the operation of a stitching machine. It was far beyond his capability. Our error here was based upon a faulty evaluation of the intellectual demands of that job."

Dr. Woodward indicated how such an individual may prove an asset to an organization:

"One of these men recently came out of the army, discharged under Section Eight. For the reason he had proven to be so dull the army couldn't teach him the things they thought he ought to know. He was a big, strapping fellow weighing over 200 pounds, with great physical strength, of which he was very proud. The steel firm where he had sought employment had a policy of referring questionable men to a community clinic for a psychological and psychiatric evaluation. The psychiatrist recommended he be assigned to a job that is simple, but which calls for great strength. Placed on a stone crusher, he handled such large pieces of stone and fed the machine so fast that after a few days he operated the machine himself, doing the work that three men had done previously. He found great satisfaction in being the sole operator of this huge crusher. Although he had an IQ in the 60's he probably was as happy as some who have IQ's of 160."

Another type of problem may be described. Dr. Eric Clarke, psychiatrist in the medical service at Oak Ridge, pointed out that "Many workers knew that they were dealing with unknown toxic material . . . (and) the constant watchfulness and checking did lay the ground for anxiety and subsequent acute panic states in the more unstable." Less dramatic but equally important are the problems presented by workers in civilian plants where toxic materials are used. Dr. Theodore Frank, Medical Director of the Pan-American Refining Corporation, points out that:

"The employee who thinks he has been exposed to an industrial hazard, toxin let us say, goes home feeling well but suffers an attack of coughing and pain in the chest. He decides, on his own, that exposure caused the attack. The physician hears his story and, knowing the amount of the exposure and the toxic effects of the substance in question, advises the patient that there is no connection between the two. The patient then becomes furious at the doctor (whether he is connected with the company or not) and scolds and swears so violently that the physician concludes that there is more than meets the eye. By a process of careful and friendly questioning in such a case it is often possible to discover that the patient is really worried about something quite unrelated, a domestic situation, a son in the army, an unresolved personality conflict, and, because his attempts to solve his problem have been unsuccessful, he develops a feeling of frustration. Frustration soon becomes irritating, and the emotional storm thus brewing is temporarily relieved by a blow-up. If it is possible to lay blame on some other person or agent, in this case, the company, the ego is better served, and the patient feels better, for the moment, because he has relieved his feelings, a sort of emotional catharsis. However, cure is not obtained in this way. The techniques of mental hygiene teach us to investigate such a situation and discover, if possible, the truth of the whole matter and then explain it in the entirety to the patient. If his emotional storm has passed, this will suffice in many cases. If it does not, the best recourse is to take it up

through a more thorough process of investigation and re-education and readjustment which is best done in an institute of mental hygiene by a psychiatrist or physician who specializes in psychological therapy."

Another example of industrial stress which may lead to emotional disorder may be classified as "promotion depression" which develops when an individual is placed in a position which requires more ability and responsibility than he has or is able to assume."

These are a few examples. Everyone here could add many more to this list—more useful ones, perhaps, because they occur more frequently. Those I have selected were chosen because they illustrate certain principles.

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### Fatigue States—Their Effect on Individuals and Industry

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I must confess at the outset that I have no actual observation on what goes on in industry per se, other than what I am told by my patients who seek my advice. I am, therefore, going to discuss the problem of fatigue from their statements and from their laboratory and clinical evidence. My interpretations are based on these observations and must be projected as they affect industry.

It must be emphasized that no one can separate the individual from his work. We are not dealing with robots but with people whose body and mind are part and parcel of their daily contribution to industry. No one wants to admit that he or she is not capable of performing his daily tasks. His very existence is interdependent on his ability to perform his daily work. The compensation he

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receives helps to produce the security that all of us seek as our goal. The attainment of this goal is vitally necessary for a stable emotional system.

Many factors enter into instability. All of us know that early childhood patterns may transcend into adult life to plague us later on. We portray these childhood patterns in many ways—not as a child but as organ language which represents our early difficulties which at that time were expressed by those patterns. The resulting pathological physiology accounts for these symptom complexes. This altered function has its origin and derives its impulses from the repressed or suppressed emotional system of the patient.

If a patient has not the security which he should enjoy, he will develop patterns in his body the same as a child who cries out for love, protection and food. Furthermore, no other vital function plays such an important part in the emotional household of the individual from early life as does eating. The relief from physical discomfort that the infant experiences while eating and the satisfaction from hunger becomes deeply ingrained in the child, being associated with a feeling of well-being and security. This oral-receptive manifestation in early infancy is a natural emotional state of the child. In later life it must be repressed because it is not harmonious with independent adult life. The repressed oral trends may produce a disturbed function leading to changes in the physiologic equilibrium. The recognition of this physiologic imbalance affords the physician an opportunity to explore the symptom complex of the patient and develop adequate and rational therapy. We can, therefore, understand how so many individuals in industry may have disturbed emotional households because of these repressed trends which are incompatible with adult life.

The worker who flies off the handle at the least provocation tries to justify his importance in a manner which is similar to the temper tantrums of a child. The individual who cannot compete with his fellow worker develops various escape mechanisms which, in turn, alter body physiology. Very few wish to admit their inability to do a certain job which they are expected to accomplish. Therefore, they rationalize their difficulties, not in failure, but in symptoms which become a means of self-justification.

Thus we find individuals who complain of

fatigue-fatigue which may not be related to effort expended but which is associated with and due to the lack of rest and enthusiasm to do their jobs. These individuals tend to avoid tasks which require the utilization of body energy. This fatigue is a "sit down" strike of the body. All of us will admit that when we have a loss of rest and enthusiasm, when we are bored or when we face a task that is beyond our ability to accomplish, we feel tired.

The worker who complains of fatigue is similar to the soldier who develops "battle fatigue" when facing danger. It is common knowledge that, with the soldier, an emotional disturbance in many instances rather than sheer exhaustion from continued loss of sleep produced this fatigue. It is important for you and me to inquire into the mechanisms of these fatigue states and see if we cannot come up with the proper answer.

The worker who, after a presumed good eight hours of rest, awakens tired, feels lousy, frequently complains of headaches, finds that his agility is somewhat hampered. He says to himself, "I wish I didn't have to go to work today—if I could only throw that alarm clock out of the window!" He frequently fails to set his alarm clock the night before. If no alarm clock awakens him, he rationalizes by saying, "It was not my fault—the clock didn't wake me up." When he wakes up, he stretches, it is difficult for him to get started and then fear enters his body and he makes a "bee-line" for his morning bathing and off he hurries to work without sufficient food. Maybe he jumps out when he gets to the bench for that extra cup of coffee, giving him enough caffeine to stimulate him. Or he goes out very early for a smoke—a drag or two on a cigarette, the inhalation of which pours some sugar into the blood. Temporarily he feels a little better but then can't wait until the noon bell rings. It is well known that the secondary effect of smoking is a lowering of blood sugar which is much more prolonged than the initial response which raised it. He eats a hurried lunch, sometimes very little at all; and if it is a woman, she grabs a sandwich, runs off to do some shopping, runs back to her job to punch the time clock and is back at work in an agitated state. He works unceasingly under strain—not with the aim of a stable person but with all the turmoil of one trying to overcome some impelling force which is telling him to "sit down, make it

easy, you're tired." He has not enough energy and reserve—he is calling on unnatural forces to face which to him is a stupendous task. A stable, non-fatigued, well nourished individual could accomplish this task with the ease and precision that is associated with an orderly, well conditioned team.

Thus, we find ourselves dealing with a problem which is, I should judge from experience with my patients, a very commonplace, every-day happening. Let us inquire into what is going on in the body under these circumstances.

I am going to limit my discussion to disturbances of sugar metabolism and see if we cannot find a logical explanation. I will attempt to explain these deviations from normal from clinical experimentation and on the basis of these observations, evaluate the underlying mechanisms which may produce fatigue. Finally, I will discuss what suggestions one might give to overcome these fatigue states.

I think you remember from your studies in physiology that you were told that the body has only enough sugar in reserve in the liver for twelve hours. The sugar, carbohydrate or other foods which you ingest is brought to the liver from the gastrointestinal tract and there it is made into glycogen, is stored and again broken down into simple sugar or glucose. This leaves the liver, enters the systemic circulation and with insulin is deposited in the body tissue, mainly the muscles.

This insulin is formed in the islet cells of the pancreas and normally circulates in the blood stream. The sugar which leaves the liver can and does stimulate increased insulin formation. Increased production of insulin is also brought about by stimulation of the vagus nerve which innervates the pancreas. I am sure you know that the vagus nerve is the most important in gastrointestinal physiology. You also know that the vagus nerve has its origin in the brain. Therefore, insulin from the pancreas can be increased in the blood for the most part by these two sources.

It is interesting to note that some of the sugar entering the blood stream from the liver does not need insulin for its deposition in those of the specialized tissues of the body—namely, the brain, the heart and the kidneys. However, most of the sugar entering the blood from the liver is formed into glycogen in the muscles where it is broken down

into simple sugar by an enzyme system and then into carbon dioxide and water. It is only under abnormal conditions that sugar or glucose may return to the general circulation from the muscle tissue. Most of the sugar we use in the body is derived from the liver. Thus we find that we are dependent upon sugar as an important part of our daily metabolism.

It is interesting to note that the brain depends for the most part on oxygen and sugar for its metabolic needs. The phospholipid metabolism and its nourishment for the brain has not been so clearly worked out.

It is well known that when the blood sugar is below the normal level for a particular individual, the cells may take on water. This is called edema. Normal functioning of the brain cells is interdependent upon an electrolytic balance similar to the cell of a battery. It is only logical to assume that if too much water enters a brain cell, its function might be impaired because of a disturbance of this electrolytic balance. The patient with emotional disturbances has sufficient difficulty stabilizing himself—the added burden of a disturbed physiologic and electrolytic balance in the brain will only exaggerate an already altered function. Thus a vicious circle is established—a brain already not properly functioning produces increased stimulation of the islet cells of the pancreas by way of the vagus nerve, which increases insulin formation. This takes more sugar out of the blood which, in turn, deprives the brain of an adequate sugar supply. Such lowering of the blood sugar is called relative hypoglycemia, i.e., it is hypoglycemic (lowered blood sugar) for that particular individual but the same level may be normal for another individual.

The body reacts to a disturbed sugar balance by withdrawing the affected person from additional activities. These additional activities can only lead to burning up or utilizing more sugar from a blood level which is already having difficulty maintaining a proper balance. This withdrawal mechanism manifests itself in the symptoms of fatigue. Each of us at some time or other is fatigued—from hard work or from loss of sleep, but in many instances from a cause that is not apparent. This unexplainable cause is the one that is of most concern to the patient.

We measure the rate of disappearance of the sugar from the blood stream by a sugar tolerance test. If one injects  $\frac{1}{2}$  gram of

glucose per kilogram of the body weight into the vein of a patient, a normal individual will utilize his sugar in a well defined manner. If a person is fatigued, this normal curve is flattened; this can only mean that the sugar left the blood stream at a more rapid rate. My clinical observations lead me to conclude that there is an abnormal amount of insulin produced in these fatigued individuals. This presumed hyperinsulinism is the result of increased vagal stimulation reaching the islet cells of the pancreas. The main function of these cells is the formation of insulin. If, in a given patient with a so-called flat curve, we inject  $1/50$  grain of atropine sulphate before injecting the sugar into the vein and then repeat similar glucose tolerance observations, namely, taking samples of blood at the fasting level and every thirty minutes after the injection of the sugar for two hours, one finds a curve of the more normal type rather than the so-called flat curve. Therefore, when we use a paralyzing drug such as atropine sulphate, we block out the vagal stimulation to the pancreas and we are able to prevent hypersensitivity of the pancreas from stimulation. These stimuli have their origin in the brain. When I applied this therapeutic approach to a large group of patients who were fatigued from this mechanism, their fatigue completely disappeared. This was accomplished by the administration of atropine by mouth three times a day at meals and an additional dose at bedtime.

Occasionally one finds a so-called "flat intravenous glucose tolerance curve" in a patient with peptic ulcer. I was interested in seeing if, in a patient operated on for ulcer in whom a complete section of the vagus was used as an additional surgical procedure, there would be a normal sugar tolerance curve instead of the previous "flat curve." We found that by cutting the vagus nerve we accomplished the same thing for a patient as we did when we gave him atropine. I am sure you will agree that it is easier to take atropine than to submit to an operation in order to cure fatigue.

You might also be interested in the observation that these fatigued patients have headaches at times—headaches which are so intolerable that they think the "tops of their heads will come off." These headaches are frequently present on awakening and as a rule are most marked in the middle of the afternoon. Such headaches could be com-

pletely abolished by the regime which I have outlined when they are a part of this particular fatigue picture. May I parenthetically add that I think the headache of the school child in the middle of the afternoon, which is thought to be due to eye strain and in which no refractory errors are found, may be a part of this so-called deranged sugar metabolism.

It is of interest to note that these fatigue patients have frequent bowel movements (diarrhea or loose stools). Here again these gastro-intestinal symptoms could be controlled by the management outlined above.

However, I must inject a note of warning at this stage. Neither you nor I have the right to conclude that this fatigue mechanism which I have outlined is the only cause of a patient's fatigue. This diagnosis must be made by a physician after a thorough examination into all possible causes of this fatigue. Someone is going to overlook an incipient case of tuberculosis or a beginning cancer or definite infection if they make a "snap-shot" diagnosis without subjecting that particular individual to a thorough examination. There is too much superficial work going on today and the only person who is the loser is the patient. You as nurses and we as physicians have a responsibility that we must never shirk. We should face this problem of fatigue with an open mind—always giving the patient the benefit of the doubt.

Now, what does all this mean? Apparently the average patient who is fatigued not from work and not from lack of sleep and not from diseases which might cause fatigue, is fatigued because there has been a disturbance in his sugar metabolism which has its origin in the emotional centers of the brain. These individuals have a pernicious inertia; they have no zest and no enthusiasm. They do their work in a monotonous fashion. They are disinterested and they are exceedingly accident-prone.

Surveys have shown that accidents occur at a higher percentage toward the middle of the morning and toward the middle of the afternoon. In the light of our evidence, this can probably be interpreted to be associated with lower blood sugar levels. It is called the post-digestive hypoglycemia, which is more pronounced in individuals who have fatigue as a part and parcel of their emotional difficulties. If we could project these evidences as

they affect industry, we might be able to arrive at a better understanding of the factors concerned.

One's daily diet is an important factor in the treatment of fatigue. It is essential for a person to have a good wholesome breakfast. In mid-morning he should have a small feeding, such as milk and crackers. He should eat a fairly large luncheon. In mid-afternoon he should again have some additional nourishment and he should eat a good dinner. Before retiring he should have a snack of easily digestible food. Time does not permit the interpretation of the fact that these individuals should omit from sugar, in the form of sugar-candy, honey, jelly, syrup, from their daily diets temporarily. It may seem paradoxical to you that I say the patient should avoid free sugar as just enumerated, when a patient has a low blood sugar. However, for the present, experimental evidence justifies this statement. All other carbohydrates are permissible in the diet. If they are under a physician's care, atropine may be given in therapeutic doses to bolster up this regime and relieve him of fatigue.

It is important for industry to recognize that the average individual is anxious and willing to do a day's work but if he is tormented by emotional disturbances which interfere with that gainful occupation, he is more of a liability than an asset. When one has individuals who are accident-prone, it is important to inquire into their emotional systems and their dietary habits. It is the rightful duty of industry to expect a person to do eight hours' work. It is also incumbent upon industry to see that that work is in a harmonious environment and that the work is not burdensome and monotonous. It is probably better for industry to pay for the food which

they give these workers between meals than to allow the individuals to have their rest periods only to smoke.

I would be willing to prophesy that the efficiency of the worker in the last two or two and one-half hours of his day's job would be increased 50 to 40 per cent if he had a mid-afternoon feeding and it should be obligatory for him to partake of this food. I have no statistics at hand but I would be willing to postulate that individuals so handled could do as much in forty hours a week as they do in forty-four.

Industry must assume a very sympathetic and tolerant attitude toward their workers if they are emotionally disturbed; if they do not have the security that they need; if they are fatigued. It is incumbent upon industry to see that the employee leads a more harmonious, a more stable and a non-fatigued existence.

The worker, on the other hand, must also know and be impressed by the fact that he has a job to do. He should try to rid himself of his insatiable habits and recognize that the fatigue of which he complains may not be due to the job per se, but is associated with a great many emotional factors which have developed this so-called "sit-down" strike.

It would be profitable for industry to have individuals in their personnel departments who are particularly qualified to investigate these emotional insecurities. Preventative medicine is cheaper in the long run than curative medicine. I as a physician and you as nurses are only interested in producing a more healthful, a more stable and a more peaceful environment for those with whom we come in contact. Industry will never find the nursing and medical professions lacking or unwilling to do their job.

# *Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME XIII

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**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

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#### Ship Operators Day

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#### Prevention of Accidents Peculiar to the Operation of Tankers

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It is a little difficult to interpret the meaning of "accidents peculiar to the operation of tankers," except in the broad sense that because tankers carry petroleum products they are susceptible to more violent hazards than freighters and other floating equipment. Some petroleum products are relatively safe to transport, but most are not, and accordingly we think in terms of the dangerous products in formulating rules for prevention of accidents. That the tanker industry has enjoyed a very reasonable degree of success in its campaign to prevent accidents can be readily attested to by the fact that personnel consider service on tankers as safe as freighting.

While the nation's railroads boast of their miles of service without accidents and aviation companies boast of their hours in the air without accidents, the tanker industry can proudly point to the billions of gallons of petroleum products transported without accidents. In the oil industry accidents not only cause pain, suffering and unhappiness, but also mean lower morale of personnel, a denial of higher management insistence on good safety records, breakdowns of schedules through loss of time with consequent disruptions in other parts of the industry, monetary losses, and an insult to the industry's pride.

It is difficult to differentiate in tanker operations between material and personnel in formulating an accident prevention program, for the simple reason that accidents to material prevent a high degree of exposure to personnel and, vice versa, personnel accidents can result in serious accidents to material. However, we do differentiate, and we unconsciously find ourselves devoting the major share of our attention to prevention of accidents among personnel. In addition to the hazards that all seagoing personnel are exposed to in their daily routine, tanker

personnel must be fully aware of hazards peculiar to their trade, some of which we mention below.

Asphyxiation is probably the most serious hazard, when one considers the high volatility and attendant toxicity of most cargoes carried. As the old saying goes—"familiarity breeds contempt" and you find many tanker men indifferent to the deadly nature of the fumes and they often take chances when entering compartments and tanks. Experience figures indicate that this hazard rates among the top in fatalities to tanker personnel. Pumprooms, cofferdams and cargo spaces present the greatest amount of exposure for asphyxiation. This is particularly true of the main cargo pumproom. Leaks from cargo pump glands, pipelines and cargo valves should receive prompt attention and the bilges should be kept free of oil at all times. It is good practice to hook up the bilge pump discharge to the shore slop line while discharging cargo and while loading cargo, because many cargo pipelines and valve glands begin leaking as a result of the high cargo loading rates now employed.

A hard and fast rule should be enforced that no man, for any reason whatsoever, be permitted to enter a cargo tank, pumproom, cofferdam or any closed space until a thorough test of the space has been made. Various instruments and devices are available for the detection of gas vapors and oxygen, and even if the space to be entered is found safe, continued vigilance is required until definite assurance is obtained that a static condition exists. Spaces which have contained petroleum products, unless thoroughly cleaned and ventilated, have a nasty habit of becoming gassy again due to temperature change, dislodgment of scale, agitation of sludge, etc. Effective ventilation of the compartment to be entered is an important

factor and this applies particularly to pump-rooms, which should be equipped with suction fans drawing the gas from the lower part of the pumproom. Before anyone enters a cargo tank or cofferdam, the valves on the cargo lines should be closed and lashed unless the cargo line has been thoroughly washed.

In the event that circumstances make it imperative for a man or men to enter a space proven to be deficient in oxygen, proper protection must be used, such as fresh air hose masks, self contained oxygen or air, breathing masks. These masks should always be used under experienced supervisors who should insure that the wearer has been attached to a life line with proper harness and provided with a reliable man to watch over him. The wearer should be familiar with the use of the equipment in question and should not enter the oxygen-deficient compartment until he has tested the equipment for tightness, leaks and proper operation. An emergency unit should be available on the spot. Above all, the entire crew should be completely educated and disciplined to a regulation prohibiting the entry into closed spaces without proper authority and assistance.

Slippery and obstructed decks are common causes of injury. Again taking into account the nature of the cargoes carried, oil from leaks, spills and cargo hose handling can make a tanker deck as slick as a skating rink. Slips and falls are the inevitable result of this condition. Moreover, on the loaded leg of the voyage a tanker presents a low freeboard and the decks are usually wet with even moderate seas. In winter this means the decks are coated with a sheet of ice. This low freeboard presents a real danger to tanker-men in heavy weather when it is not unusual to take green water over a great portion of the deck and far too many unfortunate seamen have been washed overboard or severely injured when caught by one of these boarding seas. Deck obstructions are inherent in most tankers, as cargo pipelines, cargo tank vent lines, hatches, ullage pipes, cargo valves, valves and lines under flying bridge, etc., are necessary to the vessel's operation. Such obstructions present excellent tripping and falling possibilities and do in fact contribute generously to the accident frequency.

Prevention of accidents due to slippery and

obstructed decks primarily relies on good housekeeping and illumination. Oil on the decks from leaks, spills, or other causes should be immediately covered with sand, sawdust or other absorbent and cleaned up. Drip pans should be under cargo hose connections, and hoses should be blanketed to prevent oil being spilled as they are hoisted aboard or put ashore. Obstructions should be guarded, painted in sharp contrast or directly illuminated. The use of phosphorescent paints at danger points and obstructions might have considerable merit in this respect. Blind spots around the decks should be illuminated if it does not interfere with the navigation of the vessel at night. Non-skid deck paints proved of considerable value as a deterrent to slips resulting from wet decks or light films of oil. Abrasive pads at each side of water-tight doors, top and bottom of ladders and known slipping points have proved of considerable value.

In the construction of a tanker the builder should give proper consideration to the location of hatches, valves and lines, deck fittings, etc., so that a free unobstructed passage is available on each side of the ship and there is sufficient headroom for a six-footer to pass under the flying bridge without stooping. Accidents occasioned by the low freeboard can only be prevented by alert seamanship and the exercise of good judgment by officer personnel as to when and where men are on deck in foul weather, and use of the flying bridge during the hours of darkness and wet weather.

With the present fast rates of loading and discharging, gangways from ship to shore sometimes would present a problem for even an alpine climber to negotiate. When you consider men leaving an empty ship with baggage or returning crew members boarding a ship, with purchases or baggage, it is very apparent that present gangways (not to be confused with accommodation ladders which are rarely used on tankers in domestic service) can stand much improvement in design, weight and suitable connections to the ships. Gangway accidents are usually very serious, ordinarily resulting in a man drowning or sustaining severe injuries. Aluminum gangways presented an improvement over wooden ones from the weight angle but retained the same general design. I understand tests are now being made with gangways made of magnesium metal, allowing

further reduction of weight. With the depth of ships increasing, gangways must be longer to give a reasonable angle of incline to the vessel when it is in light condition at high tide. The use of abrasive pads on the gangways assists in preventing slipping. It is desirable from the tanker operators' point of view for the terminals to provide gangways, if the liability angle can be settled. The use of ladders, in lieu of gangways, increases the hazard.

Let us now consider that malady familiarly referred to in the tanker industry as *tankeritis*. Due to the quick turn around time in port, sometimes as little as ten hours, and the monotony of his voyage schedules the tankerman often develops a mechanical, unthinking, habitual method of working which impairs his natural alertness and agility. This state of mind is conducive to accidents and yet the cure for *tankeritis* is difficult and elusive. However, clean comfortable living quarters; good, well-balanced meals; provisions for recreational facilities such as radios and movies, and frequently renewed libraries have been found effective in combating the "malady." Provisions for supplying relief crews during time in port and attractive vacation plans seem to be finding favor among the operators.

It has been found that some men are allergic to oil and consequently develop a case of dermatitis when they become engaged on tankers. Such cases can be very costly and it is only fair that after receiving proper medical attention, such personnel should be advised to seek employment where they will not be exposed to oils or oil vapors.

Perhaps no type of vessel afloat in peacetime operates continuously with as many inherent material hazards as the tankship, and as pointed out previously, accidents involving the vessel itself most always contribute to the personnel severity rate. The terrific explosive power of petroleum vapors in proper concentration and the gigantic conflagration possibilities in a vessel carrying from three to six million gallons of flammable petroleum products make it unnecessary to go into detail as to why the operators direct most of their attention and efforts to establish safeguards against these ever-present hazards. Preventive measures are primarily focused upon preventing sources of ignition from contacting the vapors or cargo of the vessel, and preventing the accumula-

tion of vapors in working or living spaces aboard the ship. Any means, whereby the vapors can be diluted to below the explosive concentration, deprived of oxygen (necessary for combustion) or removed from the vessel, will be effective in preventing an explosion. It would be impossible to discuss in detail all the various measures presently in use to accomplish any of the above results, but some of the measures in common use are—

- Suction blowers or exhausters in pump-rooms and other working spaces.
  - Use of inert gas systems for cargo spaces.
  - Gas-freeing of cargo tank spaces by hot water (Butterworth System), inert gas (CO<sub>2</sub>) flue gas system.
  - Use of explosion-proof equipment and material such as non-sparking tools, removal of metallic objects from wearing apparel.
  - Strict regulations regarding smoking and open lights.
  - Use of mast vents with flame arresters.
  - Ullage pipes to replace ullage openings in tank tops.
  - Regulations governing use of deck machinery and loading of package cargoes during bulk cargo transfer operations.
  - Forbidding use of ship's wireless equipment while handling cargo.
  - Elimination of sparks from stacks—spark arrestors on diesel engines.
  - Forbidding tugboats or other powered equipment to lay alongside a vessel handling cargo or while gas-freeing tanks.
  - Proper location and marking of fire fighting equipment. Drills in use of same. Training of personnel in use of fog nozzles (courtesy of the U. S. Navy).
  - Routine inspections and correction of possible hazards by ship and shore personnel.
  - Avoidance of collision—Radar installations.
- Suction blowers or exhausters should be driven by explosion-proof motors, steam turbines or air and should have suction leads to the floorplates of the pumprooms and several leads below the floor plates if some happen to be of closed design, in order to properly evacuate the vapors which collect in the pumproom during transfer operations.
- It is common knowledge among tanker operators and personnel that a loaded tanker is comparatively safe when compared with a tanker that has discharged its cargo and is full of hydrocarbon vapors. It was for this



reason that several tanker companies adopted the use of the CO<sub>2</sub> or better known as the flue gas system, for displacing the cargo as it was pumped off the ship. The inert gases resulting from the combustion of oil and air in the ship's boilers are drawn through a scrubber (which cools and cleans the gases) by a blower which in turn discharges the inert gas into the cargo spaces as the cargo is discharged from the vessel. When the vessel is completely discharged, the CO<sub>2</sub> gas present in the cargo tanks and the insufficient supply of oxygen present render the cargo space free from explosion until the mixture in the tank becomes diluted with air sufficiently to make an explosive mixture.

Explosion-proof equipment and non-sparking material only should be used in way of cargo tanks and working spaces. This is particularly true of pumprooms where past experience indicates that pumpmen and engineers working on the cargo pumps for examination or overhaul, will unconsciously revert to the use of spark-producing tools.

The industry has found it practical and advisable in the past ten years to run their electric cables in sealed pans, troughs and conduits on the weather decks in way of the cargo tank space to avoid the possibility of breakage and to reduce the effects of exposure to salt water and weather. This precaution likewise tends to reduce the possibility of short circuits in the cables.

The use of ullage standpipes in connection with the CO<sub>2</sub> system prevents vapors from escaping from the cargo tanks to the decks during loading and discharging operations, because the pipes extend to within 18" to 24" of the bottom of the tank. This is a decided advantage over the ullage screen in the top of the hatch which permits the vapors to escape on deck during loading and particularly topping-off operations.

Much has been written and a great deal more spoken on the absolute necessity of keeping tugboats and other ships or powered equipment (cranes, fuel barges, etc.), away from alongside a ship while it is transferring cargo, and yet, despite all the warnings, you'll occasionally find someone has relaxed or ignored the violation. The results, in a few cases, have been sufficient to warrant firm action for such neglect of duty.

It is noteworthy that several tanker companies have availed themselves of the opportunity of sending their licensed personnel to

the Navy Fire Fighting school, where the men are given an intensive course in the use of fog-spray equipment and procedure. Most of all, the course tends to destroy some of the men's fears of oil fires, and on the basis that most disastrous fires start from a small beginning it is important that tanker personnel be trained and equipped to extinguish fires in their origin. Much credit is due to the U. S. Navy for its courtesy and cooperation in making this training available to tanker personnel.

Radar is finding a welcome reception in the tanker industry as an anti-collision device. It is not the hull damage, lack of stability or seaworthiness resulting from a collision that worries the tanker operator, but rather the dread of an explosion and fire if the collision point is in the cargo space. A tanker's vulnerable spot, from the stability and buoyancy angle, is the engineroom aft, so consequently the point of contact in a collision on tankers is usually directed away from that area if possible. The avoidance of collisions has been the subject of much thought on the part of tanker operators, and it is hoped radar will live up to our expectations.

In a specialized category of its own is the process of completely ridding a tanker of its explosive vapors as well as the source of these vapors, and thereby render the space or spaces safe for men to enter in the performance of hot work in the cargo tanks. Gas-freeing operations should always be under the immediate supervision of licensed personnel with an intimate knowledge of gas-freeing operations, use of gas testers, etc. The most accepted method of gas-freeing tankers consists of washing the entire space with a revolving stream of hot water under high pressure while the bottoms are kept drained by the cargo pumps. The most dangerous period in the operation exists when the cargo tank hatches are open to ventilate the tanks after the washing operations are completed. The duration of this period is reduced by the use of exhausters, windsails or blowers, and in some companies the vapors are drawn out of the tanks through the cargo lines with exhausters. Ships equipped with CO<sub>2</sub> (flue gas) systems can displace the vapors in the tanks out the main vent after washing operations by pumping flue gas into the tank through the main cargo line, with the result that when the tanks are open for ventilation no explosive condition exists.

Experience in operation has proved the necessity of proper ballasting of an empty tanker to eliminate undue stresses being set up in the hull structure and the elimination of humping periods by avoiding critical speeds in the engine. However, this problem is one which is usually solved by a competent master in conjunction with ballasting diagrams furnished by the shipbuilder. Likewise, it is very poor policy for any tanker to leave port with slack tanks, as the forces set up in such tanks by the rolling or pitching of a ship can cause undue stresses in the structural members of the tank, or affect the stability of the vessel itself.

Improvements made in the cargo handling equipment, both on shore installations and aboard ship, have necessitated a higher degree of vigilance and attention on the part of ship's officers, particularly in loading operations. The higher loading rates demand constant attention from the loading officers to prevent spills from tank overflows, and to assure adequate venting of the cargo tank spaces to prevent excessive pressures from being exerted on the shell, decks, and bulkheads of the ship. Loading and especially topping-off operations should be under the immediate control of competent and experienced deck officers, with a sufficient complement of unlicensed personnel to adequately handle the cargo valves and to execute loading officers' orders. Cargo should never be loaded at rates in excess of safe handling.

An efficient means of communication is most desirable between the dock and the ship, and the shore and ship personnel should keep each other properly informed of conditions at all times. Cargo vent lines, flame arrestors, ullage screens, pressure vacuum valves, gauges, alarms, and cargo pump relief valves should be maintained in good operating condition. Records should be kept of hours of service of cargo loading and discharge hose and periodic hydrostatic tests applied, and it goes without saying that cargo

hoses showing any local signs of weakness or deterioration should be promptly condemned for use in transferring volatile products.

Static bonding cables between ship and shore should have proper connections, be connected and disconnected in proper sequence with cargo hoses, and be maintained in good condition to perform the function for which they are designed; that is, the dissipation of static charges built up between the ship and shore. Cessation of cargo transfer operations during electrical storms is simply a matter of prudent operation.

Doors and airlocks leading to after quarters and to midship quarters from the main deck should be kept closed during cargo transfer operations to prevent accumulation of vapors in the living spaces.

In conclusion, prevention of accidents peculiar to the operation of tankers can be summarized from a practical viewpoint, in:

1. Continuous education and edification of the ship personnel on the inherent hazards of their occupation through the media of posters, pamphlets, drills and demonstrations, etc.
2. An efficient system of safety inspections by shore side safety personnel when ship is in port and formation of ships' safety committees, to create interest in safety standards and to utilize their experience in safety inspections and discussions aboard ship.
3. A planned annual safety program on a fleet basis, stressing each month hazards which experience indicates are causes of most accidents. Monthly reports and analysis on accidents to the heads of all departments for discussion with their subordinates. Recognition of ships with exceptional safety records for the year in the house organs of the company and personal letters or awards.

No better slogan could be used in tankship operation than "Eternal Vigilance is the Price of Safety."

### Prevention of Accidents and Fires on Cargo and Passenger Vessels

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During each World War, merchant vessels were built in great numbers, and some degree of standardization was necessary and was practiced. From World War I, the best example would be the Hog Island vessel, and from World War II, the Liberty and Victory vessels. Then in addition we have the C-1, C-4, C-5 types, and the well-known passenger liners such as the America, the Argentina and Brazil and many others. These types in great majority make up the passenger and cargo fleets of the United States.

Since the war Moore-McCormack Lines has been operating an average of 100 vessels, of the Liberty, Victory and C-types, and it has been my duty to study the application of the basic principles of safety engineering to such a fleet. If safety engineering, that is, the safety planning to prevent personal injuries, is to be wholly successful, then marine architects and builders must make safety an integral part of ship design, and as master mariners and marine engineers now advise and supervise in new construction, so also must the services of a safety engineer be included. Through his knowledge, and his ability to recognize potential accident locations, necessary revisions in design and construction can be made, and many serious accidents prevented before the vessel leaves the building ways.

As all know, the greatest single deterrent to safety is the "normal human being," the human element. Men have to think safety before rules and regulations for safety can be enforced. And we have found that the first step in establishing a safety program is indoctrination of the personnel for whose safety the program is planned. To accomplish this the personality, character, and even the personal appearance of the safety staff must be considered. The psychological approach is the only practical approach for basic indoctrination. Personnel indoctrination must start with friendly understanding and confidence, built up between the men and the safety staff, resulting from contact and association; and, incidentally, the men

are quick to ignore the safety man who visits the ship or the pier on clear days only. The safety man must not be satisfied with routine inspections, nor with his discussions on safety with individual officers and crew members, but he should organize, attend, and encourage safety meetings to be held aboard when the vessel is in port, wherein the men are encouraged to give their opinions and views. These meetings should not "foul-up" a man's chance of getting home after a voyage, or limit his freedom in port, but should be timed during working days, two or three meetings being held if necessary, in order that most of the men are reached, and given a chance to participate in the safety organization. These meetings should be continued at sea, at least one to a voyage, and the chairmanship should not be a regular function of any one officer, but the chairmen should be chosen by the master as the officer before whom the men will speak freely and confidently.

Supplementing this indoctrination effected by personal contact, pamphlets and posters can be distributed to the vessels, and if the handling out and posting of these aids is intelligently administered, they can go far to encourage the desired safety attitude.

Once the personnel of a fleet have become safety-conscious, the best stimulus and stabilizer is the Fleet Safety Contest, with an appropriate award system.

In order to function properly the safety organization must have management's backing. Top management officers must give the program its drive, and I can think of no officer better qualified in authority and prestige than the executive vice president. He should be chairman of a safety board, whose other members are two or three department heads such as the marine and stevedoring superintendents, the general claim agent, the insurance manager, and the safety director. To this board all recommendations from the fleet are addressed through the safety director, who merely appends his comments before consideration by the whole board. And from

this board, over the signature of the executive vice-president, come statements of policy and major directives.

On each vessel a safety committee functions, composed of several officers appointed by the master. This committee investigates each accident occurring aboard the vessel, considers the accident's cause, and recommends to the master corrective measures deemed necessary. In addition, any recommendations from the crew's safety meetings are considered. Minutes of committee meetings, and the committee's recommendations, are forwarded by the master through the safety director to the safety board. These shipboard committees meet when ordered by the master, or immediately after a serious accident, and at least once each voyage.

A brief review of this hierarchy will show the following:

1. The executive vice-president as chairman of a safety board whose members are heads of important departments.
2. A safety director with adequate field and clerical staff to give on-the-spot inspection and survey to all of the company's activities at least once each week, and to visit each vessel while in the home port at least once.
3. A safety committee on each vessel appointed by the master.
4. And last, giving impetus to the whole organization, safety meetings of the crew.

In an organization such as Moore-McCormack Lines which does its own stevedoring, a correlation of shipboard safety to a program for stevedoring safety is definitely indicated. The two programs can be administered as one. Many of their objectives are the same, and require action from both the vessel's crew and the stevedoring personnel.

We have promulgated a group of rules covering the required condition of ship's decks while in port. Hatch-covers, pontoons, hatch beams, etc., are handled in a prescribed manner on all vessels, and the cooperation between stevedoring and ship's personnel has reduced deck accidents by 50 per cent during the last year.

Now the prevention of accidents to passengers, an extensive field in itself, must be approached as an entirely different problem. Since the passenger cannot be expected to take an actively active part in a safety program, and since indoctrination cannot ap-

ply, the ship operator must combat the deterrent "human element" by reducing known accident hazards which will exist in spite of the best designing and engineering. The safety director must be certain that his program about incorporates the protection of passengers against the known hazards. In this respect it is important that the ship's personnel not only are aware of accident producing locations, but are schooled in the planned method of minimizing the hazard's effect.

The schooling is a function for the ship's officers, but on the safety director lies the responsibility for discovering the hazard, and planning the control.

And as we go into a discussion now of the shipboard fire hazards you will see how that same planning and indoctrination can give the engineering and organization that will reduce the number and effects of fires at sea.

Any steamship line's safety program should include specific measures for the prevention and fighting of fires aboard all vessels, both passenger and cargo. At the present time with the momentarily expected return of Moore-McCormack's three large passenger liners, we are concentrating on fire prevention as it applies to passenger vessels.

Everyone is familiar with the rigid requirements of the United States Coast Guard which, in addition to fire doors and bulk-heading, have resulted in the installation aboard all our vessels of smoke detecting and CO<sub>2</sub> systems, steam smothering installations, and electrical detecting and alarm systems. On our redesigned passenger vessels we have so altered the deck-to-deck staircases that, in event of a fire on one deck, doors can be released electrically either from the bridge or on the spot, that will completely close-off the staircases, preventing the spread of fire from one deck to another. Looking back for a moment, we are carrying out in this instance the incorporation of safety in the construction and design of the vessel.

However, we are well aware that in spite of all these skillfully engineered precautions the man "bogey," the human element, can still cause fires, and it is the duty of the ship operator to use every possible means to indoctrinate and train his personnel in the latest and best methods of preventing and fighting fires.

You may recall the exploits of the American cruiser, the U.S.S. Boise, off Savo Is-

land in October of 1942. Severely damaged; a mass of high flames forward, the vessel was able to keep her place in the fighting line, to keep slugging at the enemy, and return to port unaided. It wasn't luck that made that possible. Her entire crew had been expertly and efficiently trained in planned fire-fighting and damage control. Her skipper, "Mike" Moran, knew what he was talking about when he looked over the bridge at the roaring flames, and hollered, "Hell, we're all right, keep her in there."

Aboard every vessel, whether it be combat, cargo, or passenger, every member of the ship's company must have a similar high degree of indoctrination. The present large turnover among crew members when vessels return to home ports need not and must not be allowed to lower the fire-fighting efficiency of a vessel's crew. Before indoctrination can take place the safety staff must carefully study each individual ship and develop a well-engineered plan for the most efficient prevention and fighting of fires. Once this plan has been worked out through the co-operation of the officers and the safety staff, then the indoctrination of crew members can be started. The plan should include a specific station and duty for each individual crew member. His duties at emergency drills should be given to him on a card when he signs on, and designated officers should supervise the carrying out of the prescribed duties, and this latter factor is extremely important. Every possible precaution must be taken to overcome the natural tendency to go to the scene of the fire. The men must go to their stations when an alarm is sounded. Once you can get them to their assigned stations the chance of their performing their required duties is greatly enhanced.

The officers must be firmly impressed with the seriousness of the drills and actually see that each man is at his post and knows his job. Needless to add, the very highest quality of leadership is necessary today to make men drill and drill properly. The day of the belaying pin has past, and happily so, though the void left by its absence has not yet been completely filled.

Along with this indoctrination at drills is the necessity for making all hands "fire-conscious". Fire-patrols must be kept alert and given encouragement, smoking rules must be enforced, the proper use of open flames, welding torches, etc. made clear; the hazard

of the oily rag in the locker pointed out as well as the other well-known but often ignored hazards. Here again, your safety meetings can be utilized as well as posters and pamphlets.

Then too, certain known facts of shipboard fires must be made clear. First, the officers must know thoroughly how air currents flow on their ship when it is moored and when it is moving. The movements in each case are entirely different. The transfer of fire through a heated bulkhead, the dangers from flooding, the actions of oil and water in fire, hazards of electrical fires—all this the officers must know and know well, and then pass their knowledge and training on to the men. Mr. E. Leslie Clauspoth, then associated with Palmers Hebburn, summed up the subject very nicely some years ago, and I quote:

"No matter what fire equipment may be provided; eventually the safety of life and material depends on the active manner in which officers and crew, by their knowledge and initiative, utilize the material resources with which they are provided and carry out the procedure for inspection of plant, watching, patrols, maintenance of apparatus, closing of doors and ports in event of fire, fire drills, etc., which have been the subject of thought and organization by the shipping companies and are embodied in their personnel regulations and instructions, apart from such handling of the vessel as may be possible under certain conditions to lessen spread of fire. To a less extent the behavior of passengers themselves in fire, as in other emergencies, will determine the extent of loss both of life and material."

Of course, where passengers are concerned the greatest danger is panic, and the only feasible preventive or ruin for this terrifying force is a crew working with the resolute calmness that comes from thorough training and indoctrination. You can give the passenger instructions and equipment, but the only way you can depend on his using them is by supervising his actions, and this can be done well if all the crew, and in this particular, the stewards, know their duties perfectly.

Many will raise the question, I am certain, that crew members to-day cannot be adequately trained and indoctrinated, that they are lacking in ability and ambition, and that the normal turnover today precludes effec-

tive training. I can't lean to that opinion. I think the question hinges on two points, leadership and standardization. We must select our officers with care, handle them with the deference due skilled professionals, and require in addition to navigation and cargo knowledge, the positive quality of skillful

leadership. Our seamen will react quite normally, I am sure, if our masters and officers lead them with intelligence and understanding. And when such leadership does come from our officers, others will find that the American seaman is by no means an easy mark.

### Prevention of Accidents Peculiar to the Operation of Ore Carriers

By WILLIAM R. MacDonald  
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With the exception of the necessity of guarding against a few particular hazards presented by the type of construction of a Great Lakes Bulk Carrier and the nature of the trade in which these vessels engage, the rules and methods used for the prevention of accidents on these boats will follow very closely the general pattern for prevention of accidents on other vessels.

The first effort in any accident prevention program must be directed toward making the original unit as safe as possible. This effort is made on the planning boards and in the execution of the plans is the original construction. However, even though the most careful thought is given to original plans and their execution, there are still some types of hazards that cannot be entirely eliminated and still others that appear through operating experience. The elimination, correction and reduction of these hazards is accomplished through the installation of additional safety devices which will completely eliminate the hazard. This is then followed by a continuous program of safety education and instruction.

With respect to the hazards presented by the type of construction and the nature of our trade it seems to me that there are three problems peculiar to our type of ship that are not encountered as frequently or as severely on salt water vessels.

The first is presented by our spar deck and hatch construction and our method of opening and closing hatches for the purpose of handling cargo. The second is presented in our method of mooring, unmooring and shifting our vessels at all docks and canals, while the third is the method used in boarding and leaving the vessel.

In the construction of spar decks and hatches and in the method of opening and closing hatches, we have a different type of hatch construction and operation than is found on off-shore vessels. It should be pointed out that our seamen handle the opening and closing of hatches at all times whereas on salt water vessels this work is usually performed by stevedores. Further, our hatch coverings will vary in height from a minimum of four inches above deck level to a maximum of 24 inches. On vessels that have the wooden sectional type hatches similar to salt water wooden hatches the coaming will run 4 to 6 inches; on the telescope hatch they will run from 18 to 24 inches and on the latest type single piece hatch they will run an average of 24 inches in height. It can be readily seen therefore that with the crew handling hatches at all loading and unloading ports the very nature of our hatch construction presents a serious hazard to overcome.

In so far as the basic construction is concerned a very decided improvement has been made in the development of the "Wood" type hatch which provides a 24 inch hatch coaming. A single piece hatch cover fitted with rubber gaskets is used in this type and is removed and replaced by means of a traveling electric crane. This improvement has taken us a long way toward eliminating a good portion of the hazard presented in opening and closing hatches.

We, too, have the same high percentage of accidents resulting from falls of all types including falls on deck and into the cargo hold. Falls into the cargo hold present our most serious type of personal injury. It is not practical to erect any permanent guards around

hatches by reason of the very nature of the operation, and we still have the serious slipping hazard in the vicinity of these hatches at all times. We attempt to combat the slipping hazard by using a non-skid paint on the deck surrounding the hatches and on the center leaves of the hatches. We are pleased to report that the use of this non-skid paint has materially reduced the number of slipping accidents on deck as well as the more serious falls into the hold.

In dealing with the second problem mentioned, the method used in mooring and unmooring our vessels at all docks and canals, again we encounter a fundamental difference between our operation and salt water practice. Our deck engines are located approximately midship on our vessels, forward and aft. It has been my observation that in salt water practice stevedores or shore gangs with some assistance from the crew handle the mooring lines. It is practically never necessary to send a member of the crew on the dock to handle the line. The exact reverse is true on our vessels as the crew handles the lines both on the vessel and on the dock.

At the forward end of the spar deck we have what is known as a landing boom constructed of pipe with a block at the outboard end. A manila line is rove through the block and a hook's chair is affixed to the end. The deckhand who is to handle the lines on the dock steps into the chair then is swung outboard a distance of about 15 feet and lowered to the dock a short time before the boat comes in contact with the dock. He is then thrown a manila heaving line from the dock which is attached to the eye of the steel mooring cable. When he has pulled the cable ashore additional cable is fed to him from the drum of the deck engine. The end of the cable is equipped with an eye spliced in and this is dropped over the bollard or spile on the dock. When he has placed the eye over the bollard indicated by the officer in charge of the operation he signals "all clear". The officer then signals to the man at the deck engine to heave in. If this simple procedure is followed carefully there is little danger of accident. However, the human element enters into this operation all too frequently and in a number of cases a premature signal is given which can result in serious injury to the man on the dock handling the line. He could sustain serious injury to his hands while placing the cable or be struck by the light

of the cable and knocked into the water.

In this operation we have again attempted to minimize the danger of injury. First with a very firm rule that all eyes on the mooring cables must be equipped with a becket which is one strand of the steel cable pulled out at the apex of the eye and equipped with a piece of rubber tubing or hose. If this becket is used at all times there is no danger of injury to fingers or hand.

The second step that has been taken is the installation of rail controls for deck engines. This eliminates the need of one man in the chain of operations as the man standing at the rail observing the deckhand on the dock controls the deck engine from that position and need not relay any signals to a man located at the deck engine midship.

In this same connection it must be borne in mind that our operations will again differ from salt water as our vessels must be shifted along the dock frequently during loading and unloading operations. This work is always done by members of the crew, greatly increasing exposure at both ends of the route and requires constant surveillance and instruction of all members of the crew particularly to new men in the dock department.

The third type of hazard which I believe is also peculiar to our type of operation is the use of a boarding ladder at all docks. The most common type of ladder used in the past is best described as a wooden ladder which is constructed of two upright 4 x 4's with steel rungs. These ladders vary in length, the longest being about 30 feet. This length ladder must be used at all times when the vessel is in a tight trim. I believe that this method of boarding a vessel again differs from salt water vessels in that salt water vessels usually use a gangplank of some type. Elimination of boarding ladder accidents has been one of our most serious problems as anyone in the vessel business can appreciate the many problems presented by men returning from shore leave with packages and supplies to be carried aboard.

The first step in combating this problem has been the installation of padded bags some of which are made of canvas and some of wire mesh construction. Signs are also posted directing the men to use this appliance at all times.

The second step toward elimination of this problem has been the use of aluminum ladders instead of the heavier type wooden

ladder. This made for much greater ease in handling the ladder both for the man on the dock and the man on the vessel, as they could be shifted into a firm position on the dock quite easily, and it must be remembered that in the loading and unloading our draft is constantly changing thereby requiring continuous attention to the boarding ladders.

Now that the war is over we may again obtain aluminum ladders, and the latest ones are equipped with one or two handrails. It seems to me that these are by far the safest type we have been able to secure. Unfortunately, in adding the handrails we have lost some benefit in the weight factor. We are now back to about the same weight as before with wooden ladders. However, the aluminum ladder equipped with handrails has very markedly reduced the number of ladder accidents.

It seems to me that the three examples that I have just referred to present the principle differences that result from our type of carrier and the trade in which we engage. In so far as other hazards and accidents that occur on our vessels are concerned, we undoubtedly have many of the situations found on any large bulk freight vessel.

On the subject of the elimination of hazards that cannot be entirely handled through changes in construction or new construction, we have endeavored to supply as complete an inventory of safety devices as is practical in our operation. We require a periodic inventory at both ends of the vessel which indicates the number of each safety item on board and its condition at the time inventory is made. This permits us to keep an adequate reserve supply on hand to replace any missing or worn items.

Goggles constitute the greatest single item on the inventory. We supply our men five different types of goggles and face shields. These fit any kind of work that they may be required to do.

In addition to goggles each vessel must be equipped with a fine blowing shield with rubber apron, a paint spray shield, a large supply of hard hats to be worn at all times when there is any danger of falling objects, respirators to be used in connection with spray painting, an adequate supply of kapok mats to be used by men landing from the landing boom or for any work over the side, gas masks, asbestos gloves for use in firehold, alk tablets and salt dispensers on both ends

of the ship, an adequate supply of sweat bands for summer months and a Stokes metal stretcher.

The Stokes stretcher has proven invaluable in moving injured men on the vessel and from the vessel to shore. The previous method was to use the old type canvas stretcher and lash the man to it by means of heaving lines and canvas strips.

Our company has instituted two safety measures that we are particularly proud of, and that have more than repaid us in cost. We furnished all members of the crew with suits of white coveralls with instructions to wear them on deck and on the dock at all times after sundown. In instituting this program, we contacted all of our ships as to the best method of putting the plan into effect and on the recommendation of our officers and crew, we adopted a plan whereby a man places an order for his coveralls with the master and deposits the cash value of the coveralls at that time. If he remains continuously in the employ of the ship for 60 days his deposit is refunded. On the back of the coveralls is the name of the vessel company in large blue letters. We found the men took great pride in these coveralls and they are very prompt in donning them while transiting the Soo Locks or for night loading or unloading at any port. They are of incalculable value in following the movements of men on dock handling lines at night as well as the movements of the crew in opening and closing hatches after dark. All in all, we are convinced they have more than paid for themselves.

The second measure started about seven years ago was to supply each officer and steward with a small individual first aid kit. This of course, is in addition to the large departmental first aid kit in each department. The most notable result of the use of this handy kit has been the reduction of minor infections to a bare minimum. These kits are replaced each season.

In addition to the new methods of construction and the safety equipment I have mentioned, all Great Lakes vessel operators carry on a continuous safety program which follows the general pattern of all safety programs and has as its background a safety committee on board each vessel. This committee meets once a month and considers all questions of safety on board their particular vessel. Each member of the committee is paid

a dollar for his attendance, and the secretary who writes up the recommendations is paid two dollars. The recommendations are submitted to the captain of the vessel, and he in turn submits them to our office. The majority of the safety committees have done a conscientious job and their suggestions are put into effect as promptly as is practical to do so.

With respect to the frequency experience record for the period 1940 through 1946, we find that the frequency rate in 1940 for four vessels ran 13,796 while the severity rate in the same period was 1,216. In 1941 the figures dropped to 6,694 and 0.057. Both rates were cut down through 1944, but in 1945 at which time you will recall we were just about down to the bottom of the experienced manpower barrel, the rates jumped to 12,930 in frequency but the severity rate remained at 0.058. In 1946 the frequency rate dropped to 7,168, and at the same time the severity rate dropped to 0.143.

### Fire Fighting Aboard Ship

By EDWARD J. KEHOE

Fire Marshall, Third Naval District, United States Navy Department

Shipboard fires have always been a difficult matter to cope with. Our record in the fighting of such fires has been a tragic one and regardless of whether the ship was in port or at sea, a complete burn out invariably resulted, frequently accompanied by large loss of life.

The problem of shipboard fire fighting was brought to a climax in the Navy in World War II when ship fires began to occur at a far greater frequency than had ever been experienced previously. Practically every bomb hit, every torpedo hit and every shell hit meant fire. The entire fight became a war of fire both on land and at sea. Early in the conflict in the Pacific, every one of our major warships that was sunk was lost as a result of fire. Experience indicated that our vessels would frequently sustain a hit without undue structural damage; however, the hit usually started one or more fires which ultimately caused the loss of the ship because of the inability of existing fire equipment and technique to cope with the situation.

The principal cause of accidents during these years, except 1946, was 'slipping and falling' and here, as a result of the safety program and particularly the use of nonskid paint on deck and stairways, the percentage of slipping accidents dropped from 45 per cent of the total in 1940 to 21.9 per cent in 1943 and 9.46 per cent in 1946.

Complied with these figures showing the reduction in frequency and severity, we have some very interesting figures on the reduction in compensation figures which show that during approximately the same period, actual out-of-pocket expenses on personal injury claims dropped from a high of \$10,000 in excess of \$10,000 per season to a low in 1946 of \$1,658. Vessel operators present will be interested to know that this latter figure includes compensation, investigation expense, and direct medical expense. These figures demonstrate beyond question what can be accomplished with conscientious attention to every safety program.

The initial step in attempting to solve this enigma was the construction of simulated ship compartments on land wherein large scale experiments were performed on roaring gasoline and oil fires in the mock-up engine rooms and boiler rooms; every existing extinguishing agent and procedure was tried out and new ones were developed as needed until equipment and technique were found that could lick the fire.

This work resulted in the adoption of standard Navy fire equipment including rescue breathing apparatus, mechanical foam and its generating equipment and the all-purpose fog nozzle which can apply a solid stream or fog as may be desired. The employment of rescue breathing apparatus as regular fire fighting equipment was a decidedly revolutionary concept, although a very logical one, and it paid dividends. Reasonably satisfactory mobility was offered by ingenious mechanical foam generating equipment which combined water, air and a soapy foam liquid into an easy flowing and effective

tive fire smothering blanket. Water fog utilized the great cooling potential inherent in water. Compare the ton of water a minute so ineffectually poured out by the ordinary 1½ inch open nozzle with the 54 gpm highly effective spray generated by the 1½ inch fog nozzle. While this equipment is by no means a cure-all for every conceivable fire, I personally feel that its wartime trial by fire by the Navy definitely justifies its adoption by industrial, marine and municipal fire departments to a far greater extent than has been evidenced so far.

Having found the equipment, realistic fire schools were set up and featured actual fire fighting operations on simulated full-scale ship compartments. The intensified course of instructions was made as practical as possible. Fighting ships have to be kept at sea and during wartime there is little time for training ashore. We found that after two days at our fire school, men overcame their fear of fire as they gained confidence in their equipment. All hands on the ship took the course and seamen and Captains, doctors and supply officers, cooks and chaplains became fire fighters as well. I do not mean that we turned out professional fire fighters in two days, but we did turn out men who could put out a roaring fire in the engine room of their ship.

In conjunction with our course of instruction, use was made of visual education, and sound motion pictures were shown on the "Chemistry of Fire", "Rescue Breathing Apparatus", "School of the Fire Fighter", and "Fire Fighting Aboard Ship."

In addition to the school work, consultants boarded Naval vessels in port to insure that they had the proper equipment. Combat fire fighting teams were organized and went in on the invasions. Mobile fire fighting units were set up in conjunction with the schools and traveled by tug or plane to fires at sea; these units, featuring light portable efficient equipment and trained men, saved every ship they responded to.

Almost all the fire fighting specialists in the Navy were Reservists who were recruited from municipal fire departments and have returned to their civilian positions. However, in each Naval District the Navy Department has retained one qualified officer in the civilian billet of District Fire Marshall to handle fire safety. Operation of fire fighters schools

is continuing to as great an extent as limited funds and personnel will permit.

The shipboard fire fighting work undertaken by the Navy was primarily designed for combating oil and gasoline fires since other types of combustible material were removed from our warships in so far as possible. At the same time, the Coast Guard initiated extremely valuable experimental and development work, primarily on the handling of cargo fires. This division of the work was not clear-cut since both the Navy and Coast Guard had flammable liquid and cargo fires; however, as the work progressed, the Navy concentrated more on the flammable liquids and the Coast Guard on cargo fires.

The Coast Guard also employed a logical and practical approach. A fire school was established at Fort McHenry and extensive work was done on oil fires in a simulated compartment and finally on an unseaworthy Liberty ship, the "GASPAR DE FORTOLA." Results were so encouraging that further tests were conducted in cooperation with other agencies under the name of "OPERATION PHOBUS," in which fires in a cargo of baled cotton were experimented with on the "PHOBUS," tied up in San Francisco.

While to my knowledge a final report has not as yet been released, preliminary reports indicate that much has been accomplished. The tests included experiments with fire detection, control of ventilation, water-fog, carbon dioxide, inert gas generators, mechanical foam, steam smothering, wetting agents and respiratory apparatus.

I feel that the findings of the Navy and Coast Guard fit together to form a fairly complete picture, although in both cases, the results are not considered final. The possibility of future experiments appears doubtful due to budgetary restrictions.

In conclusion, I emphatically state that the whole problem of shipboard fire fighting can be solved by two factors, namely, proper equipment and trained personnel. As proof I offer one of the most magnificent shipboard fire fighting jobs in history, the saving of the carrier FRANKLIN, swept by flames off Okinawa.

(Mr. Kehoe presented a motion picture entitled, "Fire Fighting Aboard Ship.")

## Coastal Regions Breakfast

Presiding: CARTER KENDALL, Asst. Chief Safety Eng., Bethlehem Steel Co., Inc.

## Health Aboard Ship

By WILLARD F. JONES

General Manager, Marine Department, Gulf Oil Corporation

For the first time, to my knowledge, we of the Council are now able to present statistics as a result of the work of the Marine Index Bureau and a study of these figures may prompt the membership toward some effective means of remedying the situation. Every effort is made to maintain American vessels in the highest standards of safety; in fact they are built toward achieving such a standard. It is realized, of course, there is a limit to the degree of safety in a vessel, as well as to the number of safety devices with which a vessel can be equipped, this limit being when such devices begin to interfere with the operation of the vessel. A vessel, with its multiplicity of deck gadgets, machinery and gear, is very unlike an industrial plant where there is no reason for a conglomeration of obstacles such as rigging, eye pads, bolts, braces, washboards and other hazards against free movement. Constantly, one has to contend with the hazard of the sea itself, which requires agility, alertness, and a normally sound body.

A review of the statistics will show a situation that is, to say the least, surprising, in that so great a number of men taken into employment on board ship are obviously not suited to this type of employment. The report indicates that in the brief period of six months, 64 epileptics, 94 addicts (drug or alcohol), and 245 psychoneurosis cases were reported. The Merchant Marine industry employs about 150,000 men, and there have been reported through the Bureau 27,650 illnesses and injury cases in six months. Truly, this is an unenviable record, and what connection there is between good health and these figures may be inferred when one compares them with the record of the railroad industry, employing 1,000,000 men, with 36,570 disabilities

exceeding three days in the period of a year. The requirement of the law, that the shipowner provide what is called maintenance and cure for seamen falling ill during the course of their employment, makes consideration of the figures just that much more important. The United States Government, through its Public Health Service, provides the best of medical attention and care for the seamen, which should tend to improve the physical and mental standards of seaman-applicants, but the figures given do not seem to bear it out.

It is to be emphasized that the so-called "psycho" cases, epileptics, drunkards, and drug addicts are a hazard, not only to themselves, but to their fellow workers, and I have no doubt that their fellow seamen would be as anxious to exclude them from employment as would the shipowner, as they constitute a menace to the safety of the vessel and may, if placed in charge of a watch, jeopardize its actual seaworthiness.

Considerations by those in the Governmental Agencies should be given to the exclusion, until cured, of those suffering from such disorders as psychoneurosis, addiction to drugs, chronic alcoholism, etc., and they should not be permitted to find employment at sea until they have been certified as cured.

I feel convinced that labor organizations and various seamen's bureaus will feel just as concerned about this as we, and will co-operate with the shipowner in making the ship a safer place on which to work, consigning these unfortunates to a place of rehabilitation until such time as they can be fitted for marine employment.

To this effort the National Safety Program should lend its full weight in cooperation with all concerned.

## Coast Guard's Part in Marine Safety

By REAR ADMIRAL EDWARD H. SMITH  
Commander, Eastern Area, U. S. Coast Guard

A safe Merchant Marine is of great concern and of vital interest to the U. S. Coast Guard. We are in this safety business to help you. I've always felt that the industry felt that it was largely a responsibility of the Coast Guard (legally at least) to do this, and I can tell you frankly, that so far as the Coast Guard regards it, the richest gold mine of safety is with you. It is the safety of your ships, your crews, your investment, in which we will assist and cooperate with you to realize the topmost safety and efficiency that is possible to be attained.

Now I have often spoken of our safety duties in the Coast Guard as divided into two main channels—preventive safety and rescue safety. Stated in other words we will make every effort to help you to prevent accidents, but when accidents do occur, we employ our lifeboat stations, cutters, planes and personnel in the rescue of lives and property once they become imperiled at sea.

The marine inspection and aids to navigation activities of the Coast Guard serve the preventive safety; and the search and rescue arm of the Service takes the responsibility for, and handles, rescue operations.

Preventive safety, as I started to remark, deals with:

- (a) the safety of vessel construction, repair and equipment.
- (b) the certificating and licensing of personnel to man the ships.
- (c) the enforcement of disciplinary controls.

To give you some idea of this preventive safety organization in its field work, I can best describe the New York Office at 42 Broadway, which is more or less characteristic of the other 12 district offices throughout the country.

During the past year at New York 2008 vessels were examined and 407 tail shafts were pulled in drydock. A total of 40 major vessels undergoing conversion and material alterations were overhauled, and 107 army transports were given pre-sailing examinations.

The licensing and certificating units ex-

amined 6871 candidates for licenses; 5467 passed, 1404 failed. A total of 8263 certificated men were examined for promotion; 4910 passed, 3353 failed.

The disciplinary unit investigated 218 cases of licensed officers and 1688 certified men. Forty licenses and certificates were revoked and 200 suspended. A total of 250 casualty investigations were held.

In addition the New York office issued 15,597 certificates to motor boats.

I don't wish to burden you with a lot of statistics but now to interpret some of these in terms of safety. You will note from the above that approximately 25 per cent of the applicants for a license did not get it, and about 40 per cent of the certificated men failed to make their upgrading. It is pointed out, however, that the 12,000 or more men who applied for their first papers, all received them. It is in this relatively large group that most of the turn over (discharges and hirings) takes place, and it is this group which many blame for the lowering of what might be an otherwise higher standard of safety in our merchant marine today.

Personally I am in hearty agreement with the proposal to require basic examination of fitness of applicants for first papers. It may come as a surprise to some of you that no examination whatsoever (except for a sanitary examination of food handling) is required in the ratings other than able seamen and qualified members of the engine department. Furthermore the statutes limit it to such. The Coast Guard has no alternative but to issue a certificate to the applicant for first papers, be he native or alien; whether he speaks the English language or not. When Congress at last session limited the percentage of aliens in the crews of government subsidized ships, operators and unions joined in securing a waiver of such a requirement. It was claimed that there was an insufficient supply of our own citizens despite the prevailing all-time high wages, and that sailings were being delayed as consequence.

Another feature which affects the general standards of safety in our Merchant Marine is the authority of the Coast Guard to revoke and suspend Merchant Marine personnel li-

censes and certificates because of incompetence or misconduct. This authority has been cancelled. Since June 11, of this year the Coast Guard has not conducted any hearing looking to disciplinary action due to the requirements of the Administrative Procedures Act, which provides that examiners presiding at hearings on or after the above date shall be appointed as such pursuant to Civil Service laws and regulations.

Examinations on entry and periodically for promotion serve a needed purpose, but are they all sufficient? The percentage of failures in the examinations given at New York (and presumably the record does not differ materially at other Coast Guard centers) indicates that they are reasonably rigorous. They may indicate, likewise, that the number of failures on examinations would be materially reduced if candidates were better trained and better prepared. The obvious suggestion is the need for improved continual training in service. I feel that the applicants as a whole who come before Coast Guard examination boards for both licensing and certifying need more training and experience. This subject of training, so conducive and vital to marine safety, is not a responsibility of the Coast Guard. Personally I feel that training, except in certain specialties, should continue as a responsibility

of management, so long as they carry on an active program.

I would go a step further in recommending the employment by management of safety experts to travel at sea throughout a company's fleet, tactfully indoctrinating through acts and persuasion the practical hints in safety training and practices which are so invaluable to the man on the job at sea. The Coast Guard before the war had a few safety experts who traveled among the principal passenger vessels and to those with whom I have discussed this matter, the impressions have been favorable. Here again I feel that this enters the field and prerogatives of the company itself, and it is urged that they test this system for the improvement of safety.

May I repeat that the U. S. Coast Guard welcomes and urges all those who have constructive recommendations for the improvement of safety of our merchant vessels to submit such recommendations. Simply address a letter to the Commandant, U. S. Coast Guard, Washington, D. C. Such proposals should be drafted in the form of amendments or additions to the present regulations. They are acted upon twice a year by the Coast Guard's Merchant Marine Council. The Council holds open sessions to which it cordially invites all interested persons.

### WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: CARTER KENDALL, Asst. Chief Safety Eng., Bethlehem Steel Co.

#### Annual Report of General Chairman

By CARTER KENDALL

Asst. Chief Safety Engineer, Bethlehem Steel Company

During the past twelve months the Marine Section of the National Safety Council has been quite active in leading the accident prevention work of the maritime industries.

In October of last year, shortly after the last Congress, the Marine Section sponsored a session on safety at the American Merchant Marine Conference at the Waldorf Astoria in New York. This was accomplished through the cooperative efforts of two Past General Chairmen of the Marine Section, Mr. Arthur M. Tode, Honorary President of the Propeller

Club of the United States and Captain Edward C. Holden, Jr. A similar session has been arranged for this year.

In March, the Greater New York Safety Council held their Seventeenth Annual Safety Convocation. Three sessions were sponsored by the Marine Section: Shipyard, Ship Operators and Stevedoring and in addition there was a joint luncheon meeting with the Propeller Club of the United States, Port of New York. All of these sessions were well attended and the papers presented and pub-

jects discussed attracted much favorable comment.

The culmination of the year's effort is to be found in the program for the 35th National Safety Congress. It is impossible for anyone who has never had any part in the arranging of a program to realize the work that is entailed in arranging a series of meetings of this nature. It is a big job and requires a quantity of time, thought and correspondence. Credit in full measure must therefore be given to Harold M. Wick, our Program Chairman. He has done a truly outstanding job and the Section is fortunate in that he has consented to serve in the same capacity for another year. Several members of the Executive Committee gave freely of their time and helped him in many ways. I refer particularly to Carl E. Holmes, Ed. Herges, Harold Segrave and Capt. Ed. Holden. The entire executive committee turned out in very gratifying numbers, sometimes on rather short notice, to pass on sectional matters of importance and they proved that the Marine Section is a vital force in the prevention of accidents in the maritime industries.

Our thanks also go to Mr. Cornelius A. Callaghan, Executive Vice President, Maritime Association of the Port of New York for

his cooperation in making the board room of the Maritime Association available to us for our meetings.

There are two projects pending which should be brought to your attention. The first is the revision of the Safe Practice Pamphlet No. Mar. 2 entitled Marine Boilers. This was last revised in 1938 and it is quite obviously obsolete. It is suggested that this work be given a high priority during the coming year. The other project is the membership campaign. Since Captain Holden is our "Round-up Boss" I will not trespass on his range other than to urge everyone to support him in this work. The larger our membership, the more we can accomplish.

It has been a great pleasure to have served as your general chairman during the past year. Looking backward, there are many things that should have been done that were not done. The general conditions in the maritime industries during much of the year prevented some of these endeavors, and it is hoped that the coming year will find these handicaps removed entirely. So let us now look forward to a year of unprecedented achievement, backed up our incoming officers with the interest and enthusiasm so characteristic of the Marine Section.

## WEDNESDAY AFTERNOON SESSION

October 8, 1947

## Joint Session with Chemical Section

Presiding: CAPT. ROY L. RANEY, Asst. Chief, Office of Merchant Marine Safety, U. S. Coast Guard

## Lessons Learned from the Texas City Disaster

## I. Marine Phases

By WILLIAM T. BUTLER

Chief, Hazard Prevention Section, Merchant Vessel Inspection Service, United States Coast Guard

In both the assignment and acceptance of the title of this paper, "Lessons Learned from the Texas City Disaster" it is now believed that more care should have been extended inasmuch as one might question statements that any lessons have been learned. A truer descriptive name would be "Lessons that Can be Learned from the Texas City Disaster."

The Texas City Disaster was a terrible casualty and all the more so because with ordinary care it could have been avoided, and, furthermore, after the fire was discovered, proper fire-extinguishing procedure would have probably prevented the explosion. To you ladies and gentlemen, members of the National Safety Council interested in prevention of accidents, the foregoing statement is indeed a familiar one. It is equivalent to the sorrowful one—"I did not know the gun was loaded."

That you may understand the sequence of events leading up to and through the occurrence of April 16, 1947, permit me to digress long enough to state the circumstances:

Prior to April 16 the French SS GRANDCAMP, moored at Pier "O" in the port of Texas City, Texas, had been loaded with approximately 7,341 tons of ammonium nitrate fertilizer, about 1,459 tons in No. 2 lower hold, and 882 tons in No. 4 lower hold. This loading began April 11. Prior to April 11 the American SS HIGH FLYER had received a cargo of ammonium nitrate fertilizer at the same Pier "O" totaling 961 tons of ammonium nitrate fertilizer.

After receiving this cargo the SS HIGH FLYER was moved from Pier "O" to the slip alongside Pier "A." This pier "A"

slip was about 600 to 800 feet south of Pier "O." This change of berth was made to permit the SS GRANDCAMP to moor at Pier "O" and the SS HIGH FLYER to take on additional cargo, consisting principally of "knock-down" railroad box cars.

On April 15 the longshoremen knocked off loading the SS GRANDCAMP at 5:00 p.m. and secured the hatches. At 8:00 a.m. on the 16th the No. 4 hatch was opened prior to resumption of loading. No smoke or fire was visible at that time. About 8:10 a.m. eight stevedores (two crews) entered No. 4 lower hold. A draft of bags of fertilizer was sitting on top the cargo and in the square of the hatch, where it had been left the night before when work stopped. One crew of four men began to stow these bags in their proper location in the hold. The other crew of four men sat down to await the next draft from the topside.

About 8:20 a.m. stevedores noticed smoke issuing at the top of the stowage. The smoke was at the side of the ship and was coming up in a free space formed by the frames of the vessel and the shell and cargo battens. Attempts were made to extinguish the fire with drinking water and hand fire extinguishers. Apparently the fire seemed to subside but shortly more smoke was noticed between other frame spaces, both forward and aft of the original location. A ship's fire hose was lowered into the hold but the first mate ordered no water be used, stating it would damage the cargo.

The fire, which apparently was occurring low down in the stowage of the fertilizer, appeared to be spreading with much more smoke issuing. Orders were issued for per-

sonnel to evacuate the hold. With all personnel safely on deck, orders were issued to blank off the ventilators, put the hatch covers in place, cover them with the hatch tarpaulin, and batten down the hatch. In the meantime an alarm was sounded, exact method undetermined, and twenty-seven volunteers of the Texas City Fire Department responded with their equipment. Following the sealing of the hatch and ventilators the ship's steam smothering system, fitted in holds of ships for fire-extinguishing purposes, was turned on. Pressure generated by the products of decomposition ripped a corner of the tarpaulin and blew off a few of the individual hatch covers, and judging by the pressure exerted and the amount of smoke issuing from the hold, it can be assumed the fire was spreading and increasing in intensity at a very rapid rate.

On the SS HIGH FLYER, moored in the slip alongside Pier "A," the master of the vessel, taking cognizance of the fact that the SS GRANDCAMP was involved in a fire with smoke being carried by the wind, directly across his vessel, issued orders to cease further loading, batten down the hatches, assume fire stations, and wet down tarpaulins and other exposed combustible material on board his vessel. This apparently was done in a satisfactory manner.

Upon arrival on the pier alongside the SS GRANDCAMP, the local fire department put forth its best efforts to aid in the extinguishment of the fire. The crew of the SS GRANDCAMP had been ordered ashore, so it is assumed that very little, if any, aid was received by the local fire department from the crew of the vessel.

At approximately 9:15 a.m. the cargo in No. 4 hold on the SS GRANDCAMP detonated.

Within 300 feet of the SS GRANDCAMP to the northward were certain buildings of the Monsanto Chemical Company plant. This plant manufactures styrene and the process of manufacture involves the use of petroleum products of high volatility. The buildings of the chemical plant nearest the SS GRANDCAMP offered surface exposures to the blast and the immediate damage inflicted on these buildings gives an indication of the tremendous pressures evolved.

The machine shop, the warehouse, and the office buildings bore the brunt of the ex-

plosive wave. The storage tanks, the piping and the fractionation towers suffered severe damage from the blast and were punctured and ruptured by missiles consisting of fragments of the vessel. Naturally these storage tanks and pipe lines carrying flammable liquids, when ruptured, released vapor possessing a very low ignition point, and such vapor, either by the influence of the heated missiles, or mechanical sparks caused by rupture or tearing effects, ignited. It appears that some low order explosions occurred in accumulations of such vapor and the escape from storage tanks continued to burn for some days thereafter. It is believed that the principal loss of life in the Monsanto Chemical plant occurred immediately following, and as a result of the detonation of the cargo on the SS GRANDCAMP. The low order explosions and subsequent fire did not materially add to the damage outside the Monsanto plant caused by the initial detonation.

At the time of the detonation of the SS GRANDCAMP, the SS HIGH FLYER sustained considerable damage. Hatch covers were blown off the cargo hatches; some apparently being blown overboard, others landed on the deck, while others dropped into the hold. Light structural parts of houses above deck were distorted. Doors were jammed in open or shut position. Interior division bulkheads were warped, furniture was displaced, steam lines were started, mooring lines were parted, and the vessel was forcibly driven sidewise across the slip until it fouled the SS WILSON B. KEENE, which was moored to Pier "B" on the opposite side of the slip. The master of the vessel, severely injured, mustered his crew and found that others of the crew were also injured. He issued orders to take care of the injured, have their wounds dressed or take them ashore, and otherwise endeavored to organize his vessel. After one hour of such emergency work he issued instructions for his crew to leave the ship and retire to a safe location ashore.

After leaving the SS GRANDCAMP, the crew, with the exception of seven members, remained on the dock, watching the fire department fight the fire. The seven members mentioned walked around the opposite side of the warehouse and proceeded to a lunch room about 100 feet inshore of the head of the slip; ostensibly to purchase cig-



arettes. When the explosion occurred all persons on the dock or the ship, including the entire twenty-seven volunteer firemen, were killed, with the exception of three or four persons who were standing about at the land end of the pier.

The residential area of Texas City suffered considerable structural damage from the effect of the blast. All glass within a radius of a mile was shattered. The roofs and walls of many buildings and homes were caved in or dangerously distorted.

The scene was one of chaos. As quickly as possible officials endeavored to organize relief. With fire department personnel killed and all equipment demolished, no immediate effort could be made to combat the fire in the port area. Missiles from the SS GRANDCAMP pierced oil storage tanks, igniting the flammable vapors, thus spreading and compounding the hazard in the area. It was evident that no emergency plan or disaster plan existed and it appears that early efforts to organize relief proceeded slowly and without organized direction. Nearby cities, of their own volition, went to the aid of the stricken people. The Army and the Coast Guard immediately organized and dispatched all possible men and equipment for relief. The Red Cross appeared in an almost miraculous short space of time and rendered yeoman service. The Texas Rangers responded and were a tremendous asset in setting up order in the area.

Without benefit of any organized fire-fighting force or equipment, the heroic efforts of individuals entering the devastated area and rescuing those still alive are deserving of great praise. The entire waterfront area from the Moosanto Chemical plant on the north through warehouses "O," "A," and "B" was afire. The contents of the various wrecked warehouses furnished material for the conflagration. At 6:00 p.m., an enlisted man of the Coast Guard, accompanied by several other members of a searching party, boarded the SS HIGH FLYER and discovered that a cargo of 1,050 tons of sulfur was afire in No. 3 hold of that ship. One incident emphasizing the lack of organized disaster efforts was the attempt of Lykes Brothers Steamship Company to get several representatives down to its vessel, the SS HIGH FLYER, to see what could be done about moving

the vessel. These representatives came from Galveston by automobile, and when reaching the stricken area they were denied further progress by the hastily aligned guards, with the explanation that persons were not permitted to proceed into the devastated area. Upon an appeal by telephone from the Vice-President of the Texas City Terminal Company at 8:00 p.m. that evening, Lykes Brothers organized a mission which proceeded to Texas City from Galveston on board two towboats in an effort to move the SS HIGH FLYER.

It appears that the custom in that port was to use the ship's anchor when mooring a vessel and after such mooring the anchor of the SS HIGH FLYER was left down. The mission, before attempting to move the SS HIGH FLYER, burned the anchor chain to free the vessel. A crew of several port captains and other personnel boarded the SS HIGH FLYER and attempted to aid in moving the vessel. The two tugs, after much effort, were unable to move the SS HIGH FLYER, and at approximately 1:00 a.m., April 17, the effort was abandoned.

At 1:15 a.m. the ammonium nitrate fertilizer cargo on board the SS HIGH FLYER detonated. In addition to destroying the SS HIGH FLYER, the after hull, the engine room, and the No. 3 hold of the SS WILSON B. KEENE were also destroyed. Missiles from the explosion spread fire over the remaining area of the waterfront south of Pier "A," wrecked the grain elevator at the head of the slip, seriously damaged three warehouses, set fire to oil storage tanks, and to above ground oil pipe lines in the area to the south and southwest. Fire-extinguishment efforts on the part of fire-fighting crews of the oil storage companies and refineries succeeded in limiting the amount of damage in these installations, although the fires continued to burn for several days thereafter. Other oil refineries in Texas, upon hearing of the disaster at Texas City, dispatched trained fire fighters and equipment to assist in combating the danger. Fires continued to burn at a progressively diminishing rate for about four days.

The most reliable figure of loss of life was set at 488, plus over 100 missing. It is estimated that more than 3,000 were injured. Property damage and contingent losses are estimated at \$97,000,000.00.

The hazards of ammonium nitrate fertilizer, which is basically ammonium nitrate, as it consists of 95% ammonium nitrate, had been evaluated by several competent agencies. It was not believed that any set of circumstances encountered in transportation of this substance could result in an massive detonation. There have been outstanding experiences in land storage of ammonium nitrate and ammonium nitrate fertilizer being involved in fires, and in no instance did such involvement end in an massive detonation or even low-order explosion. Regulations governing their transportation on board vessels, in effect since 1941, state:

"Under conditions of exposure to temperature above 400° F. rapid decomposition and ignition may occur with evolution of heat. Under exposure to severe shock detonation is possible, although not probable under conditions of transportation."

Needless to say, the experience on board the SS GRANDCAMP, the SS HIGH FLYER, and later the SS OCEAN LIBERTY at Brest, France gave positive proof that it is possible to cause detonate ammonium nitrate fertilizer. However, it appears definitely established that this is accomplished in cargo on board vessels only by effecting a change in the chemical stability of the fertilizer by means of fire and by confining the substance in a fairly tight compartment while it is involved in the fire, and by having a sufficient mass of the fertilizer present.

When the fertilizer became involved in a fire on the SS GRANDCAMP, three grievous errors were made: (1) by not using water in volume to extinguish the fire in its early stages; (2) by blanking off the ventilators and closing the hatch with its wooden covers and tarpauline, and (3) increasing the temperature of the cargo by the introduction of steam into the tightly closed hold of the vessel; thereby accelerating the decomposition of the ammonium nitrate fertilizer and hastening the detonation. This same set of errors was made on the SS OCEAN LIBERTY at Brest, France when fire was discovered on that vessel. This fire, in my opinion, first occurred in cargo stowed in the tween deck hold and heat was transmitted through the tween deck at sufficient temperature to cause ignition of paper bag containers of ammonium nitrate fertilizer in the hold below.

The above described errors were not factors in the explosion on board the SS HIGH

FLYER. The ammonium nitrate was stowed in lower hold No. 3 on this vessel. In lower hold No. 2, adjacent to hold No. 3, there were stowed 1,050 tons of bulk sulfur. We know there was fire in the bulk sulfur at 6:00 p.m. and we also know that there was fire in the nitrate cargo at 11:00 p.m. It is believed that admixture with sulfur hastened the detonation. Tests so far conducted confirm this.

As for "Lessons that may be learned from this Casualty"

(1) ADVANCE DISSEMINATION OF INFORMATION—Manufacturers of substances or articles defined by regulations as dangerous should disseminate complete information, in advance of shipment, as to the hazard associated with their products. Shippers of such articles should advise carriers of this hazard at the time they book space. Carriers should inform their personnel of this hazard and of action to be taken in an emergency.

Alert manufacturers ascertain any and all potential hazards associated with their products and provide the information to interested persons upon request. This procedure may be improved upon by disseminating the information through trade papers or otherwise making it generally available without waiting for persons to request it. Shippers (whether they be the manufacturers or freight forwarders) are required by Dangerous Cargo Regulations to advise the carriers of the hazard associated with the shipments being offered. Carriers are morally obligated to inform their personnel of hazards associated with the substances being carried. Admiralty law courts, both in England and in this country, have held that the carrier is responsible for knowing all of the precautions to be taken in the transportation of dangerous articles of commerce.

The Coast Guard Board of Investigation of the Texas City disaster found that hardly without exception all persons associated with the shipment, the stowage and the transportation of the ammonium nitrate fertilizer showed a lack of information regarding its hazard, or provisions of regulations governing its transportation.

The action of the officers of the French SS GRANDCAMP in their attempts to control and extinguish this fire was exactly wrong in closing the hatches, blanking off the ventilators, and ordering that water in

volume not be applied to the fire. More or less the same procedure was followed in the casualty involving the SS OCEAN LIBERTY at Brest, France.

(4) **SUITABILITY OF EQUIPMENT AND FACILITY**—Equipment used in transportation and facilities used in handling and storage should be suitable for the purpose.

Railroad equipment, and the ship which is used for transportation of dangerous cargo should be of proper design and maintained in such condition as to afford safety in this transportation.

(5) **SKILLED SUPERVISING PERSONNEL**—The carrier should supervise the handling, storage, and stowage of the dangerous articles while in his custody.

Managers, foremen, stevedores, freight booking agents, and ships' officers should possess complete information about the hazard associated with the cargo they are carrying; thus qualifying them to supervise the handling, storage, stowage, and transportation of the material.

(6) **PORT FACILITIES**—Port facilities should be of a design and be maintained to fit the needs of the activities being conducted.

This goes beyond the mere design of the facility. With the exception of certain port facilities for handling oil and others for handling coal, grain, ore and like bulk commodities, vessels using run of the port facilities often find themselves in locations which compound the normal hazard. Several ports in this country have been laid out, apparently without too much regard for safety in operation. Water areas are small, piers and wharves are built so close there is no extra room for maneuvering vessels. The same facilities that are used for general cargo are also used for transfer of flammable liquid cargoes in bulk, residential areas are close up to the working areas of the port, towing vessels are not present or immediately available, manufacturing plants are also operating in the immediate vicinity of the piers, proper fire-prevention plans, fire-alarm systems, and fire-extinguishing equipment with trained personnel are lacking, thus creating an excessive hazard. One such port is alert to this hazard, and in all fairness it must be stated, it is doing its best to counteract the danger inherent in its operation.

By bitter experience residents of cities in this country have learned to protect their investments and their comfort by the adoption of zoning ordinances. Admitting the zoning ordinance is not a 100 per cent solution, it, nevertheless, does provide a vehicle to accomplish its ends. The development of the ports of this country has generally been a competitive matter. Many of the large ports began, a number of years ago, to correct this by instituting orderly procedures and plans, and in some instances this has entailed an expensive operation in overcoming the earlier mistakes and providing for orderly safe development in the future. There are other ports, however, that have never attempted any such self-policing, with the result that the simplest operation in these ports is fraught with danger. The cure in this instance lies with the state or municipal authority.

(5) **DISASTER PLAN**—The local authority in each port should prepare a disaster plan which could be put into effect in an emergency, thus preventing excess damage and needless loss of life when an emergency arises.

(6) **TRANSPORTATION OF DANGEROUS ARTICLES**—Some local authorities have a cure which will prevent any casualty occurring in their port. This cure is simple. They are prohibiting the transportation of any dangerous article through ports within their jurisdiction.

This is an effective cure but it is not an intelligent approach to the problem. There are more than 1,000 named articles of a dangerous nature moving in commerce every day. These articles are required for the preservation of life, for protecting the health of the people, for preservation of foodstuffs, and for other creature comforts, not to mention articles needed for the security of the country. The economy of this country is intimately bound up with the availability of many of the so-called dangerous substances. The proper approach to this problem is to find ways and means of expediting this transportation, surrounding such transportation by safeguards which if observed will insure that no casualty occurs. A cooperative approach to this problem on the part of industry, carriers, port authorities, vessel owners, and state and federal governments can accomplish this end. However, the approach must

be cooperative, honest, and the enforcement real.

(7) **EDUCATING PERSONNEL**—All personnel likely to be involved in the handling or transportation of dangerous articles should be educated to the hazards associated with this transportation, and also to the proper action to be taken in an emergency.

One of the deficiencies existing at present is the fact that while much information is available with reference to inherent hazard, it is not always available in such form that the persons concerned are cognizant of it. An agency charged with the duty of correlating all correct pertinent information with reference to the hazard involved, and by liaison contact making this information available, in advance, to persons likely to need such information, would eliminate the situation of lack of knowledge of rule or correct procedure. Perhaps the first reaction is this should be a government function, but let us stop and consider whether industry and carriers alike could not provide a better medium for such a purpose.

The progress made in "safety-first work" for personnel received its greatest impetus when industry decided to put its own house in order. Perhaps that would be the best approach to this problem. Without such a program it is a certainty that casualties such as that at Texas City and others outside of any particular field will continue to occur, and when they do occur, we are very liable to find ourselves operating under legislation or regulations promulgated under the stress of emotion. This is not a good approach to a solution of the problem.

(8) **A FINAL CAUTION**—Casualties such as that occurring at Texas City are shocking to the sympathies of the American people. Newspapers are prone to devote considerable attention with exaggerated descriptions, eye witness stories, and opinions not always founded on facts. This is not said with any critical intent. It is a normal, natural reaction, and certainly the newspapers cannot stop to evaluate the accuracy, especially of statements made by persons supposedly having a knowledge of the subject. In this connection I am reminded of an editorial appearing in "Chemical Engineering" in May 1937, which, after

expressing sympathy for the people of Texas City, goes on to say:

"Our sympathies in much lesser measure, also go out to those oracles from Atlantic City and elsewhere who overnight became experts on the explosibility of ammonium nitrate. Over the radio and in the syndicated columns came many weird announcements. Sadly, we were reminded of our own rather immature outgivings of more than 25 years ago when following the great Oppau explosion in September 1921, we penned an editorial entitled 'Facts and Fancies About Ammonium Nitrate.' We think we learned a lesson. Certainly the resulting series of conferences with federal and state officials, insurance inspectors and explosives manufacturers taught us that solid facts are better than fleeting fancies as a foundation for editorial comment."

It was heartening to read this under the stress of similar experience following Texas City. However, the misinformation about ammonium nitrate fertilizer, and circumstances of these explosions that have been published are regretted.

The Commandant of the Coast Guard recommended to the Secretary of the Treasury that in view of the known facts, up to that time ascertained, it appeared that further technical research was necessary with reference to ascertaining all of the hazard in connection with the transportation of ammonium nitrate fertilizer. The Secretary of the Treasury concurred with the recommendation and invited certain agencies to designate representatives to such a committee. Acceptances were received from the Departments of Treasury, War, Navy, Interior, Agriculture, and Commerce, the Interstate Commerce Commission, the Maritime Commission, and the Bureau of Explosives of the Association of American Railroads. The State Department also named an observer inasmuch as this department has a collateral interest in the shipment of ammonium nitrate fertilizer for the relief of devastated countries. This committee has been meeting in frequent sessions since July 7, 1937 and has published Part I of its report which deals principally with the transportation of this product on board vessels. Parts II and III of its report will be published shortly. Part II encompasses land transportation and storage. Part III will contain

results of physical and chemical tests of ammonium nitrate fertilizer, with comparative tests of commercial ammonium nitrate. It is the committee's objective to provide factual

information in connection with this substance and make recommendations to increase its safety in manufacture, packaging, land transportation, handling, storage, and use.

## Lessons Learned From the Texas City Disaster II. Chemical Plant Phases

By J. I. HOFFMAN  
Safety Director, Monsanto Chemical Company

Being a safety engineer I believe that I can foresee the things you would like discussed and the information that you would like to take back to your plants. I am sure that since the Texas City disaster you have asked yourself, as we have:

What could have been done to prevent the blast?

What could have been done to lessen the terrific destruction of such a blast and the resulting fires and chaos?

Could the plant buildings have been designed differently or located in a different pattern?

Could the installation of sprinkler systems and foam systems have been designed more efficiently?

Was the fire fighting apparatus efficient; and if not, what additional equipment was needed?

Was there an adequate supply of emergency equipment—gas masks, fire blankets, asbestos suits, gloves, etc?

Were the fire and emergency crews adequate and were they efficiently trained?

How do people react in the face of such a catastrophe?

What rescue and recovery procedures were set up after the blast, and how did they function?

How about a permanent disaster organization?

These and many other questions of like nature had to be answered as we progressed with the reconstruction of our Texas City Plant. Let us take them one at a time and discuss them in the light of the knowledge we gained at Texas City. The question of "What could have been done to prevent the blast" will be discussed by Mr. Butler of the Coast Guard so I'll not attempt to go into

this but will rather confine myself to the Monsanto phase of the situation.

First "Could the buildings have been designed more efficiently or located in a different pattern so that the destruction would have been reduced or eliminated?"

In every area of the country engineering principles are applied so as to control existing local exposures. In some areas earthquakes have to be considered—in other areas, cyclones or tornadoes. At Texas City the plant was designed to withstand the force of hurricanes. In 1943 it went through a hurricane during which the wind velocity reached some 138 miles per hour. Under this terrific force the plant did not suffer in the slightest, the only damage being a paint loss due to the abrasive action of the wind and sand on the exposed steel work. So change of design does not seem to have been indicated; the buildings and equipment withstood the forces for which they were designed.

Locating the buildings in a different pattern would not have helped the situation. There was no area of the plant that was free from the destructive force of the blast.

Second "Could the sprinkler and foam systems have been improved upon? Bear in mind that this plant was built in 1942-43 and that the most modern, efficient systems available were installed. Whether or not they would have functioned in accordance with their specifications is not known. They had no chance to operate. All service lines and power were immediately cut off by the blast, and the systems themselves blown apart.

"Was the fire fighting apparatus adequate?"

Again the equipment at this plant was of the most modern design; and we feel that it was entirely adequate, as it had functioned successfully in the past. The apparatus had no opportunity to prove its usefulness be-

cause it was blown apart and rendered completely inoperative.

By the same token supplies of emergency equipment, gas masks, fire blankets, asbestos suits, gloves, etc. were destroyed and buried or rendered useless by the initial force of the blast.

"Were the fire crews and emergency crews adequate? Were they efficiently trained?"

In our opinion the fire and emergency crews at this plant were the finest in the country. They had absolutely no chance to prove their worth for the most part, because practically all of them were either killed or so severely injured that they could not function after the initial blast.

So much for the situation as it appeared before and immediately after the blast. Nothing either of a mechanical or of a human nature had an opportunity to function in a normal way; and, accordingly, we are unable to place our finger on much that can be changed or corrected in the light of the experience we gained at that time.

"How do people act in the face of such a catastrophe?"

From my observation the morning following the blast I can truthfully say that I have never seen such heroic self-sacrifice on the part of people. Everyone was anxious to do something to help—in many cases those who wanted to help were suffering from severe injuries and needed help themselves. Nevertheless they spent long hours helping people who were less fortunate than themselves. Briefly the situation seemed to be that no matter which way a person looked it was not hard to find someone who needed help and in a great many cases needed it worse than they themselves did. During the time that I spent at Texas City I saw literally no cases of hysteria. Excitement, yes, but after the first day there was a unified singleness of purpose that was wonderful to see and be a part of.

"What rescue and recovery procedures were set up and how did they function?"

Immediately after the blast the area began to be patrolled by the Department of Public Safety of the State of Texas. This organization permitted no one but authorized persons to enter the area. Crews of voluntary workers searched the area for the bodies of

those who were killed or injured. In our own plant voluntary crews made up of men who worked for Monsanto and outside volunteers under the guidance of Monsanto men searched our plant. As the bodies of victims were located identification was placed on them and they were sent to the morgue for embalming and identification. In so far as the function of these search crews was concerned they did a marvelous job, literally moving the plant by hand, almost brick by brick.

In so far as the identification of personnel was concerned, the Bureau of Identification of the Department of Public Safety of Texas did a marvelous job. The men who staffed this identification bureau were thoroughly familiar with what they were trying to do and left no avenue unopened in their efforts to identify everybody located in the disaster area.

Since the disaster the question has been asked of us a number of times, "What do you propose to do about the establishment of a permanent disaster organization?"

We have given this question a great deal of consideration and are of the opinion that the establishment of such an organization is important. However, in the organization of such a function a number of things have to be taken into consideration. The first and most important of which is the question—who shall staff the permanent disaster group? In attempting to answer this I wish to state that in my opinion the exclusive use of local plant personnel is not good policy. Under disaster conditions there is every possibility that your disaster group will be completely torn apart. The organization's leaders and its members may very likely be rendered inoperative.

For this reason I believe that an emergency organization should be set up on a company-wide basis. In other words I mean that individuals from various plants should be selected and given authority to proceed immediately to the scene of a disaster. Primarily these men should be selected for the qualities they have which are useful in such conditions. Beyond all other qualifications they should be the type of individual who works best without immediate direction and is capable of making his own decisions rapidly and following through on them.

October 9, 1947

**Joint Session with Propeller Club, Port of Chicago**

Presiding: CARTER KENDALL, Asst. Chief Safety Eng., Bethlehem Steel Co., Inc.; STUART B. BRADLEY, Attorney-at-Law, Seago, Pipin, Bradley & Vetter, General Chairman, Propeller Club, Port of Chicago

**The Purpose of the Marine Section, N.S.C.**

By CARTER KENDALL

Asst. Chief Engineer, Bethlehem Steel Co., Inc.

We are concerned with the maintaining of a vigorous, virile American Merchant Marine; a fleet that can take and hold the seas, the Great Lakes and our inland waterways; mariners who are so proficient that cargoes and passengers will be delivered safely at the scheduled destination; shore and harbor facilities of sufficient capacity and scope to handle cargo movements efficiently and promptly; and dock yards capably managed so that necessary repairs are accomplished with the very minimum of delay.

Does the Marine Section of the National Safety Council have anything to do with attaining these objectives? Most assuredly! Unless every segment of the maritime industry operates safely, there will be expensive and wholly unnecessary delays. Accidents can and do take place all along the line—on the piers,

aboard the ships, in the shipyards and during the voyage. Accidents result in loss of both time and money through damage to equipment and injury to personnel. They can be prevented by careful planning, adequate supervision and logical practical safeguarding of recognized hazards.

It is the purpose of the Marine Section of the National Safety Council to unite the efforts of enlightened management in a concerted, coordinated drive on accident causes; to pass the word to those not so well informed on how accidents can be prevented and to exchange mutually beneficial information on accident control; all to the end that needless damage to equipment, ships and machinery, needless injuries to and slaughter of personnel will no longer be a by-product of our American Merchant Marine.

**The American Merchant Marine and the Shipbuilding and Ship Repair Industry**

By L. R. SANFORD

Executive Vice President, Shipbuilders Council of America

We have had two valuable, but extremely expensive, lessons in the last two wars as to the vital necessity for both an active and adequate Merchant Marine and a sound shipbuilding industry.

An adequate Merchant Marine is necessary to these United States for two reasons, first, for national security, and, second, to promote our foreign trade and domestic prosperity.

History demonstrates that only strong nations can maintain peace. Whenever there have been comparatively long intervals of

peace, as there have been occasionally, the power to wage war and particularly to control the seas was the key to peace.

The Merchant Marine and the Navy are inseparable and interdependent. The Merchant Marine serves as an auxiliary to the Navy, without which the latter could not function effectively. The Navy maintains the freedom of the seas and keeps the sea lanes open throughout the world for merchant ships.

Early in our history, the Merchant Marine

served as a Navy, and later became the nucleus from which a Navy, as such, was developed. Developments, technological and otherwise, in the Merchant Marine are ultimately reflected in the Navy, and vice versa. Each requires technical staffs and skilled craftsmen for design and construction, and each advances the art in the interest of both.

After World War I, the Merchant Marine was permitted to deteriorate and disintegrate. As a supreme gesture, in the interest of future peace, the United States subscribed to the theory of limitation of armament and practically scrapped its Navy. So we had neither Merchant Marine nor Navy in an effective form.

It now has been conclusively demonstrated that any theory that equality or limitation of military power will prevent war is fallacious, unless there is existing power capable of and ready and willing to enforce the terms of such an agreement. Unfortunately, we cannot rely on all the signatories to such an agreement to continue to act in good faith.

The military strategy of the United States is based on the premise that the best defense is an offense to keep the war away from this hemisphere. Hence, the first line of defense is a powerful Navy and Air Force, backed up and made effective for operation at any time, anywhere in the world, by an adequate Merchant Marine.

Prior to World War I, we had neglected our Merchant Marine and our shipbuilding industry. On the outbreak of the war in 1914, we had neither the ships nor the capacity to construct a large number of either merchant or naval vessels. The war created a heavy demand for merchant tonnage, and caused the withdrawal from our trade of foreign flag vessels on which we had been custom to rely for the transportation of most of our exports and imports. Every seaport became congested with exports which could not move for lack of tonnage. Vitality needed imports ceased to flow into the country. However, over 2½ years elapsed before our entry into the war, during which time American shipyards concentrated on the construction of ships to the order of American and Allied operators. Hence, in 1917, United States shipyards, already working to the limit of existing capacity, were at least partially prepared for the war shipbuilding program that followed.

Now take World War II. Germany invaded

Poland on September 1st, 1939 and France and Great Britain declared war on September 3rd. We declared war, as a result of Pearl Harbor, on December 8th, 1941. Again, we had over two years in which to build ships and prepare for the inevitable.

Fortunately, under the Merchant Marine Act of 1938, the national policy on the Merchant Marine, originally declared by the Congress in 1916 and again in 1930 and 1938, was reiterated and confirmed. We had already commenced a long-range shipbuilding program in 1938 which, after September 1, 1939, in view of the apparent inevitability of ultimate war and the critical shortage of seagoing tonnage, was accelerated several times before Pearl Harbor. In addition, an emergency shipbuilding program was initiated early in 1941 to meet a threatened world tonnage shortage, which program was further accelerated prior to Pearl Harbor.

With the end of the war in sight, we had already begun to curtail the war shipbuilding program, and, after the surrender of the Japanese in the Far East, all ships under construction were cancelled except those so far advanced toward completion that it was deemed economically sound to complete rather than scrap them, and a few—a very few—that could be converted and adapted to specific peacetime needs.

You may well be inclined to ask, as many other already have, why we need more ships at this time when we came out of the war with well over 9000 merchant ships. Unfortunately, there are certain types of ships that are in short supply, practically none of which were constructed during the war. I refer particularly to passenger liners and combination cargo and passenger ships.

Prior to our entry into the war we had in operation a total of 118 ships of these types. Many of them (51 to be exact) were lost during the war. Ten have been retained by the Army or Navy and ten have been sold to foreign operators. Others of advanced age were so radically altered for war service and subjected to such strenuous service that it is economically unsound to attempt to recondition them. Thirty in this category are presently laid up. The net result has been that, of the prewar fleet of 118 passenger and combination cargo and passenger vessels, a fleet even then totally inadequate for national security, only 37 vessels (of an average age of 18.3 years as of the first of this year, 1947)

are now in service, or will be in service when all reconditioning now under way has been completed. To these may be added a total of 17 combination cargo and passenger vessels completed and delivered since the war.

Thus it is evident that we have, or will have, a postwar fleet of this type equivalent to only 48 per cent of our prewar fleet of passenger and combination cargo and passenger vessels. The high cost of operation, coupled with railroad competition at discriminatory rates, has practically wiped out not only present operations of this character but even plans for future operation. And yet, from a national security angle, they are a most important factor.

Military strategists agree that, in the case of a future national emergency, there is little likelihood that there will be any other nation standing between us and an enemy, or that there will be any period of grace during which we can prepare. Ships are not built overnight. We must be prepared to act immediately, and ships of the proper types must therefore be instantly available to transport men and supplies wherever needed.

There is a school of thought to the effect that ships are outmoded and that the next war will be fought in the air with atomic weapons. More thoughtful consideration indicates, however, that despite any initial damage inflicted by air power and atomic weapons, such a conflict cannot be carried on and successfully consummated without a heavy movement of military and naval forces, with their supporting supplies and equipment, for acquisition of advance bases and for ultimate actual invasion and occupation of an enemy country. Ships will still be indispensable for any such activities.

All this means that we must have an active and adequate merchant marine to supplement the Army and Navy. The mere fact of the existence of a strong Merchant Marine, backing up a powerful Navy, would have a most salutary effect on the ambition of a would-be aggressor and would thus provide a potent instrument for the maintenance of peace.

It will be alleged that the cost is prohibitive and that, in the face of a drive for governmental economy, it cannot be justified. Well, Armies and Navies are costly—very costly. Yet we do not advocate doing away with them. We realize we must have them,

despite the cost, to provide for our national security.

We all acknowledge, or should acknowledge, the need for governmental economy, but we know that in government—the nation's business—there are certain fixed expenses which cannot be eliminated, just as there are in our own businesses, and in our domestic lives. These expenses are in the nature of insurance.

It can be assumed then that we agree that we must have an adequate Army, Navy and Air Force. Our military and naval forces are helpless and cannot function effectively outside the continental limits of the United States without the support and active cooperation of an adequate Merchant Marine. It appears equally logical to leave the definition of adequacy as respects a Merchant Marine to those best qualified to judge.

After all, the cost to the Government of an adequate Merchant Marine is very moderate, a small fraction of the cost of an adequate Army, Navy and Air Force, but of vital and equal importance. The only cost, as far as the Government is concerned, which means you and I as taxpayers, is the cost of the construction and operating differential subsidies provided under the Merchant Marine Act of 1936.

We have no subsidies in connection with the Army and the Navy, because we as a government, pay 100 per cent of the cost, both construction and operation. Or, to put it another way, we subsidize the Army and Navy 100 per cent. But in the case of the equally vital Merchant Marine, where we only pay a fraction of the cost, because we are fortunate enough to be able to utilize, as an instrument of national security, a commercial operation which nearly pays its own way, we pay only a partial subsidy.

We pay this subsidy for foreign trade only, to cover the difference, both in capital investment in ships and in the cost of operation, between the cost to an American flag operator and the cost to a foreign flag operator in order to place the American flag operator in a position of parity with his foreign competitor.

Those opposed to such a subsidy fail to realize that the interest, alone, on the cost of the last war's shipbuilding program of merchant ships, if expended wisely over a period of years prior to the war, would have more than provided us with an adequate merchant

marine of modern up-to-date ships of all necessary types.

War is wasteful and expensive. All war construction is wasteful and expensive, shipbuilding no less than other industries. A shipping operator gets much more for his money in normal times. He can plan intelligently and systematically for properly scheduled additions and replacements during peacetime. Furthermore, ship replacements may be staggered in an orderly fashion to provide a reasonable continuity of production which makes for lower costs.

All the ships constructed under a war program become obsolete or reach the end of their useful lives at approximately the same time which, of itself, creates a difficult economic problem.

Now we are faced with the same situation again. We have a very large number of certain types of ships. We need other types, and we also need to plan for the orderly replacement or supplementing of those types we do have, so that eventually we will have not only an adequate and well-balanced Merchant Marine, but also one in which the normal age pattern is consistent with the ultimate perpetuation of the Merchant Marine in an orderly and economic manner.

Prior to the war, the Maritime Commission, in order to implement its long-range program, adopted pursuant to the 1936 Act, designed several standard cargo vessels of different sizes and speeds. These designs included the latest advancements in the arts of naval architecture and marine engineering. They are commonly known as the C1, C2 and C3 types.

The C4, a larger type of cargo vessel, was developed and constructed during the war. Some of this type were converted to troop ships and transports and a few of them are now in temporary passenger service, due to a complete lack of other passenger vessels. They are at best merely a stop-gap and not suitable for conversion to permanent passenger vessels. They do not comply with our present legal requirements for passenger vessels and are being operated only temporarily in such service on waivers authorized by the U. S. Coast Guard pursuant to the necessary action by the Congress. Those C4's not ultimately absorbed in the peacetime fleet will undoubtedly become part of the permanent reserve fleet, available only in case of national emergency.

We have a surplus of high class tankers, some of which recently have been authorized for sale to foreign flag owners to relieve a present shortage in world tanker tonnage. Others will form an invaluable part of our permanent reserve.

More than 2500 Liberties were constructed during the war. This group forms the backbone of our present merchant fleet as far as numbers are concerned. The majority of these cannot be utilized in normal peacetime service. Some are being absorbed by American operators to supplement their present fleets for certain types of service. Some are being utilized as transports, at least for the present (usually under charter). Many have been sold foreign. Other have been lost. The badly damaged ones are being sold for scrapping. But there still will be a large group remaining as a part of the permanent reserve.

A brief comment on the Liberty type vessels may be helpful as there is much public misconception about them.

The propelling power of the Liberty is not modern, nor is it particularly efficient. They are too slow for most scheduled services, being only about 11 knots. The present trend is toward higher and higher speeds in both dry cargo vessels and tankers, as well as in combination cargo and passenger vessels. In justice to the Liberty, however, it must be stated that they are exactly what they were designed to be and that they rendered invaluable service during the war, which war service was the sole purpose for which they were designed and built.

We also have a substantial number of Victory ships, designed during the war and constructed during the latter part of the war in lieu of Liberties. They are equipped with modern propelling machinery and have a speed of 17 knots. They are suitable for peacetime operation in many services. Many of them are being so utilized at present.

The national policy, as set out in the Merchant Marine Act of 1936, states that it is necessary for the national defense and development of its foreign and domestic commerce that the United States shall have a Merchant Marine and that it is the policy of the United States to foster the development and encourage the maintenance of such a Merchant Marine.

It is difficult for many Americans to realize the stake that business and agriculture have in foreign trade and the part that the Ameri-

can Merchant Marine plays in that connection.

We not only need foreign markets for the sale of our own products but also we need to develop markets in this country for foreign products, as well as sources of supply abroad for such products. We need imports to furnish dollars to foreign nations with which to purchase from us and promote our own export trade, the lack of which may well prove to be the difference between a profit and a loss in many an industry.

The German, Japanese and even to some extent the Italian merchant fleets are presently non-existent. Prior to the war, they did a tremendous business. Who is going to take over that business now? Are we going to sit back and wait for foreign flag lines to take it over?

We have an unparalleled opportunity within our grasp. It will not come again. Other seafaring nations are feverishly building ships of all types, determined to make the most of the opportunity. Foreign shipyards are booked to capacity for years ahead, but the shipways of our country lie idle.

We should not fail to note that many nations, particularly small nations, not previously merchant marine minded, have, since the war, embarked on merchant marine programs of their own. In addition to the former seafaring nations, such countries as Ireland, Switzerland, Canada, Australia, Colombia, Venezuela, Chile, Uruguay, Argentina, Brazil and even India and Iceland are building up merchant marines as a means of promoting their foreign commerce. The former seafaring nations who suffered severely during the war and whose economic plight is now desperate, like Great Britain, Norway, Belgium, Holland, France and even Italy, are nevertheless bending every effort to replace and augment their merchant marines. Russia is planning to greatly expand its merchant marine.

You have undoubtedly heard the adage "Trade follows the flag." It does. It has been proven. But trade is much more likely to follow the flag and in greater volume, if that flag is flying from the right type of ship—the best ship in the service—a combination cargo and passenger ship.

Passengers and freight travel together. Where there are passengers, there will eventually be freight. And if the volume of freight ultimately becomes too heavy for the com-

bination ship, the service can always be supplemented with straight cargo ships, or perhaps more combination ships may be justified and more frequent service.

If you are planning a trip overseas, you will select the best and fastest ship. If you are planning to ship goods abroad for export, again you will select the best and fastest ship, excluding, of course, passenger liners. Hence, we must always be just a step ahead of our competitors in the quality of our ships. The modern long-range cargo ships and tankers we now have are just that. But they won't be for very long. Unfortunately, we have mighty few of the combination cargo and passenger type.

An important factor which should not be overlooked, is the fact that the operation of an adequate merchant marine enables this country to retain some measure of control over freight rates in foreign trade. Active and aggressive competition tends to keep freight rates within reasonable limits.

There is another angle to this matter of foreign trade, aside from the purely economic angle. As a result of the last war, we have found ourselves in a position of world leadership. Leadership always involves responsibility. Existing and prospective world conditions have radically changed our relative position in world affairs. Even if we are to maintain merely our prewar position in the overseas passenger business, relatively poor as it was, we must have passenger and combination cargo and passenger liners appropriate for the various services.

But a Merchant Marine cannot be maintained without the continuous construction of new vessels, of the types required for all purposes, as well as to replace obsolete tonnage. Thus, at all times, that Merchant Marine should be currently maintained at a level at least the equal in quality and character of any afloat, by incorporating in new vessels all advances in the twin arts of naval architecture and marine engineering, wherever they may originate.

The services particularly lacking at present are those in which high speed passenger liners are required, such as the Mediterranean, the North Atlantic, the South American and the trans-Pacific. In addition there are services in which combination cargo and passenger liners are required, such as the Round-the-World, Far Eastern, Baltic, European, South

African, Alaskan, Coastwise, Intercoastal, and others.

Why then, you may ask, do not our shipping lines immediately place orders for the new ships that are so badly needed?

The physical factors pertain to the character and volume of the prevailing commodities transported, passenger demands and the limiting characteristics of the ports served. Less tangible factors are the prospective volume of business and the applicable rates, long term financing of ship construction, taxes, insurance, government regulations, and last, but not least, maritime union demands. Operating costs of all kinds are in a rising spiral, but the payroll is the most serious item.

There is an ever increasing trend toward less work for more pay, increasing union limitations on the amount and scope of the work performed at sea on straight time resulting not only in heavy overtime costs, but also in increased shore operating and repair costs, as well as increased port time, and hence a decreased number of tonnage-years per year. A ship earns money only while she is at sea.

The maritime personnel situation is grave. Even though we get the ships, we must have competent personnel willing to do an honest day's work under the supervision of the ship's officers, as the representatives of management, and not subject to the whims of union delegates. We must sail our ships on schedules, free from quickie strikes and unweathered picket lines which other unions will see cross.

All of these factors not only make it extremely difficult for a shipping operator to plan the amount and character of new tonnage, but also make such an operator somewhat reluctant to invest in expensive ships, with respect to which he has no reasonable assurance that there will be a sufficient profit on operations over a long term period to pay dividends sufficient to justify the investment, or even to operate on a profit basis at all.

Under the direction of the late President Roosevelt, the Maritime Commission proceeded to implement his "bold and daring plan" by developing the design and plans for a limited number of large high-speed passenger liners on oceanic trade routes. The program as developed was approved by the President and by the Navy, after which it was presented to the Congress by the Maritime Commission. After extensive hearings

this program was authorized, as well as the use of the necessary funds therefor. The Maritime Commission invited bids. A contract award had been made for three liners for Mediterranean service. Another award was pending for liners for South American service. Invitations had been issued for bids for liners for trans-Pacific service. Preliminary design work was under way for liners for trans-Atlantic service.

Then, in July, 1946, the program was suddenly suspended by the Administration. The main reasons given for the suspension were the necessity for national economy and for the conservation of certain critical materials and equipment in short supply and needed for uses other than shipbuilding. Since then the program has been in a state of suspended animation.

However, there is now a possibility of a change for the better. Early this year, the President appointed an Advisory Committee on the Merchant Marine to survey the entire shipping and shipbuilding situation and make an appropriate report and recommendations to him. This Committee, consisting of four outstanding businessmen and one high ranking naval officer, has been holding hearings at which all interested parties have had an opportunity to present their views. The Committee is now in the process of formulating its report and it is hoped that the report will be released in the near future.

It is anticipated that the recommendations will be constructive and predicated on the basic realities of national security and foreign trade. In the event that the President endorses the Committee's recommendations and requests the Congress to take appropriate action to implement them, the next step is then up to the Congress.

That is where those of you here and other groups can and should play an important role. You must first educate yourselves on the necessity for a Merchant Marine. Then, if you are convinced that the program is sound and in the interest of the nation as a whole, you are in a position to discuss the matter intelligently and forcefully with your respective representatives in Congress.

What I have said heretofore has related almost entirely to the necessity for an adequate American Merchant Marine, as such, and little mention has been made of the Shipbuilding and Ship Repair Industry with which I am associated and which I represent.

The national policy is based on American flag ships constructed in American yards, recognizing that shipbuilding is as vital to the national security as the Merchant Marine.

At the present time, however, the shipbuilding branch of the industry is in rather desperate straits and there is some question as to whether or not it can survive.

Shipbuilding, like many other heavy industries, had the Government as its only customer during the war, but unlike those other heavy industries, upon completion or cancellation of the war program, it cannot turn to a waiting domestic market, fortified with a heavy backlog of orders for its peacetime products. It faces an oversupply of most types of vessels as a result of its own war production, and a reluctance on the part of either the Shipping Industry or the Government, its only two potential customers, to invest in expensive ships under conditions inevitably obtaining after a war, particularly one of the magnitude of the last war.

The wartime shipyards constructed with government funds and operated for the government have long since closed down and either have been liquidated or are now in the process of liquidation. But the permanent shipyards which form the backbone of the industry find themselves with expanded facilities—expanded in part at least by the investment of their own capital—and little or no business in sight.

A shipyard is not a mass production industry as we know that term. It does not manufacture a great volume of relatively low unit value items of the same design for sale in a wide-spread market. On the contrary, it manufactures relatively few items, each on a special order from an extremely limited market, viz., ships of various types, ranging in cost from \$6,000,000 each for the simplest types of cargo ships up to \$60,000,000 to \$90,000,000 each for large passenger liners and \$75,000,000 or more for a battleship.

The shipbuilding business is a highly specialized business, employing certain facilities, crafts and personnel not known in other industry. The design of a ship itself is highly specialized and requires a well rounded and expert technical staff of broad training, based on years of experience and continuous practice. The construction requires highly specialized and skilled craftsmen and supervisors, as well as properly laid out yards furnished with necessary facilities and equipment.

If a shipyard is forced to close down or even radically curtail its operations for lack of work, this skilled personnel is dissipated and their talents lost.

The ship repair branch of the industry does not immediately feel the effects of a cessation of shipbuilding. As long as ships are in operation, repairs are required.

A decrease in the volume of shipping ultimately is reflected in a decrease in the volume of repairs. A ship repair yard like a shipbuilding yard is a highly specialized operation and cannot afford loss of its skilled supervisors and mechanics for lack of work.

A natural question arises as to why shipyards do not turn to some other form of industrial activity when there is a depression in shipbuilding. To a limited extent they do. They tried it after World War I, and some of them are trying it in a small way now. Such operations, however, cannot be expected to achieve satisfactory results. A shipyard is designed to be a shipyard and nothing else. It has neither the layout nor equipment to fit into mass production procedures with which it would have to compete. It, therefore, is severely handicapped in any such operation. Added to that, is the fact that its wage rate structure is substantially higher than that of other heavy industries. In the face of that condition, the industry is even now confronted with a prolonged strike to force a further increase in wages which will result in an even greater disparity in wage rate structures as compared with other industries. Hence the prospect of the industry turning to other industrial activities with any hope of success is remote indeed.

It should not be overlooked that the shipbuilding industry is equally vital to the Navy and to a lesser extent to the Army and the Coast Guard. Navy yards are primarily intended for maintenance, and, in any event, do not have the capacity nor the design staffs to undertake extensive naval construction. During the late war, the Navy relied largely on the industry for both design and construction of combatant and auxiliary vessels.

To recapitulate, it is evident that, to safeguard the national security and to promote the national welfare and prosperity through foreign trade, we must have an adequate and modern Merchant Marine. Such a Merchant Marine will contribute to the maintenance of our national prestige at a high level.

In order to have such a Merchant Marine,

we must have a shipbuilding and ship repair industry.

That industry must have a reasonable continuity of ship design and construction in order to maintain itself in a healthy condition and thus retain its invaluable and irreplaceable skilled staff. It can then contribute to the accomplishment and maintenance of a normal age pattern in the Merchant Marine by producing modern up-to-date ships of all

essential types at regular intervals and at reasonable cost.

Hence, if we so plan and coordinate the necessary merchant ship construction and the necessary naval construction in time of peace as to create reasonable continuity of production in the shipyards, we will have accomplished many objectives, direct and indirect, all of them for a mere fraction of the cost of a war shipbuilding program.

## U.S. Merchant Marine and Safety

By JOSEPH K. CARSON, JR.

Commissioner, United States Maritime Commission

I should like to discuss not only the safety problems confronting American flag shipping as an industry, but also the U. S. Merchant Marine as a factor in the safety and security of the United States itself. We are placing the utmost emphasis upon safety in shipping in order to provide ourselves with a merchant marine that will be an efficient, dependable instrument of trade, travel and defense.

We, of the United States Maritime Commission, together with the leaders of the industry, are now endeavoring to reestablish our merchant marine on a solid economic basis. The shipping industry is a complex international business. One of the greatest problems facing this industry today is the multitudinous laws, rules and regulations with which every American ocean-going vessel has to comply.

We also have to comply with the safety rules and regulations of every foreign country and port at which our ships call. These foreign and domestic safety rules and regulations cover such items as:

- Scaffolds and stairways.
- Trunks and hatches to cargo spaces.
- Shaft alleys.
- Machinery.
- Cargo handling gear.
- Anchor handling gear.
- Electric wiring and lighting.
- And many other similar items.

The endeavor to comply with all of the safety rules and regulations has almost driven naval architects and ship operators to the point of mental derangement, because if the naval architect does not include such safety

items in the design of a vessel, the vessel is often fined for non-compliance with the regulations. Besides this, the vessel may be held up at a port for non-compliance and the loss in revenue to the ship operator, plus port costs may far exceed the penalty for non-compliance with the regulations. When I tell you that it costs about \$1,000 a day to keep a 10,000 ton freight vessel in port, and that this figure may go as high as \$10,000 per day for large passenger vessels, you can readily see that any delay in the sailing schedule will seriously increase the operational costs of any seaship operator.

There have been cases where our vessels have been held in foreign ports until certain small safety requirements have been accomplished.

There appears to be no doubt that the vessels of the American Merchant Marine are complying with more safety provisions than vessels under any other flag. Our peace-time vessels have more watertight bulkheads, properly spaced, for their length than any other merchant vessel. Our passenger-cargo vessels are better fireproofed than any other merchant ships afloat. We have made an earnest endeavor to comply with all foreign and domestic safety laws, rules and regulations but the cost has been entirely too high. At some point this must cease and we must get down to short economical strokes if our merchant marine is to survive.

Many of the foreign safety rules overlap in that they require the same installation in slightly different locations in order to comply with the regulations of two different

ports. For instance, in one foreign port two ladders are required in each hatch, whereas, in another port one ladder must be in the hatch and the other on a bulkhead. Nor have the safety regulations on our Atlantic, Gulf and Pacific Coasts yet crystallized into one firm set of safety rules recognized by all involved in this important problem.

In 1939, the Maritime Commission began a study of this matter but World War II precluded its completion. In 1945, the Maritime Commission endeavored to continue this study but the drastic cuts in our budget have again precluded its completion. We did, however, in August 1946, complete a tabulation of the foreign and domestic stevedoring safety rules and regulations for many of the principal ports of the world. A copy of this tabulation was forwarded to the National Safety Council for information.

All of the United States Maritime safety laws, rules and regulations were promulgated to protect American passengers, crews and stevedores. While in normal times about 75 per cent of our passenger travel has been in foreign vessels and all foreign vessels are loaded and unloaded in American ports by American stevedores, it is an astounding fact that foreign vessels cannot be compelled to comply with all of the American safety laws, rules and regulations, even though the foreign nations compel our vessels to comply with their safety regulations. The reason for this sad state of affairs is not attributable to any negligence on the part of our governmental inspection agencies, but because of treaties which foreign nations have made with the United States which preclude the enforcement of our regulations on their vessels. Whatever the cause, the effect places our vessels at a distinct disadvantage in competition with foreign vessels as it increases the cost of our vessels. Further, the lives of American citizens are not adequately protected on foreign vessels.

There would appear to be an answer to this problem. It is not an easy way out, but it appears to be the most logical.

It is suggested that the Marine Sub-Committee of the National Safety Council endeavor to write a safety code of minimum safety standards based on the recommendations of the Accident Prevention Bureau of the Pacific Coast Marine Association, San Francisco, California, and further, that the National Safety Council endeavor to have

this code accepted for ocean-going vessels by the Maritime industry on the Atlantic, Gulf and Pacific Coasts.

When such a code is accepted for all American ocean-going vessels, the State Department could then be requested to call an international meeting to endeavor to standardize these minimum requirements for the principal maritime nations and ports throughout the world.

Neither the United States Government nor the shipping industry will endeavor to evade any known law, rule or regulation which would aid in any way in the safety of lives or property, but it is felt that more effective safety precautions can be exercised as a considerable saving in cost if they are accomplished in a more orderly manner throughout the shipping world.

Any discussion of safety as it is related to shipping brings to mind the role of the Merchant Marine with regard to the safety of the Nation as a whole, and I would like now to add a few thoughts in that connection.

In the last 30 years the United States has fought two wars to end war. It is hoped that our second attempt has been successful. Out of the desperate efforts that the people of the world are now making to establish universal peace through the United Nations will come the fulfillment of our hopes. There is no denying, however, that progress toward that objective has thus far been discouragingly slow.

The achievement of a permanent peace depends upon the willingness of all nations sincerely to strive for that aim. It is upon that willingness that the future peace of the world depends.

While we should, to the extent of our ability, bolster the European nations in need of our help and get them on their feet in order that they can finish the job themselves, we must not weaken America in achieving that goal.

In a world situation like the present it would be pure folly for the United States to neglect any single factor of its national defense. The Merchant Marine is one of those factors which, let me emphasize, is not merely an auxiliary to the armed services, but is of itself a concomitant part of our national defense structure. If we regard the Merchant Marine like that—in its true light—we cannot fail to appreciate the necessity of main-

taining it as a primary instrument for defense.

The reason, I believe, many people do not understand the true role of the Merchant Marine in national defense is that the Merchant Marine, unlike the Army and Navy, takes off its uniform in times of peace. In other words, while the Army and Navy continue to be defense services in appearance as well as in fact, the Merchant Marine becomes a private business in time of peace. This unique feature of our merchant shipping establishment has a great practical advantage. During peacetime the Merchant Marine, as a private industry, in the main pays its own way, while the Army and Navy continue to be financed by the Federal Treasury, which is, of course, proper.

I have stated that the Merchant Marine pays its own way in the main. That is true. However, in many quarters it is believed that subsidies are paid to certain operators to insure that a profit is made by them. Nothing could be further from the fact. The Merchant Marine Act of 1936 as amended authorizes the payment of an operating differential subsidy when it is found that an American operator maintaining regular sailings over routes theretofore found to be essential to the foreign commerce of the United States is at a substantial disadvantage with foreign competitors with respect to the following:

1. Pay and subsistence of crew.
2. Insurance.
3. Repairs not covered by insurance.
4. Maintenance of vessel.
5. Any other factor which the Commission officially finds that is peculiar to a particular trade route.

None is will be seen that a subsidy is paid for a service rendered; namely, regular sailings over essential trade routes where foreign competition is such that the line in question could not maintain service without government aid. Let no one be misled. If you believe in a strong Merchant Marine, please do not permit the misapprehension to go unchallenged with respect to subsidies.

Construction differential subsidies are also provided in order that American purchasers may be permitted to acquire vessels at a cost comparable to that at which they may be constructed in foreign yards. It is necessary to encourage private owners to acquire new tonnage in order to keep our fleet modern.

Lack of unified international laws and regulations are a part of our high construction costs compared with foreign costs.

I would like to emphasize one more important point before I finish. We cannot maintain a Merchant Marine adequate to all purposes, as envisaged in the Merchant Marine Act of 1936, without a shipbuilding program. The thousands of ships we built during the war were built for war and they served their purpose in war. They were never designed or intended to constitute a peacetime, competitive American Merchant Marine. We need fast, modern ships, specially designed for special services, in order to stand up to our foreign competitors on the trade routes of the world. We especially need passenger ships—the fast, big ships that become troop transports in time of war. Right now we have only one such ship under our flag—the SS AMERICA—while other nations are crowding the trade routes with luxury passenger liners. While foreign countries are now engaged in large shipbuilding programs we are facing virtual cessation of shipbuilding in this country by early 1948.

The Maritime Commission has a plan for the building of such ships to balance the American Merchant Marine. I will not burden you now with the details of it, but that plan has been publicized and it is ready to go any time Congress provides the money. If we want to keep America strong economically, politically and physically in these troubled and uncertain times, we had better build up our Merchant Marine. To fail to do so is taking too long a chance.

To summarize this complicated problem of laws, rules and regulations with which the American shipping industry is faced, there is a definite and urgent need to bring about a coordinated code for our industry. Then our State Department can call for an international meeting and endeavor to make these minimum requirements world-wide. Until this is accomplished the United States Merchant Marine will be at a decided disadvantage.

Further I reiterate that the national defense requires that not a single one of our four great services be weakened; namely, the Army, the Navy, the Air Corps, and the Merchant Marine. Each one is an integral part of the whole.

I also wish to call your attention to the fact that subsidies are not paid for the pur-



pose of insuring profit to the operators but rather to equalize the difference between the standards maintained by the American shipping industry and its foreign competitors.

Finally, I cannot emphasize too strongly the need for the continuation of a construction program which will develop and maintain a modern, well-balanced fleet.

#### THURSDAY AFTERNOON SESSION

October 9, 1947

#### Shipbuilders Day

Presiding: L. R. SANFORD, Executive Vice-Pres., Shipbuilders Council of America

#### Control of Accident Hazards in the Scrapping of Vessels with Particular Reference to the Demolition of the Normandie

By MORRIS E. LIPSETT  
President, Lipsett, Inc.

The story of the dismantling of the former liner NORMANDIE is important to us inasmuch as every phase of safety was used in floating the vessel from her berth in Brooklyn, N. Y. to our Yard at Port Newark, New Jersey.

The ship was 1,039 feet long with a beam of 117 feet, requiring 56 feet of draft, and had 57 feet of free board. She was resting on the mud in the dock yards at Erie Basin in Brooklyn. It was necessary to move her at high tide, which that week was about six o'clock in the morning. A fleet of thirteen tugs had been engaged, and we waited for the opportune moment.

Finally, when the wind was right, the vessel was guided through the Great Kills Narrows; a task requiring intricate maneuvering. After a remarkably short time—only 5 1/4 hours—the vessel was tied up and secured safely at its present mooring.

Four pile clusters consisting of nineteen piles each were driven on the off-shore side, so that if the mooring lines or bollards should break she would be prevented from being set adrift. In the past this precaution has proven to be of the greatest value to us.

At the time the vessel was purchased, we realized the difficulty that would be encountered in her dismantling because of the great weight cantilevering over her stern and the large amount of ballast put into her hull at the very bow, setting up great stresses at

the upper decks near midship. The ideal dismantling place would have been in a drydock or graving yard large enough to hold her, but the charge for such facilities was prohibitive. Therefore, a plan was devised whereby we could dismantle her while still afloat.

To determine the stresses created in the hull and deckplates through the overhang at the stern and the ballast placed in the bow where the vessel had buoyancy, a stress gauge, known as the Whittemore Stress Gauge, was used. Readings of ten thousandths of an inch were made with this gauge.

To establish the stresses already in the vessel, we had to resort to some drastic experiments. Twice the side plates were cut down until they were overloaded and cracked. Another time our stress gauge points was placed on the overloaded shell, and then this portion of the shell was cut out. After it was released from the external stresses, this determined under what weight the rest of the shell was loaded.

We had 200 stations on the docks at various points on the ship so that we would be in absolute control of the stresses created. Readings of these measurements were taken twice daily at these stations, and these readings guided our dismantling operations and somewhat relieved our "mental stress."

A prime factor in the safe dismantling of the vessel was the precaution taken in the handling of burning gases; namely, acetylene

and oxygen. Throughout the pier, hydraulic flash-back arresters were installed, from which half inch hose led into the manifolds on board the vessel. Each manifold supplied oxygen and acetylene for four burners, so that in the event of a break in the lines, only four of the total of sixty burners would be affected.

To maintain and safeguard the line, a man constantly supervised and kept all burning hose in good and safe condition.

A laboring gang of forty men were employed to remove the debris and keep the vessel in a clean and orderly condition. Particular attention was given to having free passage throughout the vessel. All stairways leading to the lower decks were kept free from debris and foreign objects.

Each of two gantry cranes was served by a rigging gang of five men and a foreman. The foreman inspected the load and boom hoisting cables every morning before beginning operations. If they showed the slightest wear, they were replaced. Also, our slings and chokers were replaced as soon as they showed any weak spots. We had men in our own shop who were wire rope splicers, and our slings and chokers were made on the premises. There has not been a failure of any kind in the loading and shipping of one thousand cars, nor has a car been rejected by the railroad inspector, due to improper loading.

A guard service of six men was employed on 24-hour duty together with fire apparatus and equipment. When the side plates were burned alongside the pier, the dock was constantly holed.

Because of the size of the ship, it was impossible to bring it up on any ways or beach in the proximity of our working operations. Therefore, we had to resort to a few "Rube Goldberg" contraptions. A bulkhead was built every 30 feet. A hollow sheetmetal band was made to encircle the outer shell of the vessel between the two bulkheads. This sheetmetal strip was then covered with canvas. Burning operations were started from the inside center to the sides, thereby causing a seepage of water instead of a pressure flow. The seepage was pushed aside with an air pressure hose, keeping the area dry where the acetylene torch was cutting. We burned to the sides, leaving a sticker of 18 inches on each side and our chokers were placed dead center. When our pick was made, the stickers were burned and approximately 60 ton pieces

were landed on the pier where the material was prepared in shipping size and loaded in gondola cars.

At present we have dismantled about 300 feet of the vessel in the water by the method described above. We will drive three bents made up of 18 inch columns underneath the bow of the ship and move the last part on the bents at high tide and complete our dismantling there.

To ballast the vessel, several thousand tons of water were pumped into the bow, while we were cutting the stern and that process was reversed when we cut the bow, pumping the water out as necessary.

In conclusion I want to say that experience has taught us that accidents are due to the following:

- 1—35 per cent to faulty equipment.
- 2—25 per cent poor supervision.
- 3—25 per cent to inexperienced help, etc.
- 4—15 per cent unavoidable.

All of our operations are handled in keeping with the lessons we have learned "the hard way."

Our equipment, pneumatic tools, line block and falls, steel cable, etc. are kept in good condition so that no accident or injuries to our employees can happen from this cause.

One of the hazards encountered in our business is the fumes created by burning painted steel. Paint contains a large amount of lead, the fumes of which cause lead poisoning. A great deal of research has been done by our organization in order to find a remedy for this problem which seemed insurmountable in our early days of operation.

Since then we have used air-line respirators, giving our men a pint of milk twice a day, one pint at ten o'clock in the morning and one pint at three o'clock in the afternoon, to build up calcium, thereby creating a resistance to lead poisoning. Further, a medicine which we call a "Pink Lady" is given the men when necessary.

Every effort is made to be good housekeepers on our contracts; that is, keeping the sites clean, inspecting cable lines; hose, covering holes, valves and stairways. This always pays dividends.

The insurance carrier naturally is very much interested in a safety program to reduce the injuries of employees, but we have found that occasionally hardships are placed upon us by them through their own in-

perienced personnel. In most cases the cooperation between ourselves and the carriers is 100 per cent, but occasionally we run into an arbitrary fellow. If we cannot convince him that he is wrong, we shut down our operations until an understanding is reached as to method, because we have had some bad experiences in the past. As an illustration, one carrier insisted that each burner should

be tied with a life line to a member of a steel structure. A fellow worker, not being alert, and forgetting about the life line, burned this member loose, which caused the other fellow to fall and be seriously injured. In another instance, the carrier insisted that life preservers be worn. A life preserver caught fire, causing serious burns to the employee's body.

### Control of Accident Hazards in Ship Repair Work with Particular Reference to Asphyxiation, Fire, and Explosions

By I. C. YATES

Director of Safety, Alabama Drydock and Shipbuilding Company

Effective accident control can be accomplished if the problem is recognized at the proper time and the necessary technique applied.

Safety engineers in ship repair work have varying conditions to compete with, due to the different type ships that come in for repairs, and the variation of individual problems dealt with. Therefore, it is imperative that the most effective control methods be applied in order to prevent accidents.

It is also important that the safety engineer have previous ship repair or marine experience, and be a man of more versatile nature.

In order to effectuate accident control, there are several things necessary or at least that would be of great help in the program. Namely, management's receptive attitude, supervisory training (especially in accident prevention), and suitable locality or layout of yard, with sufficient space facilities and equipment, etc. These are of major importance and have to do in a great way with the success of the program.

Accident control in ship repair plants suffered a slight relapse at the close of World War II, due to the sudden "let down" in operations, or in the change over from war to that of peace. This sudden "let down" was one which no one in particular could possibly have prevented, but there were some things that could have been done that would have helped tremendously in keeping the accident prevention program in full force.

In particular we mention—during the war our slogan was—"Conserve Manpower for Warpower," which did appeal to all of us in

doing our bit, but we possibly in some instances did neglect to substitute that slogan for an all time slogan of, "Prevent losses and preserve the peace."

The safety engineer is the designated person to locate these costs due to accidents, and effectively present them to management in order to gain effective control.

Had all safety engineers grasped this one very important solution and applied it properly, there would not have been, as likely, any "fog of confusion" to come out of, with reference to accident control immediately following the close of the war.

It is very easy to say, "Save cost—prevent loss," "safety pays dividends," etc.; but actually, who is going to do the job? The safety engineer, because it is his responsibility. How? By simply and effectively bringing from darkness into light the one thing that is of interest to all industrialists, "Cost."

Accident control is not a productive schedule designed to make money alone, but one which can be "geared up" to save money for the production program, in order to bring about successful operation.

To effectively start methods of accident control through the presentation of accident cost, the safety engineer must be familiar with operations of all crafts, and must constantly be in circulation through every department in the plant, over and into every section and compartment aboard ship. He must "rub shoulders" with the craftsmen in order to understand their problems, methods of doing the job, and above all to gain their confidence and respect.

The actual picture of the job, or even the accident, positively cannot be gotten from a drawing or print, from the foreman's report, or from the first aid report, neither can it be gotten through narration on the part of others. The safety engineer must get the information first hand, in order to know or do anything about it.

The presence of the safety engineer in the "belly of a ship" is better than any other method in getting the know-how and confidence that is so very necessary in putting over the most effective control of accidents.

Yes, it is still a selling job. Everyone has to be sold from the president to the porter, and especially the supervisor or foreman on the job. When the supervisor is sold and he definitely knows that you are trying to help him lower cost on his job, he will then be willing to help you, by helping himself in the prevention of accidents.

You can't sell a boilermaker and a machinist on the same basis, and by the same token applied technique in the control of accidents is different. This is where job analysis comes into the picture, and the safety engineer must be capable of digging up the facts, and presenting them effectively in order to gain the objective.

We have certain basic principles set up within the industry that are good, and we are obliged to follow them, but they do not always apply to the specific job or place, due to varying climatic conditions, locality, type of ships, working conditions, etc. The control technique must in a great way be applied according to these outstanding conditions.

It is said that the supervisor or foreman is the "key man" in any industrial accident prevention program. This fact is acceptable, because again in the Ship Repair Safety Program is very dependent, and without this "key man" the control of accidents cannot very successfully be accomplished.

We have in ship repair work three hazards that are commanding and require considerable effort toward their control. These hazards are: asphyxiation, fire, and explosions.

Asphyxiation might well be termed the "silent killer," because near victims tell us that it is not evident until it is often too late.

Whether with us that the word asphyxia means "the condition of lifelessness occa-

sioned by suspension or interruption of respiration."

Due to the many spaces aboard ship where it is possible for this hazard to exist, it is very necessary that we gain control of this situation by strict or positive means.

The danger due to toxic gases or vapors is much easier detected compared to where there is a deficiency of oxygen, due to compartments having been closed for long periods. The sense of smell very often tells workmen that there are gases or vapors present, and that they should not enter that space, but that by no means is any method of controlling the hazard. The means of control will have to come from a higher source or from better insured methods than the "slipshod" or "trust to luck" way of doing it.

First on the list of control methods is company policy. If the firm or management intends that this hazard be controlled, it will be so done by adoption of strict policies regarding same. Secondly, and we say the most important, is supervision from those employed in that capacity directly on the job. Without the supervisor or foreman's assistance in seeing company policies carried out, the cause is definitely lost.

Third on the list of control measures, we offer safety and first aid training to all employees, and in particular the foreman. This training serves as a reminder to them, as to the dangers of the hazard, and teaches respect for it. Any employee who has had first aid training is definitely more safety conscious and a better fitted workman. The forceful addition of the "human element angle" into the job instruction training, usually results in a careful operation. Teach the employee the types and uses of safety protective equipment, and you awaken his sense of responsibility, as far as this hazard is concerned.

There are certain other control methods that are necessary, such as the inspection and testing of the area before work starts, placement of warning signs, installation of ventilation, necessary work restrictions, etc.; but these are of no value unless the policy, supervision, and training are brought to head the list of control methods.

Some ship repair safety engineers may think that ventilation is the answer to this problem; although it is very necessary, it is not altogether the answer by any means.

If there is a definite established policy, strict on-the-job supervision, with sufficient

safety training, all the others serve as important additions to direct accident control.

Workmen have been known to remove man-hole covers, and go into inner bottoms, peak tanks, and other confined spaces, before tests or inspections were made, and even before ventilation was installed. Even though precautions are required, they are sometimes neglected and workmen lose their lives. No compartments should be opened or gone into, unless under personal supervision of the foreman in charge.

The use of chemicals for cleaning purposes, spray or brush, painting in confined areas, has caused workmen to be overcome by these fumes. The installation of ventilation and the use of protective masks under the direction of the supervisor is an effective means of control.

Even devices originally designed for safety, have been known to cause death due to their improper use or for the lack of necessary precautionary measures.

This is particularly true in regard to the use of CO<sub>2</sub> gas systems aboard ships for control of fires. Cases are on record where these systems were accidentally released into confined areas and workmen were asphyxiated.

Some CO<sub>2</sub> systems are electrically and others manually controlled, but neither is insurance enough against the possibility of accidental release during the process of the ship's repair or conversion. It is suggested that to insure safety of these systems during the period, that each system be secured at the source, unless same would conflict with insurance or Coast Guard regulations.

A definite policy and course of procedure should be established regarding the control of CO<sub>2</sub> gas systems aboard ships during repair or conversion periods. This should be given immediate attention by those in authority in the marine industry.

Few persons give any thought to the air we breathe, and in most cases assume that it is odorless or tasteless, and at a reasonable comfortable temperature, it is acceptable for working conditions. This is definitely a very poor method upon which to risk the lives of persons.

Repeated tests of the air should be made during all stages of work process. Continuous inspection of the work areas should be made by those in authority, and rigid inspection and maintenance of protective equipment should be carried on at all times.

The most careful consideration given the hazards involving asphyxiation is necessary to maintain control.

The most destructive hazard in ship repair work is that of fire.

In recent years this hazard has been increased due to the use of more welding and flame cutting equipment.

Although fire prevention engineers have given us more modern and effective fire fighting equipment, no one has to any great extent been able to combat the human element involved in the control of fire. In order to gain necessary control, we must devote considerable time and effort toward the human side of the picture.

Practically every fire can be extinguished within the first few minutes, provided proper equipment is brought into service by men who are trained in its use. Fire extinguishments does not necessarily require elaborate, expensive equipment, but the right kind of equipment, in the right place, properly maintained, and a well trained group of men to handle it, gets results after the fire has started.

Fire extinguishment is necessary, but fire prevention is still the primary point, and if a well organized Fire Prevention Program is instigated and fully carried out, control of the hazard will no doubt be successful.

In the control of fires in ship repair plants, the first essentials are company policy and supervision. After these are firmly established it is a matter of follow-up methods. The most effective follow-up method is brought about by good housekeeping, the removal of all flammable materials and equipment before work begins, the requirement of close follow-up by a fire watchman of all hot works, or the wetting down process, and continuous inspection of work areas by supervisors and safety engineers.

Even though some plants have organized, paid fire departments, it is an effective control method to organize and train employees as auxiliary firemen. This training and obligation serves to make the employees more fire conscious. These squads should be divided so as to cover all sections of the plant, all crafts, with rotation in order that all employees will receive the training and realize the obligation.

Investigation of fires is very necessary and penalties should be imposed where negligence is evident. Proper display of fire equipment

serves as an important reminder concerning the hazard.

Explosions are commonly known as the "fourth-to-five" of fires. Their causes, and cures, with some exceptions, are practically the same. One usually results in the other, if allowed to gain headway, and practically the same precautions are necessary in ship repair work.

Some explosions are caused by the building up of pressures due to excessive heat, improper or no vents, defective equipment such as tanks, valves, pipes and other containers.

Heating and burning very often causes explosions, when the objects are not properly vented to allow the escape of excess pressure or gas. This is particularly true in regard to drums, tanks, pipe, hollow castings, etc.

Particular attention must be given oxygen and acetylene generator plants. The underwriters and manufacturers specifications and requirements in regard to operation and maintenance should be strictly complied with.

Oxygen-acetylene torches are to be regarded as serious explosion hazards. Training in safe handling should be required and very close maintenance should be observed.

Strict company policy, close supervision, continuous inspection, and extensive safety training are very necessary in the control of the explosion hazard.

It is the sincere hope and desire of all concerned in the field of accident prevention that not too far in the future, accident costs will be recognized as the number one problem in industry, and that an all out effort be put forth to gain effective control.

May those in authority realize that accident control is like putting money in the bank, "unless you put something in, you can't possibly take anything out."

May we as safety engineers in the marine industry, resolve to insert the dollar mark (\$), emblematic of accident cost, into "The Green Cross for Safety," and carry this banner forward to a successful conclusion in effective accident control.

## Control of Accident Hazards in Construction and Repair of Vessels on the Great Lakes

By J. M. DALZIEL

Superintendent, American Shipbuilding Company

Due to the extended length of time Great Lakes vessels can operate on account of ice conditions in winter, it is imperative that as little time as possible be taken up with repairs during the operating season. The first thought of executives, foremen, etc., is how quickly the vessel can be released, and at this time we are apt to forget safety rules.

One of the greatest hazards aboard ship is fire. Fire can be caused by defective wiring, burning, or welding. A fire-watch should be placed aboard ship. Whenever a burner or welder is working, the welder should place his ground or return cable as near as possible to the section in which he is working. Fire can be caused by the welder's return current passing through the crew's cabins.

It is common practice to build stagings on steel hangers, or steel or wooden hangers in order to remove damaged shell plating, or renew loose rivets. The steel hangers are gen-

erally hung from the vessel's gunwale bar. The wooden or steel horses are set in the bottom of the drydock. Care should be taken in winter to remove snow and ice from the planking before allowing employees to start working. All staging planking should be at least 3" x 12" as free of knots as possible as at times 6 or 8 men may be on the same staging at one time.

Tools should be examined for flaws, as they more readily break during very cold weather. Any tools showing ends buried should be sent back to the blacksmith shop for re-drawing.

All chains and shackles used to lift materials should be carefully examined, and should be annealed once a month during very cold weather.

In the removal of bottom shell plating it is common practice to remove rivets by burning them. After a few rivets are taken out it is

important to insert bolts in each corner, so that when all rivets are removed, the plate will hang on these bolts. When this is done these bolts are burned off and plate falls into drydock. Three or four 12" x 12" wooden blocks as wide as the plate should first be placed directly below. This will prevent damage to the dock floor and prevent plates from falling on employees' feet or legs.

Bolts, rivets, tools, etc. are liable to fall from scaffolds and numbers of employees have been injured in this manner. Control this hazard by wearing safety hats.

During very cold weather employees on the outside jobs wear considerable more clothes than usual with the result they cannot move around as freely. All ladders should be set at an angle which makes them easier to climb. Snow and ice should be kept off all ladders and stairs.

All riveters, drillers, chippers and reamers must wear safety goggles. This will eliminate most of the eye cases which make up the majority of shipyard accidents.

No work of any kind should be started in

the tanks of an old tanker until all tanks have been tested and certified free from gases.

The hazards I have named are well known to all shipyard personnel and I believe the methods of control are similar as described. The bulk of the repair work on the Great Lakes is accomplished during the winter months. Ice and snow make a continual hazard.

The problems of hazard control are somewhat similar in new construction as in ship repair, so that both departments of ship building should be on the alert to eliminate accidents. Safety should be first. Good workmen are hard to get.

In closing I wish to draw your attention to a little book that was given to each employee when hired at the Delta Shipbuilding Company in New Orleans, during World War II. This book had a great effect on all the workers and won praise from U. S. Maritime Commission and War Production Board.

It is my opinion that a similar book should be given to all employees describing standard safety rules to be observed in the plant wherein they are employed.

# Transactions

## 35TH NATIONAL SAFETY CONGRESS



VOLUME XIV

MEAT PACKING, TANNING &  
LEATHER INDUSTRIES SECTION

NATIONAL SAFETY COUNCIL, INC.  
20 NO. WACKER DRIVE • CHICAGO 6, ILL.

## Foreword

**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

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## MONDAY AFTERNOON SESSION

October 8, 1947

Presiding: D. R. BLENIS, Safety Director, Oscar Mayer &amp; Company

## Safety and Labor Management Relations

By R. C. WINKLER

Director of Industrial Relations, Wilson and Company

Jobs can be performed three ways—the wrong way, the right way, and the safe way. Naturally, we are all interested in a combination of the latter two. How can this be accomplished? Let's take, for example, the new employee on the job. On his first day don't let him figure the job out by the costly trial and error method. Show him how to work right and safely at the same time. Are you personally going to show each new employee how to perform his job? One safety director can not be in several different departments at the same time, showing new employees correct, safe working methods, nor can you be expected to know the details of all the different plant jobs. Who then is to handle this all important phase of getting new employees started on the right foot? The answer is obvious—your department foreman or supervisor—the person the employees look to for leadership on the job. He must shoulder the full responsibility for this phase of employee training. To be respected as a leader, the foreman must know how to perform the job of each employee in his department.

Management of a plant cannot legislate or force safety on the productive worker. The human being instinctively resists any force that he does not understand. Safety is no exception. If the accident prevention goal is to be reached, it must be done through understanding and receptive channels of the human being involved. First, the employee must understand the problem. If he or she understands the problem, the reception is apt to be more favorable. The foreman must explain the situation fully. If the employee performs the job safely, as well as correctly, after he fully understands the reasons for doing the job correctly, the safety idea has been sold. Who was the job salesman—the foreman. Sell safety, don't try to legislate it. Here are some of the ways that the foreman can sell safety.

1. Learn to call the employee by his first

name or nickname if he has one—get close to the employee and have his confidence.

2. Always speak to him, or recognize him by a nod, or some other gesture, unless to do so would distract his attention from his work.
3. Occasionally engage him in conversation about a subject matter other than his work or safety; for example, his hobby, etc.
4. Compliment him when he does a good job.
5. Try hard to see things from his point of view, or sell him on yours.
6. Take time to listen to his suggestions, no matter how poor they may be. This will stimulate his thinking about safety. Give him the reasons as to why his suggestions will not work.
7. Only make promises you know you can keep.
8. Let his fellow workers know when he has made a good suggestion. This will give him recognition and confidence in his ability to think and act safely.
9. If he makes a mistake, publicizing the fact further only runs down his already injured ego.
10. Develop a genuine interest in each employee. Adopt the old saying "Treat your workers as you would like to be treated."

An effective safety or accident prevention program cannot be turned on and off like a faucet. It must receive daily follow through, as a part of the job. It is the foreman's responsibility to double check each employee working in his department.

How can all of the aforementioned items be accomplished by your foreman? He, too, must be receptive and open minded on the subject. This is where higher management must be the salesman. Higher management can sell the department supervisor through

the medium of a foreman's training program. This training program should be well planned in advance and all phases of the company's program policy on accident prevention fully explained. Accident frequency, severity, costs, etc., must be thoroughly explained so the foreman knows and appreciates the importance of accident prevention.

Once again, if the foreman absorbs the contents of the training program and carries the safety message to his workers, then management has sold the foreman. In other words, safety is a selling job from top management all the way down the line. To be successful, a safety program must have too management backing.

Just how do we propose to stimulate the thinking of supervision along the lines of accident prevention? The adverse effect of this question can often be the barrier that will throw an entire program of accident prevention into the realm of a wasted training program. Place yourself in the position of the line foreman. Can you honestly say that you would care to spend even one hour a week listening to some one (a training supervisor or safety director) expound dry statistics, basic accident prevention theories, or analyze your plant accident record? All of this would be just so much wasted energy on the part of whoever might be conducting the meetings, and one might very well say it is wasted production time on the part of the attending supervisors.

We, who are engaged in safety work, well know that we must make these basic presentations on accident prevention interesting if we desire to aid supervisors in attaining our ultimate goal—elimination of accidents. Remember, it is not necessarily what you present, but how you present it, that either develops or destroys the interest in what you are attempting to put across.

Once we arouse the interest of the supervisors, the problem then is, how do we maintain the interest of the foreman. In the recent war years, you probably had some experience with the J.I.T. type course. The success of this type of presentation has been phenomenal; primarily, because it involves actual demonstration as well as participation on the part of the supervisor. They say a pic-

ture conveys an idea much better than a thousand words. Exposure and development of any physical demonstration presents a challenge to each and every supervisor as he individually volunteers to demonstrate or break down a specific job. Supervisors are selected for their manifold abilities to get facts, analyze situation and solve problems. Therefore, the "J" type course is a natural.

The "Safety Steps" cards are elemental tools for any supervisor. These small cards summarize basic ideas in safety. They differ slightly in color and wording from time to time, but they give the safety conscious supervisor tools with which to aid in the accident prevention program. I am sure you will find that due to this type of training you will have a better equipped supervisory force to do the job. Frequency and severity rates will tumble, and accidents will slowly but surely dwindle to the point where accidents will truly become a rarity. A program based on "Safety Steps" is not going to bear fruit the day after this system is installed because it will take a little time for reaction to set in all the way down the line to the production workers.

"Safety Steps" present a positive approach to any problem of accident prevention. It is only through a positive approach to any problem that worthwhile results follow.

Our first line of human relations contact with the worker is through his immediate foreman in whose department problems originate. Therefore, if we equip the individual supervisor before hand with positive steps he can take to eliminate some of the things that aggravate his workers, cause them to become irritable and thereby make them accident prone, we have made tremendous strides in improving our relationship with our fellow workers. Any steps taken by the employer in improving working conditions, providing safe, well guarded equipment, making the job less strenuous, improving lighting, etc., are appreciated by the individual employee. As we have mentioned before, people are human and any inclination toward making their place of employment a better place in which to work is a step toward a closer relationship between employees and the management.

## TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: HUBERT L. CLOVER, Safety Director, International Shoe Company

## Accident Records and Analysis in the Meat Packing, Tanning and Leather Industries

(Panel Discussion)

Discussion Leader—HUBERT L. CLOVER, Safety Director, International Shoe Co.

Participants:

R. A. HARSCHNEK, Safety Dir., Swift & Co.  
F. L. LUMPP, Insurance Mgr., Armour Leather Co.

H. B. DUFFUS, Supvt., Accident Prevention Service, Westinghouse Electric Corp.  
GENE MILLER, Senior Statistician, Statistical Div., National Safety Council

MR. CENE MILLER: This afternoon we intend to discuss certain problems and questions regarding accident reporting. A good question to start on, and one which is being handled far from uniformly concerns the definition of a lost time accident. In this connection I am thinking particularly of the time element involved. How long must an injured employee be away from his job before the injury is determined as reportable? Mr. Duffus will give us the ruling of the American Standards Association on this question.

MR. DUFFUS: In answering these questions that come up I will give you the interpretation as we see it within the American Standards Association code, adopted October 11, 1945. I am going to leave it to Mr. Lumpp and Mr. Harschnek to give you the interpretations as far as they refer to your practice. The old code (before 1945) stated that an injured person had to be able to return to work at the start of the next calendar day. The new code states that he must be able to return to work on the next calendar day before the end of the time interval corresponding to his regular shift. For example, suppose an employee starts work at 8:00 A.M. and is scheduled to quit at 5:00 P.M. He sustains an injury at 1:00 P.M. If he is able to return to work the next calendar day (even at 1:00 P.M.) to his own job or to a regularly established job within the plant, then the injury is not classified as a lost time injury.

MR. HARRY E. GAVEY (Division Supr.,

Swift & Co., Chicago): If it were two o'clock in the afternoon and he only works until five, why would he want to come to work? Chances are he would wait until the next morning before he came back.

MR. DUFFUS: The code does not permit a choice by the injured person. If the physician authorized by the company to treat the injury declares that the man is able to work within the time limit I have mentioned, the injury is not classified as lost time. Let me give you some of the reasons that led to the establishment of this system. I think the best illustration is that within our own corporation. We have plants ranging from 25,000 employees, with complete medical staffs, including eye doctors, x-ray specialists, and so on, to small units of 25 employees, with no medical staffs.

We found that a plant with a well-staffed medical department has very few one day lost time accidents as employees are induced to stay in the plant and be treated before going home—say for a badly lacerated finger—and come in before work the next morning and receive the same treatment. In a unit of 25 employees which has a doctor only on call, probably two or three miles away from the unit, a person with the same accident would go out to the doctor at one o'clock in the afternoon, sit in the doctor's office for half an hour to await his turn for treatment. Then it would be too late to return to work so he would stay home. The doctor would in all conscientiousness say, "Before you return to work I want you to stop in at the office tomorrow morning and I will treat it"—probably nine o'clock in the morning. The employee is supposed to start work at eight. After sitting there a while, the fellow gets through with the doctor at nine or ten o'clock and then comes in to work.

The difference between those two cases is that the complete medical staff in the large plant permitted the fellow to get all his

treatment without lost time, while the other plant was penalized by the fact that the worker did not return until ten o'clock the next day, after having received the same treatment. So in fairness to the small unit we put in this clause, and we have found in many cases that the person will return at two o'clock because the treatment has been finished. He wants to get those few extra dollars, because very few states pay compensation for the first day's disability.

MR. GAVEY: Suppose that the worker did come in at two in the afternoon and went to the doctor's office for medical treatment. After receiving treatment it was too late to go back to his department. What would the code say?

MR. DUFFUS: The code says that he must be able to return to, and perform his regularly established job within those hours. If the doctor declares him unable to work, the accident is classified as a lost time case.

MR. HARSCHNEK: I would like to bring out very clearly the point, that whether this man returns to work or not depends on the doctor's diagnosis. His diagnosis is the governing factor as to whether or not you count or do not count as accident.

MR. DUFFUS: Not only must the man, in the doctor's opinion, be able to return to a regular job, but that job must be open and available to him. If he is unable to work at his own job and no other regularly established job is available for him, he has not returned to work in spite of the doctor's opinion.

In some controversial cases where the man neglects to return to work or refuses to return to a job that may be open and available to him, then we give that medical opinion an opportunity to take effect so that we don't penalize a company because of a man's neglect or refusal to cooperate.

MR. MILLER: If an injury occurs on Friday and the man can return to work on Monday, which is the next time he is scheduled to work, is that case reportable, and under what circumstances would such a case not be reportable?

MR. DUFFUS: The fact that he was injured on Friday is simply a matter of chance, so in order to have a correct measure of disabling accidents and the number of days lost, it is important that we use calendar days and measure accordingly. In this particular case we ask the physician who attends the injured employee whether the employee could have

returned to work some time during his next regular shift, assuming that he would work Saturday and Sunday? Unless you do this, you get a distorted picture.

In many cases we plot injuries by days of the week. To take an example, a worker is injured on Friday afternoon. He goes to the doctor Friday and again on Saturday. The doctor treats him and the fellow goes about his normal work, and in the doctor's opinion there is no reason why that person couldn't have returned to work some time that Saturday, if it had been his regular working day. We would not count that as a lost time accident.

Taking the other extreme, a worker goes to the physician on Saturday morning with a bad laceration or a fracture in order to have it reduced. The doctor places him in the hospital on Saturday morning, and he is released some time on Sunday. Unquestionably, this man could not have returned to his regular job on Saturday. Even if he returns to work on Monday morning, he would still have a lost time accident of two days disability.

MR. LUMPP: Are you talking of reportable injuries so far as National Safety Council records are concerned or according to compliance with state laws at various places?

MR. DUFFUS: I am talking of reportable injuries only as they are defined by the American Standards Association. The interpretations of state and federal laws vary as much as night and day both in their measurement of time and in their compensation payments.

Moreover, I should like to say that we are only members of the ASA, as others are, and those of you who do not have a copy of the ASA code can readily get one. They cost only 35 cents, and are available from the American Standards Association whose address is 70 East 45th Street, New York 17.

MR. MILLER: I would just like to mention regarding this particular standard for reporting injuries, that it is necessary in any accident prevention work to know what your record is and how it compares with other plants. Every plant reporting in accordance with the standard method will be able to compare its record with that of other plants reporting in the same manner. If your plant has a rate of 15 for example and some other plant has a rate of 20, you know that these two rates are being determined on the same basis and that the rate of 15 actually does



represent a better rate than 20. If you know that the rate of the meat packing industry, for example, is around 35, and the rate of another industry is 20, you can tell from these rates that accidents occur more frequently, on an average, in the meat packing industry than in the industry with a rate of 20, assuming that all injuries are reported on this same comparable basis.

Now, if any plants want to keep other records for their own use—perhaps they want to keep records of first aid cases—that's perfectly all right. But in reporting injuries for rates that will be used for comparative purposes, injuries should be reported in accordance with the standard method.

MR. DUFFUS: Don't forget the National Safety Council's Safe Practices Pamphlet No. 21 is an excellent interpretation of the ASA code on accident reporting and in addition, contains a lot of useful information on cause analysis techniques.

MR. LUMPP: Safe Practices Pamphlet No. 21 can be used in place of the American Standard code. The pamphlet amplifies and explains the code.

CHAIRMAN CLOVER: Then the American Standards Association sets the standards on what is and what is not an accident, rather than the National Safety Council.

MR. DUFFUS: All American Standards Association codes are sponsored. The ASA doesn't initiate anything; they are requested by some interested body to set up a standard. In this particular case the sponsors are the National Safety Council and the IALABC—the International Association of Industrial Accident Boards and Commissions.

MR. MILLER: If there are no other questions on what is a reportable injury, let us discuss one particular type of injury—the hernia.

When is a hernia a reportable injury, and how many days should be charged to this type of injury?

MR. DUFFUS: Hernia has always been a controversial injury in safety work. Should it be called a lost time accident because we know it to be generally an aggravation of a pre-existing condition or is it something inherent in a person over which industry has no control?

I will quote from the code, paragraph 2.2: "Hernia shall be considered an industrial injury only if it is precipitated by sudden ef-

fort or severe strain and meets all of the following conditions:

"(a) There is a clear history of an accident.  
"(b) There was actual pain in the hernial region at the time of the accident.

"(c) The immediate pain was so acute that the injured employee was forced to stop work until this pain subsided."

The standard is a compromise, but it does offer something tangible with which to work.

MR. LUMPP: Where a concern does not have a pre-employment medical inspection, and a man comes to work with a hernia condition which develops and suddenly causes trouble it may present a difficult problem.

MR. DUFFUS: We try to safeguard against that by stating there must be a clear history of an accident. There has to be an accident or an incident that aggravates the pre-existing condition in order to make it reportable.

MR. LUMPP: That clears up any question.

MR. MILLER: How much time should be charged to a hernia?

MR. DUFFUS: When you have a hernia, there are three steps that can then be taken immediately in correcting the condition. The worker may decide to have it repaired surgically, he may decide to use the injection method for having it reduced, or maybe he is 30 or 35, and doesn't want to have an operation, so he decides to wear a truss. There is no lost time in the last two cases, there is lost time in the first case, but there is exactly the same degree of injury. So we decided that the best thing to do was to set up a 50-day charge for all hernia cases, irrespective of the method of repair or the ultimate time lost.

When the person involved goes to a hospital and has the hernia reduced surgically, and is in the hospital, say, six weeks, and returns to work in 45 days, we charge 50 days. The average is somewhere between six and eight weeks, and we use approximately a seven week period. That would be 50 days temporary total disability, because the person returns to work at the end of his recuperation period.

The person who receives the injection treatment doesn't lose any time from work as he has the treatments in the evening. Here, too, 50 days temporary total disability are charged to get a measure of the seriousness of the case.

For the person who is too old for an operation or has had a recurrent hernia and in the doctor's opinion any further reduction would have little value because it would tear

open again, we have a permanent partial disability of 50 days. He wears a truss. He has a permanent disability of a partial nature as long as he lives. It isn't very serious, but we feel there has to be a measure, so we classify that as 50 days permanent partial disability. We use the same measure, independent of the type of treatment given for the case.

MR. T. L. CLARENDON (Insurance Manager, U. S. Leather Company, New York City): What happens if a man is really out for 80 days, with complications?

MR. DUFFUS: In compensation for that we have the fellow who doesn't lose any time, so it balances out. People don't agree with compromise, but we are looking for comparability. We have many fellows who lose only three weeks with a hernia.

CHAIRMAN CLOVER: If he loses 21 days it is charged as 50?

MR. DUFFUS: Yes.

MR. WILSON: When do you start charging the number of days?

MR. DUFFUS: Fifty days are charged when the hernia occurs.

MR. A. M. BALTZER (NSC Staff): I wonder if you would answer two questions regarding compensation that is paid on a hernia case. First, what effect, if any, does a Compensation Board ruling have on the designation of a hernia, and second, does a Compensation Board ruling have any effect upon the amount of disability charged?

MR. DUFFUS: As I mentioned before, rulings by the Workmen's Compensation Commissions in the several states are just as broad and as variable as night and day. This, of course, makes it very difficult for any national comparability on the extent of disability. So in October, 1945, the ASA code was changed. It now says this:

"The standard methods established by this code are independent of state and federal requirements for reporting injuries for purposes of workmen's compensation and of rulings as to disability by Workmen's Compensation agencies."

It meant in some cases keeping additional records. We do it by keeping complete records of our compensation cases under our compensation records. We can't use these records for comparing the experience of a plant we have in Pennsylvania with a plant we have in Bloomfield, New Jersey, but for internal plant purposes we can use the Work-

men's Compensation figures. For comparability nationally, we use the American Standards Association Code.

Regarding the worker who lost 80 days because of his disability, we would charge 50 days according to the ASA code, but on his experience card would be shown 80 days lost, and his compensation payments would be based on 80 days.

The person who didn't lose any time from work would be paid no compensation because of the injury. If a truss were needed, the cost of this would be paid, and in the case of the injection treatments, the medical bills would be paid. But we would still show 50 days charged against that particular case.

MR. HANSCHNEK: You are comparing one state with a strict compensation board with another state where the compensation board is lenient. Do you make comparisons on a frequency rate basis between plants in those two states? Do you have two sets of frequency rates and severity rates, or do you just use the code established by the ASA as the basis of frequency rates?

MR. DUFFUS: The only frequency rate we use in the corporation, and the only severity rate is that determined in accordance with ASA reporting. In comparing compensation board rulings we use only costs and number of cases. In our particular case we happen to be self-insured, and when we set up our cost per hundred dollars payroll, we are able to learn the cost per hundred dollars payroll for the respective states, and we can then compare these costs. The frequency on workmen's compensation basis is essential, because that's part of our business within that particular state and shows us the desirability of our operating within that state.

But for frequency and severity rating we go only by the code, and I think it is well to do that, because the majority of the organizations who use the code follow that same practice.

Through the meaning of the code as we have set it up, we found that we get greater comparability with this code than we ever hope to get through the compensation payments or days awarded by compensation, because without question, states are becoming more and more liberal in their payments for compensation.

While our compensation experience cost per hundred dollars payroll has varied in our particular corporation, fluctuating somewhere

between 25 cents to 31 cents per hundred dollars payroll, we find we are still holding a pretty good level, but that is because our frequency and severity rate is showing a distinct drop.

In other words, in a ten year experience we have dropped our frequency and severity approximately 50 per cent, while our workmen's compensation has stayed normal. Basically, there is a greater spread now between those two than there would have been ten years ago, under the same basis.

MR. WILSON: On the hernia case, where you charge 50 days, what do you charge if a recurrence happens?

MR. DUFFUS: If the recurrence were caused by an accident, we would charge another 50 days. But if the individual had to lose an extra week's time because of pain, I would leave that in the original 50 days, because there was not another incident or another accident.

If there were actually a recurrence of the hernia, caused by another accident you would have to count it again as 50 days, definitely.

MR. MILLER: You pointed out that the code is very clear in deciding what shall be counted as a hernia case. In other words, three conditions have to be satisfied if a case is to be charged as a hernia. If any one of the three is not satisfied, the case will not be counted as a hernia in the reporting of comparable figures. One of the three points which is used to help decide this is that the immediate pain must have been so acute that the injured employee was forced to stop work until the pain subsided. Just what is meant by "stop work"? Does that mean five minutes or half an hour?

MR. HARSCHNEK: We consider each case on its own merits. I remember one case where there was a distinct incident. The man did stop work temporarily. By "temporarily" I imagine that he was out for the rest of the day, but he did return the next day. The company provided him with a crutch, and he worked for four or five weeks until the time that he was able to get into the hospital. Well, that's one case that we counted, because we could point to a definite accident that resulted in this injury.

We had another case here in Chicago where we had a college boy working with us. He came to his foreman one day and said, "Say, I had an accident a couple of weeks ago, and I got a hernia. I'm going back to school in

September, but I would like to leave early so I can get operated on."

We haven't taken that case yet, although it was indicated that he could have been injured on that job in the manner in which he described. Our attorneys will take the case before the Commission, and we will take it if the Commission rules that we are liable.

MR. DUFFUS: This question of "stop work" has been misunderstood. Actually we say here "the immediate pain was so acute that the employee was forced to stop work until it subsided." I use the expression "immediate pain" as the controlling factor. It doesn't say he had to stop work for a day or two because of this, and therefore, if he stopped work for a short period to go over to the medical department, you shouldn't count it because he quit for a little while and then went back.

That he stopped work until the pain subsided is simply a manifestation of the fact that there was immediate pain. He had to stop work due to actual pain in the hernial region. So in any interpretation of it, and as most of the people that are following the code interpret it, if he stops work for only five minutes, in order to take hold of his side and press, or make some physical manifestation of having sustained an injury, then that is a sufficient period to set up an actual incident—an actual injury. Simply the fact that he stopped work, with no time limit given, manifested the fact that he had pain and had sustained an injury.

MR. WILSON: How can you prove that?

MR. DUFFUS: You are dependent on the integrity of your supervisory personnel. If a man is willing to condemn himself in the sight of everyone for a couple of hundred dollars, then there isn't much you can do about it.

In our particular case we get the safety observer and the foreman together and say, "Here is the story the man gives us. Is he right or wrong? It isn't up to me as the safety supervisor; it is up to you, for whom the man works, to commit yourselves that he is right or wrong." Let them get together and decide.

MR. WILSON: The reason I am bringing that up is this. If it resulted from natural causes, he can come back to work the next day and say he injured himself.

MR. DUFFUS: Many of them do, and we take them. There isn't much you can do

about it. That's just human. There is always the fellow that feels "the company has a lot more money than I have, and let them pay for it." We admit that many of our hernias are definitely not of an industrial origin, but we have to take them. We have tried, as I said, to set up this compromise, and I believe you will find that by following this code you will throw out about 20 per cent of your hernias, but you will still be taking about 80 per cent of them.

MR. LUMPF: Even so per cent is a good percentage.

MR. MILLER: There is another question on this same subject that is also important. In what period shall a hernia be counted. Suppose a man has a hernia and decides to wait or is forced to wait two or three weeks or months before he can have something done to it. Perhaps at this later period he loses two or three weeks in the hospital having it repaired. Should this hernia be charged at the time he has it repaired or when it actually occurred?

MR. DUFFUS: The time that it actually occurred, because that is when the injury happened. The code specifically says that the injury shall be charged in the period in which it occurred. For example, a person is injured today, and it is established that the injury was of industrial origin and it is accepted. You simply note in your records one lost time accident, either as a permanent partial disability, or as a temporary total disability with 90 days' charge, or 90 days' lost time, whether or not his hospitalization is delayed.

However, in the case of some other type of injury which was not reported until a couple of months after the accident actually occurred, you would not charge that accident in the period when it was reported, but you would record it in your annual experience on the actual day on which the accident occurred. Get the accidents into the actual month in which the injury occurred, because that is the measure you want for all your future statistics.

MR. CLARENDON: In our company's situation, you could count the accident on the day it occurred and then give the man the injection system. If this treatment were unsuccessful, and the annual period ended a month or two prior, and the man wanted an operation which you give him, then you might have the cost of an operation with no

accident. In other words, you would have a \$500 or \$600 cost item with nothing against it.

MR. DUFFUS: You are quite right. In fact, it is practically impossible to try in any way to show your costs over short periods of time in the actual time in which they occurred. It is not unusual to get a medical bill for a treatment that was given six to nine months prior to the time you first see that bill.

MR. CLARENDON: We put in the charge. If we don't get the bill, we make it up. We have a charge for it in the period it happens.

MR. DUFFUS: That's a good idea, because probably at the end of each year you balance out plus or minus.

MR. CLARENDON: We have the superintendent send us the number of trips the man made to the doctor. We can tell from his prior bills what he generally charges for the first visit, the second and third, and we can figure out that this is probably going to cost us \$35.

MR. DUFFUS: In that case, we would show it in our annual expenditures, but we balance the anticipated cost for future years against the anticipated cost as we have set up for previous years and only throw the difference into that year's experience.

Your method I think is the most practical, because independent of anything else we do, we have to show management how much these things are costing us. We talk frequency and severity—we give them a measure—but they still want to know how much it is costing, and the quicker you can do that against the particular month, the better job you are doing in your accident prevention publicity.

MR. MILLER: Many of you fellows have your plants entered in our safety contest, and I receive letters quite often asking, "Shall a hernia be charged in the contest?" Well, for the Food Section Safety Contest, hernias will be chargeable if they satisfy the conditions which have been set up here. In other words, a hernia which is reportable is also reportable in the safety contest.

On this same subject, Mr. Duffus, of determining in what period an injury shall be charged, will you please explain the method of handling days lost on such injuries? I am thinking now particularly of temporary total disabilities, where actual numbers of days lost are counted. In a situation where an injury occurs in one month and the days

lost extend into another month, how are those days lost charged?

MR. DUFFUS: In the compiling of industrial injury rates, you make an estimate at the time of the injury and include in that estimate from the doctor the complete number of days anticipated. You do this much as you do with other costs. This can be based either on past experience or on the doctor's opinion of the particular injury. All of the days lost are then put into the month in which the accident occurred.

For example, a person breaks a leg. There are complications. The doctor can anticipate two or three months duration—we'll say 30 days. The 30 days are immediately charged against that injury which we'll say occurred on October 6, and all of the days are charged to October.

Now, we do this in order to get a fair comparison. We charge immediately what we think the total days lost are going to be. Before the twentieth of the following month, when our report is sent through, we check with the doctor to see if he has revised his estimate of disability. The doctor secures this information from the response of the injured person, from his knowledge of the injury and the amount of recuperation and repair that is necessary. The doctor can thus set up a pretty close estimate which enables us to balance out within a few days in 99 per cent of the cases.

The entire lost time is charged to the month in which the injury occurred. We don't charge it off each month as it is accumulated. I find that this gives us a better measure, because I can evaluate the seriousness of our injuries for those particular months in which they occur and plot it accordingly.

MR. HARSCHNEK: I might say we are still following your old system. For example, if a man got hurt in the last week of one month, and it is an injury which disables him for three weeks, we will throw one week into the month in which the accident occurred, and then we will throw the next two weeks into the following month. We have found that it's easier to keep the records that way rather than to continually change them as one person after another goes back to work.

MR. WILSON: How can you show severity if you don't have an accident?

MR. HARSCHNEK: I agree with you. We are wrong there. But we don't make

our comparison between plants on a severity rate basis. We are still on a frequency rate basis only, so it doesn't do too much damage.

MR. MILLER: May I bring up a point on the system you are using? You mentioned to us before this meeting got under way that you are contemplating changing over to the present standard method. I just wonder if it might not be good to bring that point out.

MR. HARSCHNEK: That's right. You might get the impression that we are going to continue with the old method. We are going to change with the beginning of our next fiscal year to get on the same basis as Mr. Duffus here is expounding on, and we hope to be comparable from then on.

I would like to ask one more question. We seem to have considerable difficulty, for example, when a man fractures his finger in finally determining the percent of disability resulting from such an accident. It might be only ten per cent. How do you know that in the month in which the accident occurred? We sometimes don't really know the end results of an injury until four or five months after its occurrence. Does your physician take a wild guess at it and then do you later correct your figures?

We continue to have quite a few knife cuts and many of them finally wind up as permanent partial disabilities of 10, 15 or 20 per cent loss of use of a finger or some other part.

We have had those cases too, where the fellow didn't even lose time. How do you know what time charge to make against that particular month in which the accident occurred, when you really don't determine the percent of loss until two, three, four months have elapsed?

MR. DUFFUS: You will find that your physician, if he is a good industrial physician, can come pretty close to saying that this case will be a permanent partial disability. He won't know exactly how many days, and therefore will give you an estimate so that you set up a lost time accident of probably only 30 days. Then three months to a year later, when the condition has stabilized itself and you have properly evaluated the extent of disability, you will be able to correct your original estimate and insert the actual number of days charged.

In the two years that we have been keeping our records, our plus and minus on these estimates have balanced out quite well. This

has been true except for permanent partial disabilities that have been caused through infections or secondary infections, where the original injury looked very healthy and everything was all right, but maybe an unanticipated diabetic condition or something like that caused it to become more serious so that there was lost time. Those are rather uncontrollable—three, four, five per cent—and don't throw your statistics out so much that you can't go back and make the corrections.

CHAIRMAN CLOVER: In establishing the date of the accident, the foreman is going to resent having an implication made that the record is marred later than when the accident actually occurred, if you don't definitely establish the date that it did occur. In other words, when a no lost time accident is determined to be a lost time accident, what date is going to be set against the foreman's record?

MR. DUFFUS: Your point is that we guess wrong and everything looks healthy so that we decide not to take it as a lost time accident at the time, but circumstances show poor judgment or a poor estimate on our part, so that two months later we decide to take it as a disabling accident. It occurred in June, and in September we decide that we guessed wrong and we have to take a lost time accident. You have already set up the accident on your medical department records, with what we call a minor injury report, showing that it occurred on such and such a date back in June. You don't change your September record—that is still zero—but in your accumulated experience for the year to date, which includes January through September, you show one additional lost time accident and we'll say the 75 days permanent partial disability charge that has been established.

CHAIRMAN CLOVER: Would your days be charged to June or to September?

MR. DUFFUS: To June, if you wish to make that adjustment. However, it is usually sufficient to include it in the cumulative experience, without trying to change the separate monthly reports. That way it still shows in your overall year's experience.

MR. CLARENDON: Mr. Duffus, how would the code register a case where a man meets with an accident which doesn't disable him enough to lose time, but only enough so that he must take a job which will pay him ten cents an hour less for a period of seven weeks?

MR. DUFFUS: If the fellow doesn't lose any time in the interim, and it is simply a matter of the accident being such as to cause him to be transferred to another regularly established job, we would set that up as seven weeks temporary partial disability. He is able to do all of the regular duties of an established job other than his own, but he is not able to do his own job. We would set that up as a temporary partial disability with seven weeks duration, but we would not show that in our accident frequency records.

MR. CLARENDON: How are we going to report it to the Council?

MR. DUFFUS: You don't.

MR. MILLER: It would be classified as a temporary partial case, and those are not included in computing frequency rates.

Cases occur occasionally where a man loses time as a result of a condition which has developed over a period of time, as a result of repetitive movements or repetitive operations. Perhaps the worker gets a sore wrist or a sore arm which finally develops to the point where he is required to lose time.

When do you determine that such an accident occurred, considering now, the date of reportability?

MR. DUFFUS: You are thinking of something like bursitis, for example, where a fellow is working in a normal operation and, through repeated use, particular muscles or joints become sore. Bursitis is a good example of that.

They are rather difficult to handle. It is a question of interpretation of the code; since nothing is specifically written in the code about the date to which these particular types of disability should be charged. We had a case like that. The committee of judges classified it as a disabling injury chargeable to the date on which the worker first required first aid for the condition.

MR. CLARENDON: Some states won't count bursitis as an accident.

MR. DUFFUS: That's right. But the code includes "occupational disease" and elements of that nature. We classify bursitis like an injury, but the time charged for it and the record of it would start when the employee first reported the condition.

I recall a silicosis case we had a few years ago, a tubercular condition aggravated by silicosis. After being away from work, on and off, the person eventually died because of a TB condition, but we decided that there was

actually a silicotic aggravation. It accumulated over ten or fifteen years, and the only thing we could do was to charge it on the day when the fellow first lost time from work because of this condition.

MR. CLARENDON: Do I understand the National Safety Council wants occupational disease cases included in reports of injuries?

MR. DUFFUS: Here's what the code says on that.

"None. Whenever the phrase 'in the course of employment' is used in this code, it shall be construed to mean in the course of and arising out of employment, and the phrase 'industrial injury' shall be construed to include industrial disease."

That definitely includes industrial disease as a disabling injury.

MR. CLARENDON: I didn't know the Council wanted industrial disease cases included in accident compensation.

MR. MILLER: Disabilities of that type should be reported.

MR. BLENNIS: In regard to determining severity rates, Mr. Duffus, how would you handle the following case which happened in our plant this summer? An elevator operator was cleaning the elevator doors on a night when he wasn't too busy with the elevator. He was instructed to use steel wool and the night superintendent borrowed a portable tool for a buffing brush. He was instructed to use goggles, but had no goggles on. A wire from the brush penetrated the eyeball and destroyed his sight, but it was a clean injury and healed rapidly. The fellow lost only one week of time. Under the Wisconsin code and under our Industrial Commission's ruling, the loss of an eye is chargeable as 1800 weeks. Now, the fellow is back on the job one week later, running his elevator nights. How would you make a time charge on figuring his severity rate?

MR. DUFFUS: One eye, loss of sight, 1800 days. We would charge that automatically independent of your state ruling.

MR. BLENNIS: You would charge that even though the fellow was back on the job one week later performing his duty as before, lost no time except the one week.

MR. DUFFUS: It would be charged automatically as a permanent partial disability, 1800 days. You would not show that one week as a temporary disability, but only the 1800 days as permanent partial disability. This is because he has a definite loss that

is going to handicap him for the rest of his life.

MR. MILLER: I might just mention that 180 weeks amount to 1750 days, which is just about the same as the code, which is 1800.

MR. BLENNIS: We have made a habit of using the Industrial Commission's penalties on lost time injuries.

MR. DUFFUS: You will find that in general, in the more serious cases, the two of them run pretty close. It is only in the smaller ones, the fractures and things like that, where there is a wide difference between the two. However, the standard time charges provided in the code should be used in calculating the severity rate.

MR. MILLER: We have brought up the question—and I think we have made it clear—that industrial disease shall be construed as an industrial injury and reported in the same way. But some cases occur where there is a question whether they should be charged as sickness or injury. I have in mind a situation where perhaps an employee becomes ill or faints, and as a result of this condition, strikes his head against a machine or a post or on the floor when he falls, and suffers a disabling injury from the fall.

Should that be charged as a reportable injury, remembering that it really arose from the case of sickness and not from an accident itself?

MR. DUFFUS: Such cases are not covered in the code, but require an interpretation of the code.

If it can be shown that an accident or an incident occurred that could have aggravated this particular weakness or this particular sickness, and as a result of such aggravation, the person sustains an injury, then definitely it is reportable.

Suppose a girl is walking down an aisle, and in trying to avoid rather hurriedly an industrial truck that is coming along, exerts herself to an extent that causes her to faint through her own physical weakness. That definitely would be a reportable accident.

But if a person is walking down the aisle, meeting nothing unusual, faints, and strikes his head, such a case would not be reportable. There was no unusual condition; this situation could happen outside as well as within the plant.

In general, if a person sustains lost time because of sickness on the job, and the sick-

ness can be traced to an incident or an accident, then I think you would count it.

MR. WILSON: What if somebody walking along the aisle took sick and hit his head against a stairway and died? Would you figure he died because he had hit his head or had a heart attack?

MR. LUMPP: In my way of thinking it would depend on which occurred first, and what did occur.

MR. DUFFUS: It depends entirely on conditions. If that stairway had nothing unusual wrong with it and it can be shown that the injury which he sustained was definitely a result of a heart attack which caused the worker to fall, then the fatality should not be charged to the job.

MR. WILSON: What caused the death—the heart attack or the stairway?

MR. DUFFUS: If the stairway was a sound stairway, with normal means of egress, and the person was taking the normal course of egress, and there was nothing unusual but he had heart attack, I think you could not automatically say in saying it would not be industrial. But suppose the person had to escape himself to an unusual condition, say half way up a ladder, and he had this heart attack, fell to the ground and was injured. I am afraid that you would have to take that as an industrial accident, because you have nothing to prove that it wasn't the fall from the ladder that actually caused the death, although it might have been caused by his heart condition.

We leave it up to our physician to decide and we pretty much his complete story. Right now we are confronted with such a case, where a person sustained an injury by tripping and falling, we don't know why, and died some four months later because of cerebral hemorrhage. The heirs are trying to set it back to this incident four months ago. It is going to be awfully controversial. We won't know how to take it, but I made this ruling: Let's get all the facts, get impartial decisions on it. The operations that preceded the death will say where this hemorrhage was, how it was related to the minor injury that was sustained four months ago, and from that and medical testimony we can probably determine whether it was industrial or not industrial.

They are awfully hard cases to determine, and you have to evaluate them individually.

MR. MILLER: You are bringing out a

point here which should be given emphasis. In many cases it will be necessary for the physician to determine whether or not they should be reportable.

MR. DUFFUS: There is a part in the code that covers that. I think it is 3.7. Let me read it first, and we will decide afterwards:

"In case of doubt as to the degree of disability, the classification of an industrial injury shall be based on the decision of the physician engaged by or authorized by the employer to treat the injury."

Does that cover your point?

MR. MILLER: That is what I had in mind.

MR. DUFFUS: Notice the phrase, "engaged by or authorized by the employer to treat the injury." We don't want the fellow's family physician saying that the boy has so exerted himself that he has to take a two weeks fishing trip in order to recuperate from the strain he had in the shop. We like to get the plant physician or a person engaged by the plant physician to take care of that case, to determine whether it is or is not of sufficient seriousness to warrant being classified as a disabling accident.

MR. MILLER: The next type of injury that I should like to bring up for discussion is the recurrence of previous injury. I have in mind a bad knee or a lame back, which may have been counted as a reportable injury at one time, and the man went back to work, and perhaps a month or two later he has a recurrence of that same disability.

Will you explain, Mr. Duffus, how cases like that are handled? Are they counted again as another injury at the later date, or is the time lost at the later date charged back to the original injury?

MR. DUFFUS: In my own interpretation of the ASA code, I would say this: If the worker was doing his normal job and there was no incident that preceded the knee going out of joint, or the shoulder going out of joint, I would be tempted to classify it simply as additional days lost because of the original injury. The worker may be a softball pitcher or something like that, playing hard in the evening. Maybe he throws his shoulder out of joint and every once in a while he has to take a couple of days off because he comes back to work and aggravates the condition. You certainly couldn't classify it as a lost time accident each time that happens, because

there was no accident or incident even though he has definitely lost a couple of days.

I would charge the days lost to the original injury, calling it a recurrence or a continued treatment of that original injury. That would be my interpretation of the code.

We had a couple of rulings on that by our seven man committee of judges, but our decision was divided. If there was an incident or an accident that was very definite, then you have to call it aggravation of a pre-existing condition, to follow the code verbatim. But if there was no incident or accident, you could simply add those days back to the original injury.

MR. MILLER: If there aren't any questions on that type of injury, I have one here which came to us from some one in the meat packing industry, regarding the definition of temperature extremes. The ASA code states, "An injury which results from exposure to temperature extremes, heat or cold, is an industrial injury only if it arises out of and in the course of employment."

This particular question involves the interpretation of the term "temperature extremes."

MR. DUFFUS: Say the person is exposed to normal room temperatures, and we'll say it's a hot day—about 85 degrees outside—and probably because of these conditions it is up to 85 degrees, or 90 degrees within the plant. I don't think it's the intent of the code to classify that as temperature extremes. Suppose a worker suffers heat prostration and passes out as a result of that. Invariably that is traceable to some systemic condition within the person and not to a condition which you would call temperature extremes.

Conversely, suppose a foundry worker, a cupola operator, or probably some of your meat packing workers are exposed to inside temperature of 105 degrees when the outside temperature is 85 degrees, you could assume that to be a temperature extreme, and if a person passes out and loses time under such conditions the case would be classified as a lost time accident.

It is hard to decide, and you have to consider all of the facts. You have to consider the doctor's diagnosis of the case and the man's condition. If they are established as being unusual conditions that the rest of the employees in the plant are not exposed to, and the outside temperature has raised the inside temperature to a point where it could

cause prostration and then a person loses time, this would be a lost time accident and should be reported.

MR. MILLER: Let me quote exactly from this particular question. I think you have already answered it. This question states: "Suppose a worker does not take salt tablets or goes out and gets drunk the night before, and as a result he is physically below par, and then, on an ordinary hot day which does not affect other workers, he suffers heat exhaustion on the job."

MR. DUFFUS: There, again, you have to have additional facts. "An ordinary hot day"—was the employee working in an operation where temperatures are ordinary, probably with a five to six degree differential? If so, I wouldn't count that.

MR. GAVEY: In our plant we had quite a number of cases reported as mild heat prostration. A lot of our foremen were concerned because we were counting them as lost time accidents. The workers would come in in the morning and tell their foreman that they were sick—they hadn't even worked that day. The doctor gives them time off and says "mild heat prostration," maybe as a result of, as you said, dissipating the night before, or possibly being exposed to extreme heat the previous day. But in every one of the cases the facts weren't available, and we didn't like to count them as lost time accidents because they didn't seem to stand alone. But we did take some of them, or most of them, and in doing that we rather lost the support of the foremen in our safety program. They have asked me many times to define heat prostration, and why such cases are counted as lost time accidents. I think it would be interesting to have a little more discussion on the subject.

MR. LUMPP: You mean regarding whether or not such a case is actually a lost time accident? Is that your question?

MR. GAVEY: That's right.

MR. LUMPP: The man didn't work at all that day? He came in and went to the doctor with the story that he was sick and was sent home?

MR. GAVEY: That's right.

MR. LUMPP: I would say no, it is not chargeable as a lost time accident.

MR. GAVEY: The doctor gave him time off.

MR. LUMPP: All right, that's the doctor's policy.

MR. GAVEY: And they reported it on an accident form.

MR. DUFFUS: The code considers two things on this subject. First, temperature extremes, and from what you say there were no extreme temperatures under which the employee was working.

MR. LUMPP: He wasn't at work.

MR. DUFFUS: But it is quite possible that his exertion under unusual conditions the day before and the lack of care of himself the night or day before left him in a weakened condition so that in the doctor's opinion he wasn't able to perform his normal duties.

MR. GAVEY: That's what I say.

MR. LUMPP: There, again, you leave it to supposition and the doctor's opinion. If you are going to accept the doctor's opinion as to what is and what is not a lost time accident, you have no other course.

MR. DUFFUS: I think you have to get the doctor's opinion on the degree of disability, whether the man is or is not able to work. That's the doctor's prerogative. But the question of whether the condition that brought on this degree of disability is industrial or non-industrial is not always for the doctor to decide. The doctor simply knows that this person is physically unfit to work, but I don't think the industrial nature of the causative exposure should be left entirely to a doctor's opinion. The doctor's opinion is essential in determining the degree of disability, but not industrial origin. I think you have to get more than that, because the doctor is only competent to give you an opinion of the degree of disability and the man's ability to work or not to work.

MR. LUMPP: There are just a few remarks that I wanted to make. We have been talking about records and the preparation of records. All of it has to do with the record of the

accident, so far as the books and the National Safety Council statistics are concerned. But there is one all-important record that we haven't talked about at all, and that is the investigation of the case after the accident occurs, the attitude of the investigator to the employee, and the employee's attitude to the investigator. Many things happen at this time, and in these days when the employee takes it upon himself to ask outside advice, very often he decides to go to a lawyer because he doesn't like the fellow that's making the accident report, and he doesn't tell him the truth. The fellow that is making the report doesn't have enough patience or he doesn't have enough knowledge to inquire about all the facts in the case. The result is that when the case is finally prepared for the adjuster, he doesn't have enough information at hand to proceed, and that means going back over the same ground, and by that time, the employee has consulted a lawyer, or someone else who has given him some advice, and the case becomes complicated.

The point that I wanted to make regards the treatment of the employee when he comes in with an injury, the method of questioning him, obtaining all the important and pertinent facts, and the impression that is left with the employee when the investigator is finished. I think if these four points are given the attention that they deserve at the time the accident is investigated, much of our difficulty will be avoided and much of our expense will be eliminated.

We have found that investigators sometimes irritate an employee. An employee is a human being, and he should be treated as such, and if you treat him that way he will probably tell you everything he knows about the case. Very often he will bring out facts that you wouldn't get otherwise.

Those are just a few thoughts that I want to leave with you.

*Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME XV

METALS SECTION

NATIONAL SAFETY COUNCIL, INC.  
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## Foreword

**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

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## MONDAY AFTERNOON SESSION

October 6, 1947.

Presiding: J. L. RIDINGER, Safety Director, Inland Steel Company.

### How the Front Line Supervisor Should Carry Out His Safety Responsibility

By H. H. FEIT

Superintendent of Industrial Relations, Homestead District Works,  
Carnegie-Illinois Steel Corporation

I shall not burden you with a discussion of the history of the safety movement and the progress we have seen within our lifetime, because as has been said before, "there is no need to continually examine the past if we fully understand how much a part of it we are."

One thing, however, we should fully recognize is that the progress we have thus far made was largely within the field of facilities. As is so frequently the case, scientific development of material things is much more rapid than the scientific development of men and their actions. Briefly, we have seen much accomplished in the way of safeguards on machinery, the use of colors and signs to designate dangerous areas, governors placed on machinery to hold it within safe speed limits, and a host of other improvements too numerous to mention here.

Obviously, then, it is the individual toward whom we must direct our attention from the standpoint of safety. We must increasingly concern ourselves with what he does if we are to determine why it is that accidents will occur. Such a problem cannot be solved unless there is a definite and conscious effort made on the part of all management through the front line supervisor to get at the source of the trouble.

In the field of equipment everyone recognizes that the best performance is obtained when that equipment is attended to a sensitiveness that makes for smoothness and freedom from trouble. It follows, then, that the supervisor, too, must have that sensitivity—or, as we can otherwise state—an awareness of those conditions which are necessary for the continued safety of all concerned. Awareness, to me, is being alive; the intuition to sense when something is out of the ordinary, even though to all outward appearances there

has been no appreciable change from the normal. The ability to be aware of these subtle changes spells the difference between success and failure for the modern front line supervisor. We cannot be content with such answers as prevailed in the past: "I didn't see anything wrong in the way they were doing it," or "They surely know better, because they've been told often enough." Our responsibility is to be aware of why individuals continue to be involved in accidents and to develop a solution of this problem. In connection with this increased awareness there must also be an increased sense of responsibility as a necessity on the part of all supervisors.

"Fencing the buck" is an indication that the proper degree of responsibility has not been accepted, or has not been delegated to the proper degree. Ideally, everyone should assume the responsibility for the safety of himself and others to the degree that accidents of any kind would be only history. But this is idealism of the highest order, and will occur only when man has reached the millennium. Until then, we will continue to recognize that the front line supervisor has a definite responsibility for the safety of those for whom he has assumed the position of supervisor. He cannot, if he is to be the kind of supervisor we must have in industry today, assume part of the responsibility without assuming the whole.

Before entering into the detailed discussion of how the front line supervisor exercises his responsibility in connection with safety, I feel it would be well to depart momentarily and consider the responsibility of management as a whole. I do this because we all realize that the front line supervisor is a member of the management team. It is therefore necessary that each element in man-

agement function to a high degree of effectiveness if the front line supervisor is to perform in the best manner possible.

The very nature of the problems indicates that a coordinated plan is essential. In planning we require in many instances a policy which can be decided only by the top level. If we continue downward in the management organization, it becomes apparent that the plan must be benefited by contributions from each level so that the entire organization has the benefit of coordinated thinking. In addition it is necessary that the tools by which the front line supervisor accomplishes his purpose are furnished by the higher levels of management. We are familiar with the fact that such tools as equipment and materials are definitely reviewed and in a large number of cases even requisitioned by the higher levels of management. On the other hand, the correct use of such equipment is the responsibility of the front line supervisor. The same procedure holds true in those cases where the tools are in the form of procedures, programs, educational information, or things of a like nature which, although developed by the staff organization or higher levels of management, become effective only when put into use by the front line supervisor. To have a well coordinated management group it is necessary that there be an unhampered two-way flow of information. Also there must be a crystallization of such thinking into a program that can be adhered to by all members of management, and above all, there must be an understanding of the common purpose to which the management organization is committed.

To illustrate how this process works and to demonstrate the part the front line supervisor plays I shall outline for you a program that we in Carnegie-Illinois have developed with respect to safety. This program involves four steps. In step one we analyze all accidents within a department for the past year. The accidents are coded according to job position and job occupation to arrive at the occupations in which the greatest number of accidents have been occurring. By this analysis we are able to select that point which requires immediate attention. An explanation is made of our findings to the various levels of management for the purpose not only of acquainting them of our findings but to gain their cooperation with respect to the procedure. The third step is to deter-

mine what medium will be used as a tool to apply to the particular problem, and the fourth step is an effective follow-up which will keep the program up-to-date. The tool are usually supplied by the staff organization.

To enlarge, we all recognize that the purpose of both the supervisor and those supervised is to get out production. It is while performing his duties that we find that the individual becomes involved in an accident. Frequently we have found the supervisor introducing an element of caution by repeating the expression, "Be Careful, Work Safely, Think Safely," and numerous other statements of similar vagueness. At the same time, he emphasizes the importance of getting production out on time, and often safety has been thus divorced from being an integral part of any operation or series of operations.

In connection with the program just mentioned we have discovered, through observation and analysis, a fact that to us is amazingly significant. *The fact is that it is an act on the part of an individual in most instances which is the true source of the accident.* The severity of the accident does not alter this fundamental fact because severity is merely a matter of degree. The advantage of such a program is that it highlights the necessity for every front line supervisor to be responsible for knowing how to perform every job under his supervision. Only through this knowledge can he be sure that those for whom he is responsible are performing in the manner necessary to maintain satisfactory production with an absence of accidents.

We furnish the front line supervisor tools in the form of a kit. This brings the conference room out to the working area. Such material has the advantage of providing technical assistance in a realistic and practical background. Such material we find enables the front line supervisor to be much more articulate and frequently stimulates constructive discussion by the entire group before whom it is presented. Since this will be a specific application, I shall outline upon the manner in which the use of the single objection can open a number of avenues all bearing upon the same problem.

For example, in 1946 our company was confronted with the problem of reducing the 2,575 cases of heat sickness that had been recorded the previous year. That figure was made our single objective within the field of heat sickness. The medical department's at-

tention was directed to this problem for its analysis and assistance. From them, it was learned that heat sickness is largely a matter of physical condition on the part of an individual. In addition, the fact was confirmed that the body, when exposed to heat, loses certain necessary chemicals. Included in the requirements for physical well being are the factors of proper diet and rest, together with frequent bathing. Furnished with this information, the company turned its attention to transferring this knowledge in usable form to all of our employees. Our front line supervisors were made thoroughly familiar with the findings, and were furnished material in the form of booklets and posters. In addition they were furnished with salt tablets, the so-called pep pill, to distribute to employees to offset the losses in body chemicals. The point that was hammered home constantly was that heat sickness is directly connected with physical fitness. The front line supervisor was able to exercise his responsibility in connection with this problem by being furnished with authoritative information and the practical means for impressing his personnel with what they could do, individually, to minimize the problem. The results of the use of the single objective to this problem have been gratifying, to the extent that with the approach of warm weather this year, heat sickness has decreased 84.2 per cent since 1941, or 280 cases remain to be overcome.

Another aspect of the same problem which confronts the front line supervisor is the fact that he is frequently faced with the training of new individuals. While it is only natural for the new man to imitate methods used by fellow-workers, the responsibility of the foreman is to see that such imitation is based upon correct performance. He cannot be satisfied merely to turn the new man loose with a perfunctory discussion of safety in the initial interview, and then expect that

this discussion will carry the new man through the complexities of his new situation. The use of the single objective is not a cure-all, in fact, it emphasizes that only through repetition of the teaching process and strict adherence to lessons learned can any permanency with respect to safety be gained.

In connection with his responsibility in carrying out safety, the front line supervisor must recognize that his job is not static, and that each day there will be a new twist to old situations. His knowledge must be so thorough that his men will look to him as an authority to dealing with the various problems related to the various jobs under his supervision. There will be times when it will be necessary for him to outline and sell his problem to those to whom he reports. To obtain the best results will require that he present comprehensive facts rather than generalities if he is to obtain help adequate to his problem. As a consequence many serious problems have continued because a clear-cut picture has not been presented and a singleness of objective has not been obtained.

Let us remember, then, that in carrying out his safety responsibility, the front line supervisor must have an ever-increasing awareness of what is taking place around him. He must see—and not merely look. He must have a thorough knowledge of how the various jobs under his supervision are performed. He must not leave to chance the transfer of that knowledge as the responsibility of others. He must form objectives, and with a singleness of purpose bring to bear all the resources at his command to obtain those objectives. He must not dissipate his efforts in generalities; he must concentrate on specific objectives, and above all, he must grow constantly with his job and never be guilty of becoming static within his environment.

## TUESDAY LUNCHEON SESSION

October 7, 1947

Presiding: J. L. RIDINGER, Safety Director, Inland Steel Co.

### There Is No "Irreducible Minimum"

By F. M. GILLIES  
Works Manager, Inland Steel Company

It is my premise that all managements are compelled to an interest in industrial safety as an essential of efficiency. The degree of interest in safety will vary in direct relation-

ship to interest in efficiency as it is affected by satisfied, trained employees who can earn their livelihood without fear of bodily harm and as it is affected by the efforts of people engaged in the field of accident prevention.

Briefly, a management lacking an interest in safety exists because of the failure of those specializing in safety to convince that management of safety's importance. That is your job and it is not my purpose to tell you how to do your job. My presence here can be taken as an indication of my interest in safety. It is an interest born of time spent in industry as a workman, a foreman, a department head, and in more recent years as a member of higher management. In acquiring that interest, I have seen and participated in the reduction of occupational injury rates to their present level, which level for the last decade has remained more-or-less static. This static position, to me, has been a cause for concern; and, while I cannot stand before you today as a specialist in your field, I should like to solicit your consideration of four points which to me seem worthy of note in our attempts to again direct the curve downward.

The bromide, "Irreducible Minimum," from time to time is heard in safety circles. I am constrained to think that there are some who have allowed themselves to be "taken in" by this cliché. Since 1918 and thereafter, the emphasis in safety has largely been in the field of mechanical safeguarding; and, while this has been supplemented by other means, the result we have attained is primarily attributable to caging in those things which cause our trouble. It would appear that we have now reached the point where caging must be supplemented heavily with other methods. Machines and wild beasts can be caged; but, since the human mind cannot be caged, we are still confronted with the problem of the individual who will put his hand between the bars.

"Psychological Warfare" was a term commonly used in the recent world conflict, and those skilled in warfare attribute successes in a large degree to the skilled use of methods falling in this category. Through the mediums of the picture, the printed and the spoken word, there has been developed a technique which lends itself singularly well to the solution of the present static position of the accident problem. These mediums have not passed unnoticed in the field of safety,

but it should be marked well that in the field of advertising startling results have been accomplished through these mediums alone and without any other vehicle to carry the burden, as mechanical safeguarding has carried it in the safety movement. I propose for your consideration, therefore, a marked intensification of the psychological warfare against accidents.

The success of a safety program, and of any program in industry, rests primarily upon its effective administration. Administration is a function of management which includes and requires those quarterbacks who direct the team in the field—the foremen. Field generalship is born of good coaching devoted to individuals whose competence enables them to understand and to effectively practice and pass on that which they are taught. I submit for your consideration the fact that a foreman who rates tops in safety is not necessarily a good foreman, any more than is the quarterback who can pass and nothing else. On the other hand, the foreman who recognizes the value of perspective and the relationship between overall efficiency and safety will be a good foreman not only for safety, but in all phases of supervision.

In the past, attempts have been made to relieve foremen of certain specialized functions which properly belong with line supervision. In every instance that has come to my attention, such attempts have failed. The foreman is management and as a manager is entitled to staff assistance, which you can provide; but his is a function which requires him to direct all activities which come within his responsibility and this necessitates the broadest perspective and managerial ability. Safety and all the other considerations required of a manager in modern industry demand the highest type of individual and the rarest qualifications to fit a man for foremanship. The choice of these people and their training in safety and other fields must be given an increased amount of attention.

The static position of the accident problem to which I have referred, suggests another thought which I should like to develop briefly for your consideration. At its inception, the safety movement capitalized on the spectacular, and emphasis was directed to those accidents and injuries which by their very nature compelled attention. The loss of life, permanent disabilities and the suffering which they occasioned have been properly

and successfully used to bring us to the present stage of the effort. The improvement that has been made, however, has progressively reduced the number of such incidents that can be called upon as illustrations to serve our purpose. This can be taken as an indication of the need for more rigid standards for the determination of good and bad accident records.

Is there any one of you who, following an accident and injury, has not been confronted with this first question from a supervisor: "Is it a 'last time'?" A tendency to concern ourselves with whether or not an injury is serious has grown to supersede the more important questions of: Where did it happen? How did it happen? Why did it happen? and what could we have done, or what can we do, to insure that it won't happen?

I venture to say that you have all had the experience where under a particular set of circumstances, an individual sustained an insignificant and minor injury on one day and under the identical set of circumstances another individual sustained a serious injury the next day. Invariably, in such incidents, the difference in the degree of the injury can be accounted for solely by the element of luck. Over luck we have no control. Potentially, if for no other reason than the factor of inferiority, the least of injuries carries with it the implication of death. This suggests to me that our present concepts of frequency and severity have become timorously and that we are faced with the choice of complacently carrying on at our present level under these standards, or of tightening them to the point where all injuries are regarded with equal concern because of their potential.

In recent years, union relationships have blossomed for a large portion of my time and I have been called upon to bargain on nearly all the items comprising the long list with which you are familiar. It can honestly be

stated that the least controversial of these items has been the one with which we are concerned here today. In one sense this is complementary to both Management and Labor; but at the same time, closer analysis suggests the existence of something sinister. Labor unions are possessed of many of the attributes which characterize political organizations, and the continued existence of such organizations is largely dependent upon nurtured controversy. Management in its recognition of safety's importance to efficiency, has largely removed the element of controversy from this endeavor and, thus, have minimized the interest of organized labor. This seeming paradox has a detrimental effect upon safety and establishes a need for providing safety incentive for labor. I do not mean to suggest that we should seek out a basis for controversy in this regard, or that unions should distort safety to provide an industrial "Townsend Plan"; but, at the same time, it should be readily apparent that does are not forthcoming from disabled or deceased members.

I will presume to commit management to a continuance and extension of safe working conditions; but, at the same time, I should like to solicit the cooperation of labor in the matter of safety education, the observance of safety regulations and in the enforcement of sanctions, without which the program cannot advance.

In conclusion, it might be said that the industrial safety movement has come a long, tortuous way to presently stand upon the bank of its "River Styx" and that we are now confronted with the problem of bridging this barrier. It is my belief that an intensification of the psychological warfare on accidents, a greater attention to our choice and training of those who carry the ball, the adoption of more rigid criteria for records, and the earnest cooperation of labor will enable us to pass the barrier.

**Analyzing Basic Accident Causes**

By I. C. STENNETT

Director of Safety Engineering, American Mutual Alliance

Foundry operations undoubtedly present a wide variety of hazards, and the problems of achieving safe working conditions in foundries may seem more difficult than in most other industries. There are, however, obvious and proven methods of controlling practically all foundry hazards. The existence of unsafe working conditions generally may be taken as an indication of poor management.

Accident causes in the foundry industry differ little from causes in other industries—the chief difference is primarily one of environment. Many other industries believed at one time to be extremely hazardous have adopted scientific controls for accident causes and reduced their frequency of accidents near the irreducible minimum. The steel industry is one of these and it operated last year with a frequency rate of 7.2 or less than 1/4 of the foundry rate. The foundry industry can likewise make substantial reductions of accidents by determining its basic accident causes and setting up procedures to control them.

It is generally recognized that every accident can be traced to the existence of an unsafe working condition, to the commission of an unsafe act by an individual or to a combination of both of these accident-producing factors. The Bureau of Labor Statistics has found that 90 per cent of all foundry accidents involve both an unsafe working condition and an unsafe practice. It is apparent, therefore, that any successful foundry safety program must include measures designed to control both of these major accident causes.

The correction of unsafe working conditions is entirely within the control of management—even in the small foundry. The control of unsafe acts, on the other hand, requires close cooperation and understanding between management and the employees.

The relative importance of unsafe working conditions may vary widely between different plants but the majority of unsafe conditions

fall into five general categories, as follows:

1. Poor housekeeping.
2. Lack of personal protective equipment.
3. Hazardous lifting conditions.
4. Defective equipment, tools, etc.
5. Unguarded or improperly guarded machinery and equipment.

Housekeeping, good or bad, is a splendid barometer of any industry. Good housekeeping conditions are requisites in the control of accident experience in foundries. Both the National Safety Council and the Bureau of Labor Statistics report that 30 per cent of all foundry accidents are directly traceable to poor housekeeping conditions. Apparently disorder is the rule. A disregard for good order results in nearly 1/4 of all foundry accidents. By providing good housekeeping the foundry industry could reduce the frequency of employee injuries by 30 per cent and nearly in line with other major manufacturing without hesitating about the other four measures.

Unstable and irregular piling of flasks, castings, patterns, and other materials and equipment, dust laden atmospheres, congestion and crowded work spaces and poor plant layout together with irregular, crowded and uneven walks make for poor housekeeping. Such conditions can be corrected easily and with little expense. It requires less time and less expense to establish and maintain good housekeeping conditions than it does to crawl around and over the disorder that is typical of many foundries. This major accident producer is a management problem and the foundry management that permits poor housekeeping is not only inefficient but criminally negligent.

The next major unsafe condition—that of the lack of personal protective equipment is responsible for nearly 25 per cent of the injuries. The ever present eye hazard from chipping and grinding and from the handling of molten metal requires some form of face

and eye protection such as goggles or face masks or shields.

There is also the need for safety shoes, leggings, asbestos clothing, respiratory protective equipment and others. This problem is more difficult to solve than others because it requires employee cooperation and participation. Employee cooperation can be secured as we shall point out later, but it is first necessary to have the right types of personal protective equipment available for use. This is a management problem.

Unsafe working conditions include unsafe lifting conditions. Because of lack of adequate mechanical lifting apparatus, employees are often injured when attempting to raise and move heavy and bulky objects by hand. This hazard is also closely related to poor housekeeping when lifting is required to be done in cramped and crowded quarters—or removing objects from unstable piles—or piling heavy objects too high. Industry in general has found that most lifting accidents can be prevented by providing adequate mechanical handling equipment.

Unsafe lifting conditions were involved in about 30 per cent to 35 per cent of all foundry injuries. These accidents are due partly to inadequate supervision. In all work that involves lifting, the immediate supervisor should be required to see that proper space is provided for the job and that adequate teams of men or proper mechanical lifting equipment are available.

Defective agencies account for about 10 per cent of all foundry accidents. There is a definite need for the close inspection and prompt maintenance or replacement of defective equipment, tools, hand trucks, chains, cables, slings, ladders, flasks, machines, etc. Uneven or broken flooring is particularly hazardous due to carrying or carting heavy materials or molten metal. Such hazards are usually obvious and are seldom difficult to correct. This accident cause can be controlled if and when management desires it.

It is not surprising that only 7 per cent to 8 per cent of foundry accidents are due to lack of mechanical safeguards. It is surprising that the percentages are not smaller for state laws and regulations have been in force for many years requiring guards for moving parts of machines exposed to hazardous contact.

The lack of guard rails on open-sided floors, on cat-walks, and around pits, or the

lack of guards on belts, pulleys, gears, shafting or on flywheels, tumbling barrels, conveyors and other equipment exposed to hazardous contact are obvious. The hazards are well known. It should not require much urging to secure guards for such equipment and yet employees are still being injured by unguarded machinery.

Sometimes machine guards are designed merely to meet minimum state requirements or for appearance, to promote sale of the machines, without regard to the extra protection which could be incorporated into the design at a slight additional cost. Mechanical safeguarding is a management problem—one that requires constant attention to see that new equipment is properly guarded before being put into service and that guards are installed on old equipment and are properly maintained.

Obviously, then, to control the five major unsafe conditions, which cause approximately 90 per cent of foundry injuries, management must—

1. Provide and maintain good housekeeping in all work areas.
2. Provide and require use of adequate personal protective equipment where such equipment is warranted.
3. Provide mechanical lifting and handling equipment or sufficient assistance when manually lifting and moving heavy and bulky materials.
4. Provide and maintain safe tools, equipment, material, etc.
5. Provide and require the use of proper mechanical guards for all machinery and equipment.

It has been pointed out that 90 per cent of foundry injuries were due to a combination of unsafe working conditions and unsafe personal practices. We do not mean to infer that the elimination of all unsafe working conditions would eliminate all the injuries. We still have to deal with the worker who may willfully or unwittingly perform unsafe acts that will result eventually in injuries to himself or to others.

Approximately 25 per cent of foundry injuries are charged against the practice of using unsafe equipment or using equipment unsafely. An employee who works on unguarded or improperly guarded machines commits an unsafe act although there is little he can do about it—he might report such conditions to his employer, or he can

refuse to use unguarded machines and thereby lose his job. The employee has little recourse if management refuses to guard the hazard.

On the other hand, the employee may lack skill or lack a full realization of the hazards involved. Many injuries occur because the employee uses his hands or feet to guide suspended crane loads into position instead of using tag lines or hooks. He may unknowingly try to lift loads with equipment designed for much lighter work. Or, he may remove guards from machines or make them ineffective. Thorough training and competent supervision will aid materially in reducing injuries from this cause.

Employees may take unsafe positions or assume unsafe postures while doing their work. Such practices account for about 10 per cent of all injuries. When an employee walks or stands under suspended loads or works or walks in front of moving vehicles or too close to other employees who are performing hazardous operations such as carrying molten metal, he is violating safe practices. Such unsafe practices can be controlled, also, at least in part, through thorough employee training and competent supervision.

From 10 per cent to 30 per cent of foundry injuries are associated with the failure to wear safe clothing or personal protective equipment. Loose and ragged clothing that may catch in machines or on projections; this soiled shoes; trousers that are too long or have cuffs that trip workers contribute to injuries in this classification.

Safe clothing is of less importance than the failure to use personal protective equipment such as face and eye protection—safety goggles—safety shoes—gloves and other protection when conditions require it. When such equipment is made available, by management, the employee violates a safe practice by refusing to use it. The plant which provides personal protective equipment and merely invites employees to use it to comply with state laws does little to avoid injuries from this source; nor do shop safety rules requiring the use of such equipment accomplish their purpose unless strictly enforced.

Efforts to force employees to use personal protective equipment, however, have met with little success. Workmen resent wearing equipment that does not appear to them to be necessary. They want to know and have a

right to know why they are required to wear such equipment as goggles, safety shoes, airline helmets, respirators and other devices. Those companies which have taken time to explain to their employees the need for personal protective equipment, why it is designed for their protection and how it should be used, have secured much better compliance with shop safety rules.

It should be recognized that respiratory protective equipment for protection against harmful dusts and gases is intended for emergency use only. It should not be used to replace sound engineering controls to remove atmospheric contaminants at their source.

Injuries resulting from manual lifting of heavy objects present a serious problem in foundries and account for about 30 per cent of foundry injuries. Injuries from unsafe lifting practices indicate a lack of skill, lack of training and a lack of appreciation of the hazards involved. Of course, the complete elimination of manual lifting and handling would avoid injuries from this source, but is an impossible goal. Nevertheless, many foundries could materially reduce lifting injuries by extending the use of mechanical lifting equipment. In addition, thorough training of all employees in the safe methods of lifting would go far in preventing injuries from this source.

For many years, safety engineers and others have known the direct causes of foundry accidents and methods of controlling such causes have been developed. There is a wealth of practical information in the literature which if applied to foundry operation would materially reduce accidents. For management to refuse to use the knowledge on how to prevent foundry accidents is as bad as though we refused to allow vaccination against smallpox.

#### BASIC REASONS

The basic reasons behind the high injury rate in foundries include:

1. A lack of interest in the prevention of accidents on the part of management and its disregard of available information for the control of hazards.
2. Lack of information and "know how" on the part of foremen.
3. Lack of employee training.

We have pointed out that a few foundries, large and small, have been able to operate with relatively low frequency rates and some

with perfect records for more than 2,000,000 man hours. This is equivalent to a foundry with 1,000 employees working a full year without a reportable injury; or a foundry with 100 employees working for ten years without a lost time injury. The managements in such plants have been personally interested in the reduction of accidents; they have set up the necessary measures and procedures to control unsafe working environments and unsafe operating practices. They have by their example proven that foundries can be safe places in which to work. Others can do the same, if they are interested.

Foremen are frequently given a lot of responsibility by top management for the reduction of accidents but lack the necessary information and know how to do the job well. If supervisors are to be held responsible for the safety of their employees, they should be given the necessary tools to assist them in carrying out their responsibility. These tools include:

1. A statement of policy stating clearly what is expected from the foreman.
2. Thorough training in safety fundamentals and in general foremanship.
3. Training procedure and training aids for employee job training.
4. Authority to correct unsafe conditions.
5. Time to make necessary inspections and to give employee training.
6. Technical literature such as publications of the National Safety Council, the American Standards Association, the U. S. Department of Labor and state laws and regulations.

7. Accident cause statistics broken down to fit his particular department.
8. Competent consultation service as might be provided by the plant safety engineer, insurance safety consultant, state factory inspector and others.

Too much emphasis cannot be placed on the value of foremanship training in a program designed to reduce foundry accidents. Such training courses might be set up under the direction of some plant official or placed under the direction of the Engineering Extension Service of your nearest engineering college, or set up in cooperation with your compensation insurance carrier or others.

Nor should the importance of some type of formal training for employees be overlooked. Job training for each employee will go far in reducing unsafe personal acts but formalized employee training is strongly recommended in the following areas:

1. Proper methods of lifting and handling materials.
  2. Need for and use of personal protective equipment and safe clothing.
  3. Proper use of tools and equipment.
- Accident rates in the foundry industry are disgracefully high. But these can be reduced materially as they will compare favorably with less hazardous industries through a program set up to (1) control unsafe working conditions and (2) control unsafe personal acts. Basically, top management of foundries must take greater personal interest in accident prevention; foundry foremen must be given the necessary tools and training to carry out their responsibilities and employees must be given not only job training but formalized training in certain areas of foundry operation.

#### Realistic Hygiene Practices

By MILTON H. KRONENBERG, M.D.

Assistant Medical Director, Caterpillar Tractor Company

Regarding factory employment and working conditions, a common practice is to use the term "industrial hygiene" which takes into consideration not only optimum atmospheric hygiene, but also acceptable and necessary healthy workroom practices and sanitary measures in order to bring about what may be termed a desirable "man-job-environment relationship."

Hygiene and safety are merely two parts of the same thing. The safety element, concerned with physical forces, is directed toward safeguarding employees against injuries, explosion, burns, suffocation, and other types of physical injuries, resulting from accidental occurrences. The hygiene element is concerned with physiology and toxicology and commonly involves chemical forces that are

influence by factory operating conditions and manner of work. This calls for a sort of medico-engineering complex. The maintenance of that industrial environment while primarily an engineering undertaking is based upon standards which are essentially physiological and medical. You cannot separate hygiene and safety. They are allies and must work together.

"Safety first" work is now so well organized, its operation so systematized that its extension to include hygiene practices as well should involve little extra expense. Inasmuch as the health of civilized man is never certain, not guaranteed, and not self-perpetuating and therefore requires the constant exercise of his intelligence and the observation of others to keep it on the right track, the progressive and enlightened executive will accept and share his responsibility for employee health. Those of you who participate in such programs will hold the leadership in your respective industries, the regard and loyalty of your employees, and the gratitude of your stockholders.

Since we must have facts and should see things for ourselves, let us arrange an imaginary trip through a plant. We will not concern ourselves specifically with individuals, but rather with environmental conditions or manner of work. We will assume that the employer has been properly selected, medically approved and satisfactorily placed on the job.

We call this first phase our visual audit. It aims at determining the nature and scope of our problem. It tends to serve as a guide for the more detailed studies of that environment which may be necessary later.

As we proceed through the workrooms, and before making any specific determinations or decisions, or recommending corrective or remedial measures, it is a desirable practice to grade or classify the manufacturing operations, processes and workroom practices observed into three groups.

(1) Those that are obviously safe and hygienically sound and need not be the subject of initial action. This stems from constant maintenance and external vigilance on the part of management.

(2) Those conditions that are the source of complaints and causing difficulty, or, are deemed worse or less acceptable than good industrial practice dictates. Since the conditions observed are admittedly worse, control

measures may be instituted at once to abate the offending factors.

(3) Are those conditions not readily catalogued or discernible by general observation. The exposure of that environment may not be within safe and healthy limits and therefore beyond the threshold of human physiologic adjustment. This calls for further study.

From a medical standpoint we know that an individual can by gradual tolerance to wide variations in his working environment physiologically adjust his bodily functions. Beyond that threshold adjustment, it is not possible and that is when trouble ensues. However, research studies have given us certain bench marks to guide us which are in general use today for minimizing many exposures. Engineering ingenuity has helped lead the way.

In the course of our visual survey, data is also collected concerning materials used and produced, processes and operations, by-products created; also extent and type of ventilation facilities, adequacy of illumination facilities, presence or absence of temperature extremes, abnormal humidities, odors discernible as well as other kindred and related hygiene undesirable, which under certain conditions can become deleterious. The type of control measures in operation and other safeguards in use are also noted as to whether or not they are adequate, approved, and of proper design. And above all, whether they are effective.

Having assembled this information, the next phase in this diagnostic procedure is spoken of as the quantitative study. Its purpose is to determine the extent and degree of the exposures or hazards suspected. Here is where we undertake to analyze and measure precisely the magnitude of our problem. This may require atmospheric sampling collection, air analyses, and other precise mechanical and chemical methods of determinations whether it be for an unpredictable or undesirable dust exposure or atmospheric gas contaminant. By being able thus to precisely measure the extent of the problem, it serves as a basis upon which to consider, develop and afford protective devices and other control measures for the specific problem in that area or workroom.

With the facts obtained, properly correlated and evaluated, a decision must be made as to whether or not the situation is harmful, and, if it is, what action must be taken.

There are no set rules that can be set forth to be instituted in an attempt to control an industrial health hazard. The specific conditions encountered in each plant will determine the type of control and protection to be employed. There are, however, five principal methods for the minimization of an exposure:

1. Substitution of a non-toxic material for a toxic.

2. Steel grit or an artificial abrasive in place of sand in the sandblasting process.

3. Complete enclosure of a harmful process.

To prevent the possibility of it becoming a general atmosphere contaminant, the hazard can be minimized, such as the modern enclosed sandblast barrel used for cleaning small parts.

4. Local exhaust ventilation.

This is the most frequently used method of control and aims to prevent atmospheric pollution by collecting contaminants at their point of origin. This is not a job for a tinsmith. It requires correct design and construction and must be maintained with care. Knowledge relative to the physical and chemical properties of the various atmospheric contaminants is essential before attempting to design exhaust equipment.

5. Wet methods for certain specific processes.

Limited to dust producing processes, such as in rock drilling and loading.

6. Respiratory protection.

Are for situations where other means of control will be impracticable, inapplicable or at times not effective.

At this point, it is not unusual for someone to say that all this is "big plant stuff" which the small plant cannot undertake.

Then we can say that production efficiency is only for the big plant which the small plant cannot undertake or afford. This is not true.

Executives of small plants often hesitate to embark on such a hygiene program because they are looking for satisfactory answers to such questions as:

How much will it cost?

What are establishments the size of mine doing about it?

How much of a program does my plant need?

What standards of working conditions in my plant can be called healthy?

The wit of man has apparently not been able to devise a trustworthy measuring rod that will give a satisfactory answer to the critical. However, there are many indications and sideglances that favor the belief that it pays dividends all the way around. It is not so much that they cannot afford a program; it is rather that they cannot afford to be without one. Many small plants do have such programs in operation.

As a physician, let me state that while we do not expect every medical practitioner to know how to perform a thyroidectomy or remove a brain tumor—we do hope and expect him to know when it is indicated and when to call for help or invite the specialist. So it is with our venture in industrial hygiene—know when aid must be forthcoming, know where it can be obtained. It is available for you.

The following official and non-official organizations, agencies and associations are prepared to offer you a service in some capacity. They can be avenues of great help concerning one or more of your specific problems. None of them aim to regulate; their purpose is to educate.

American Standards Association  
Industrial Hygiene Bureau of State Health Departments  
Private consultants (Chicago, Detroit)  
Other private industries, maintaining such services  
Insurance carriers—offer facilities as part of their service  
Industrial Hygiene Foundation of America  
Various universities (Pittsburgh, Harvard)  
National Association of Manufacturers  
American Association of Industrial Physicians and Surgeons  
Council on Industrial Health, American Medical Association  
U. S. Public Health Service  
National Safety Council

An additional consideration about this venture is that we should further ask ourselves whether or not our workrooms meet the standards as legal provisions of the state health and labor departments where we operate. While you may be complying with the requirements for a healthy workroom environment, it is also your responsibility to see that you are not creating a public nuisance, hazard, or health problem to your neighbors or the community at large.

We know that in manufacturing opera-

tions, many and varied types of materials and compounds are involved. It is desirable that you have a knowledge of the various uses of such materials so that the plant engineers, company supervisors, safety and medical personnel can be better informed and advised of hazards or untoward effects which might be created. Here is where your purchasing department can assist. What is bought, how much and who uses it should be obtained. Develop for yourself a numbered material card system and get the necessary data about these materials. Clauses of caution, how to handle material and other warning notices can then be prepared and issued. Too frequently materials and compounds are purchased by trade name only, which are subject to change. On other occasions only catalogue numbers are used. Here again you are working in the dark. It is important to know the characteristics of such materials, what they are, how toxic they are, and how they will be used.

Other departments or units of a manufacturing establishment, such as planning or engineering, likewise play an important role. New processes or operations that are being considered or installed should be called to the attention of those responsible for the hygiene program. Even if a manufacturing process or operation requires a simple revision or change, it should be properly channeled in order to have prepared the necessary safety and health cautions and control specifications. This means getting in at the blue-print stage. It allows for the bringing of these new or revised operations in line with acceptable practices, according to existing codes and regulations in your jurisdiction.

Where employees handle toxic materials or are exposed to harmful compounds, clothing for the job is essential. These may be laundered coveralls, overalls, smocks, etc., depending upon the nature of the job and the type of exposure. We must look upon such apparel as tools in a hygiene program.

In other instances a particular industrial operation may call for personal respiratory protection. For the majority of hazardous industrial exposures, the selection is a relatively simple problem. When the conditions are unusual, it may be necessary to examine in considerable detail each of the factors, to weigh the advantages and disadvantages, and to repeatedly modify the device or the oper-

ation until a practical and comfortable form of protection and control is obtained. Each type of respirator places some restriction on the wearer. The question of efficiency is satisfied in part by the testing and approvals set up by the Bureau of Mines. Respirators should be individually assigned, properly maintained and inspected regularly.

Protective creams while not high on the list of preventive measures are often one of the only available means of protection. When a protective ointment is used, the worker invariably removes it with soap and water at the lunch period and at the end of the shift, and so removes at the same time whatever irritants are on the skin. This adds considerably to the protection supposedly given by the ointment. There are commercially available various types of these protective creams applicable to a long index of manufacturing compounds and materials.

Up to this point we have concerned ourselves with the atmospheric environment and its related aspects. There is also a real need for measures and equipment that go to make up the balance of an optimum workroom environment, which can be expressed by sanitation facilities and housekeeping techniques. Some phases may be connected with the person as well as the environment. They are the items that are looked upon as necessary personal services which should be afforded employees.

In any given type of industry we find that the incidence of occupational dermatitis bears a direct relationship to the adequacy of washroom and shower facilities. Every employee leaving a plant improperly or inadequately washed, represents a liability to that company. Too often there are an inadequate number of wash basins and showers with inferior construction and maintained in an unsanitary manner, supplying only cold water with no soap or towels. There are in existence minimum acceptable washroom standards which call for proper maintenance and adequate facilities. Separate washrooms should be provided for each sex. The common towel should be prohibited. Individual towels of paper or cloth should be provided and proper receptacles for disposing of same. Other hand drying apparatus may be substituted after approval by the enforcing authority. Soap in a suitable dispenser should be provided. There are available industrial cleansers for the normal skin, the sensitive or

dry skin, or the defatted skin. Reinforced skin cleansers to safely remove tenacious oils and dyes are also available and should be provided. Promiscuous use of various solvents for cleansing hands is a poor substitute for safe and proper soap. Avoid harsh, strong, alkali soaps as they themselves are dermatitis producers. The use of foot bath preparations, while not universally accepted, are in any event hygienically sound.

Another hygiene requirement involves the adequacy, spacing, and proper maintenance of toilet facilities for both male and female employees. They should be readily accessible, adequate in number, of approved design and construction and properly maintained. They should meet the plumbing codes and building regulations of the local enforcing authority. An adequate supply of toilet tissue, in proper holders, as well as adjacent washing facilities should be provided.

Let me state here that the contraction of syphilis or gonorrhea from toilet seats may be rather remote, but the revelation which results in not using toilets induced by filthy arrangements is not remote. Toilets reeking ammoniacal odors of stagnant urine and fecal material are excellent conditions of chronic constipation and other ills.

A separate lunchroom, should be maintained in every establishment unless it is convenient for the employees to eat lunch away from the plant premises. No employee should be permitted to eat meals at his workbench. A company lunchroom or cafeteria if maintained should meet the sanitary codes of your community, and the kitchen kept free from filth, rubbish or other garbage. Very few circumstances cause more plant disruption and at the same time lowers employee morale than an outbreak of food poisoning. Such incidences create various rumors and cause lack of confidence. A routine program of inspection and supervision must not only be directed at the plant cafeteria, but, in the case of food caterers, to the place of production and point of distribution as well.

Dressing rooms and ventilated lockers should be provided whenever the type of work performed involves exposure to excessive dirt, grease, fumes, abnormal moisture, etc. A two compartment locker with separate facilities for work clothes and street clothes should be provided for those whose clothes are exposed to contamination with poisonous, infectious or irritating materials. Pro-

hibit the storage of oil soaked rags and clothes since it invites the danger of spontaneous combustion. Discourage the pernicious habit of keeping food in these facilities since it invites roaches, rats, and other pests. A resting room should be provided where women are employed and have it equipped with a bed or couch.

To further promote and encourage hygiene practices, various arrangements for laundry service of plant work garments will go a long way in strengthening such a program.

Water supply and drinking facilities are always a matter of prime importance. All places of employment should provide a readily accessible supply of clean, cool, wholesome and safe drinking water. The common cup, open containers and inadequate number and unapproved types of drinking fountains should be eliminated.

Where water is taken from an unapproved source to be used for industrial processes or fire protection, notices should be posted stating that this water is unsafe and should not be used for drinking purposes. This falls into the realm of sanitary engineering and can be worked out satisfactorily with your local health authorities. It also calls for avoiding the possibility of polluting streams and bodies of water in your community.

Eric Johnston, formerly head of the U. S. Chamber of Commerce, once wrote that "the best rough test I know of the efficiency of a factory is its cleanliness" and so our interest in furthering plant housekeeping takes into consideration the maintenance and condition of factory floors, workbenches, aisles, windows and overhead structural supports. Wherever practicable, dry standing room should be provided. Sweeping should be done as often as necessary and in a manner as to avoid dissemination of a contaminant. Floors should be kept free of oil and protruding nails and splinters. Where cuspidors are used, they should be cleaned daily.

A factor which affects every manufacturing environment and has a bearing on employee well-being and health concerns illumination. The quality and quantity will naturally depend upon the work performed. Illumination standards are available through many of the agencies previously listed. The benefits provided are a greater accuracy of workmanship, less eyestrain, less fatigue, less accidents, better plant morale, and improved quality of product.

The new science of color dynamics also merits your consideration from a hygiene standpoint. While colors have been used to identify danger points, we also feel that they may have a therapeutic value. It tends to reduce eye fatigue and lessens nervous strain. Certain colors such as green are said to inspire patience. Others such as blue are said to reduce muscular tension, while yellow possesses value in overcoming neurotic states. Color can give you a lift.

A milestone in progress toward protection of employees from the harmful effects of atmospheric contaminants centers around what is known as maximum allowable concentrations (M.A.C.). They are useful to many of us who are charged with the maintenance and promotion of industrial hygiene. These standards also serve as a basis for the engineer in designing methods of control. Official and non-official agencies have recommended some and in other instances they have been defined by law or regulation. Ascertain what your state codes call for and avoid confusion. With these bench marks there is an opportunity to gauge the workers' environment insofar as it affects health.

Without mechanical ventilation, many important processes in modern industry could not be carried on and many useful materials would have to be discarded because of menace to health. Open doors and windows do not constitute a ventilating system. Since this is a special topic for one qualified to discuss its design and application, I will leave it for the experts.

Overcrowding of men and machines is neither conducive to efficiency nor to good housekeeping, sanitation and health. Epidemics and other contagion are possible in close quarters. That which is orderly and well-kept has a definite human appeal.

Work in hot industries may be responsible for a number of physiological derangements, the acute effects having a direct bearing on health in general, on ability to work and some relation to accidents. The conscientious use of salt or salt and sugar tablets has largely eliminated the disability and discomfort which were so prevalent years ago. The temperature requirements in industries having extensive radiant sources such as a foundry cannot readily comply with desirable temperature tables. However, a few observations from the physiological viewpoint concerning optimum conditions of temperature and hu-

midity for industrial operations are appropriate. For sedentary work the optimum temperature is between 68 and 73° F. There should not be a difference of more than 2° F. between the temperature at the floor and the breathing levels. For moderately hard work, a temperature of 65° F. is preferable. A relative humidity of 40 to 60 per cent is generally considered best in these temperature ranges. Air movement should not be over 40 feet per minute when the work is not strenuous. The air supply should be sufficient to maintain the desired temperature and humidity without drafts and to remove odors and other contaminants. Air movement is of no value if the air is saturated and the temperature is above 68° F. The common belief that dry air in itself causes a harmful effect has never been proven by convincing evidence.

Under certain operating conditions abnormal noise levels may have a profound effect on some workers producing fatigue and kindred phenomena. Long exposure to sounds above a level of 80 decibels are disturbing and uncomfortable. Noise reduction at the source may be accomplished by insulation, special forms of machine design, proper mounting or proper bases.

Often where correct posture seating is needed the most, that's where it has been neglected. To have an operator seated at a costly machine on seating equipment that makes it hard or impossible for that operator to get the best and the most out of the machine is a poor and costly practice. Empty orange crates are not the answer. In sedentary occupations, the employee must be seated at that certain height which places him in natural and convenient eye-level and arm-level relationship with the working plane. Otherwise, the requirements of the body are disturbed which taxes one's physical and mental energy.

All provisions for the well-being and comfort of the individual by the employer will be futile, if the worker through ignorance or carelessness fails to observe and cooperate. Continued systematic instruction and education are necessary and are a potent factor in the success of this movement. Where such is lacking we find that more ignorance exists concerning health matters than many of us, even the most imaginative, realize. It is in these plants where we find employees who "ward off" illness and ill-being by wearing various concoctions around their neck or in

their throat. Lucky stones and charms of all kinds are carried or worn for their mysterious powers of protection.

The preservation and promotion of employee health through plant hygiene practices and how they may be achieved should admittedly not be a subject on which there can be any controversy. Its success will only

be possible by a cooperation of the highest order in which top management, the physician, engineer, safety experts and other technical personnel participate. It is not a one man job. Community resources are also available to help you. Those who provide and uphold such practices will find it an antidote for many of management's ills.

### WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: J. L. RIDINGER, Safety Director, Inland Steel Co.

Demonstration Sketches—

Metal Products Newsletter,

Dec. 1947 in v. 5.

In R. 17

EL 2545

EL 2545

### Demonstration—As an Aid to Safety Training and Instruction

By E. H. HOUCK

Superintendent of Safety & Welfare, Jones & Laughlin Steel Corporation

Much has been said about the four E's of a well-rounded safety program—Engineering, Education, Enforcement and Enthusiasm. All are important and must be used effectively if an accident-prevention program is to be successful.

Of the four E's, Education for safety with its many and varied aspects, has been given a great deal of thought and planning. Frequent and periodic analyses of lost time accidents in a steel plant disclose from 80 to 90 per cent of these accidents are caused by unsafe practices rather than unsafe conditions. These percentages vary from month to month but hold surprisingly constant within that range. Too often the employee injured has failed to think before acting. Accidents result from such causes as (a) lack of good judgment, (b) abstraction, (c) inexperience, (d) distraction, (e) incomplete instruction (f) disregard of instruction, (g) horseplay, (h) lack of alertness. A need for further and continued education of the employee is necessary if the accident rate is to be reduced.

Among the many ways of educating the employee on accident prevention, various kinds of visual aids have been developed. The March issue of the National Safety News carried the following statement: "It has been reported Army and Navy instructors have found by test that students learn up to 35 per cent more in a given time and remember 65 per cent longer when conventional texts

are supplemented by movies and other visual aids." Some visual aids are old in years of service, others are comparatively new. Among visual aids are bulletin boards, motion pictures, sound slide films and records, safety-graphs and demonstrations.

Demonstrations can well be used to illustrate a discussion or instruction on some one item or phase of safety. They should be used immediately following the discussion, to emphasize and fix the ideas in the minds of the audience. Most of us retain more that we see than what we hear or read.

A well-planned demonstration will create additional interest in the subject under discussion. Foremen frequently request some method or aid to vary their safety meetings with employees in order to increase the interest and to prevent these meetings from becoming routine, dry and uninteresting. To meet this demand, demonstration units have been devised, shown to a group of foremen, and then turned over to them for use in their meetings.

A demonstration emphasizes what may and can occur if the safety rule or safe procedure is not carried out. Too often we hear the complaint that verbal safety instruction "goes in one ear and out the other." A demonstration will drive a safety idea home perhaps more than a lengthy discussion or written words can do.

To illustrate the use of "Demonstrations—



As An Aid to Safety Training and Instruction, two demonstration units are here presented. They were constructed in our General Maintenance-Electrical Department at our request.

The first unit demonstrates what can occur if a main power switch is not opened and locked out before employees repair or work around machinery which can be accidentally placed in operation. We have rules in our "Rule Book for Crane Operators and Repairmen" and in two Safety Dept. Standard Sheets, which state in effect that before starting repairs on machinery or cranes, the main power switch must be opened and locked out with a special type safety lock provided. The foreman or employee in charge of a crew must open and lock the switch or in the case of an individual employee, such as a crane man inspecting his crane, he must open and lock the main switch. In any case the employee locking the switch must keep the key on his person, and he alone unlocks the switch.

In 1943 a fatal accident occurred in our plant. A laborer was using a shovel to clean steel scale from under the discharge end of a steel billet charging table during a temporary shut-down, when the table began to move and several 8" x 8" x 12" blooms, moved by chain and dogs, were shoved off the end of the table on top of him.

In this case the labor foreman assigned the employee to do this work, but instead of going to the main power switch located on a platform about 30 feet away, decided instead to station himself at the nearby master controls used by the operators and which were in neutral position. While the employee, who was later fatally injured, was shoveling out the accumulated scale, without warning the chains and dogs on the table started to move. Three witnesses later testified no one touched the master controls, which were in neutral. One witness, the skid charger operator, testified, he then jumped to the controls and reversed them, but without effect—the blooms continued to move in the one direction toward the deceased.

Following this accident, this demonstration unit was made up and has been used throughout the plant with what we believe to be effective results.

This unit consists of:

- (a) A board on which the equipment is mounted and is portable.

- (b) An extension cord to plug in any nearby outlet.
- (c) 110 V 60 cycle A.C. current.
- (d) Main power switch with wire guard over it.
- (e) A small lock to represent a safety lock, with key.
- (f) A small motor behind the board and attached revolving gear placed in front of the board.
- (g) Master control and lever.
- (h) Magnetic contact, operated by the master control.
- (i) Glass tube to represent conduit with two wires enclosed, connecting the master control to the power circuit.
- (j) Both wires in the glass conduit have part of the insulation removed to cause a short circuit.
- (k) Bottle of salt water with bulb and glass tube, to insert water.
- (l) Bottle of fresh water for flushing purposes.

The second unit demonstrates what may and can occur if a fuse in an electrical circuit is replaced by a fuse of higher ampere rating.

A fuse is obviously a safety device which fuses or burns apart at a predetermined maximum electric load. It serves to protect not only the electric wiring but also the equipment, such as the motor, from overloading and subsequent damage by heat or fire or both.

When a production machine driven by a motor develops some trouble, or the operator overloads it, the motor attempts to drive the machine and if the overload becomes great enough the fuse blows or fuses. The usual procedure is for the operator to call the electrician who attempts to find the cause of the overloading, if electrical, and replaces the fuse with one of the same rating. However, it sometimes occurs that a machine is near its maximum capacity and any slight overload, causes the fuse to blow. In other cases, the operator may be abusing the machine and causing an overload. If frequent delays of the machine then occur, either the operator or electrician may decide to cure the trouble by inserting a fuse of higher rating. My electrical friends will protest this statement as they are on record frequently complaining about unauthorized persons changing fuses to higher rating.

If nothing occurs for a time, the overfusing

is forgotten, until some day an overload occurs accompanied by a fire sometimes of major proportion and heavy damage to wiring and motor. In one case the electrical department in our plant has locked panel boards in a building where the circuit is carrying about all it can. Overfusing could cause a major fire in electric wiring concealed in the frame walls. However, both the police and electrical depts. have keys. This is not desirable and work is under way to re-wire this building.

We are all familiar with complaints of public utility companies who service private homes with electricity. Inspections of fuse boxes in homes disclose pennies, wire, nails, etc., placed in fuse receptacles by the home occupants who, instead of replacing the fuse with a good one of like rating, place a penny or other metal object in the socket and screw in the burned-out fuse, thus removing a safety device placed there by people who have a knowledge and respect for what electricity can do if abused.

This unit consists of:

- (a) A portable box.
- (b) Lamp switch.
- (c) 110 V 60 cycle A.C. current.
- (d) Extension wire for nearest plug-in.
- (e) A screw type receptacle for fuse plugs.
- (f) Two outside terminals with wing nuts for attaching a piece of electrical wire.
- (g) A transformer inside the box to step up the amperage.

No attempt has been made to cover the whole field of demonstrations. A few sugges-

tions for demonstration units in addition to the two just used are:

1. A model of an overhead crane. This can be constructed to scale, wired and used to train cranesmen.
2. Actual demonstration of an oxygen-acetylene burning and welding unit.
3. Models of scaffolds and ladders built to scale, demonstrating proper construction and use.
4. Proper use of portable power tools.
5. Various types of gas masks—how to wear them and their limitations.
6. Fire extinguisher demonstrations on actual fires in the field.
7. First aid demonstrations to include control of bleeding, artificial respiration and proper transportation of the injured.

In conclusion, demonstration units can be used effectively to:

1. Illustrate a discussion and instruction in safety.
2. Create additional interest in a safety subject.
3. Illustrate what may and can occur to cause an accident.
4. Serve as an aid to foremen in conducting safety meetings.
5. Fix in an employee's mind better than many words, the "why" of a safety rule or regulation.
6. Serve as positive rather than negative instruction.

Our experience so far proves these units have a definite place in an effective safety program.

### What the Medical Department Can Do to Assist in the Prevention of Accidents

By RICHARD J. BENNETT, JR., M.D.

Chief Surgeon, Chicago District, Carnegie-Illinois Steel Corporation

We safety men and physicians are in this business of preserving life and limb together, and the responsibility of each must be recognized. In the future, as in the past, much of the success of the safety program will be because we, although members of different professions, nevertheless united and combined our efforts to keep employees healthy and to keep employees safe.

Prior to 1912, the doctor's activities, as

viewed today, were almost non-existent. It was the thought of practically everyone in industry, employees included, that physical fitness was the sole responsibility of the employee. In many cases, this concept went so far as to consider the employee responsible for securing medical treatment of injuries as well as for the payment for such treatment. Remember, too, that the hygiene and health knowledge now obtained by urban high

school students from parents, or in hygiene or physical education classes was almost entirely lacking. Although deplorable, it is not surprising that this lack of knowledge, plus inadequate medical facilities, very often resulted in widespread infection and incorrect healing.

Judge Elbert H. Gary, the first head of United States Steel, took the lead in decreeing that safety and health and welfare were to be the prime factors of consideration in the making and shaping of steel in the corporation. Out of the philosophy of Elbert Gary, and modified, of course, by the times we have gone through has come the concept of our own medical division which will probably be quite similar to one in your own organization.

This concept reflects a means of determining the physical fitness of an employee in the performance of his regularly assigned job and a means of directing professional medical service that might be required for the preservation of the health and well-being of the employee while on the job.

That, as simply as we can state it, represents the thinking of the corporation I represent here today on the subject of industrial health and the part that we as doctors will play with you in maintaining it.

But by itself, it means nothing. Backed up with action, it does. What, then, will the action be?

The first step we will consider, because it is the first step in any doctor's work, is examination, which we all know is the means for determining the physical fitness of the employee. To be effective, the examination must vary in accordance with the physical expenditure required by a particular job. There need be no elaboration on this point since I am sure that it is clear to all in this room this afternoon. Clerking, for example, calls for a different type of physical expenditure of energy than does, say, handling and packaging steel plate. What is equally as important, however, yet not so widespread as yet is that the physical facts of the job—the physical fitness requirements of the various job types—should be in the hands of the examining physician. In most instances, it is safe to say, the accumulation of facts that should be in the hands of the physician will be gathered by other personnel. The method will be furnished, and the adequacy of such information will be reviewed and approved

by the medical division. And the results from such a procedure will be a standardization of the health requirements for an individual plant as well as for a job or job type throughout the entire company.

I think that it is only the plainest form of logic to say that a well-rounded initial medical examination will have a direct bearing upon our accident frequency rates. A healthy man, with a sound mind and body, is less apt to commit safety errors than one bothered by ill health, mental worries, etc.—which should have been picked up by the examining physician. You, on the other hand, come in by reducing accidents and injuries on the job for which we say he is physically qualified. This relationship in our work has worked wonders in the past, and it is one to which we will hold for the future.

Formerly, a very cursory type of examination of the employee at his original entry was considered sufficient so that actually the only definite, scientific knowledge of the physical fitness of the employee (unless he had been hospitalized or treated as the result of an accident or disability) was obtained at the time of his original entry into a company. Yet we know from actual experience that the physical condition of an individual might alter through influence of occurrences while on the job or away from the job. The armed services, during the war period, reported an extremely high rate of hospitalization or treatment required of individuals who arrived in camp after a furlough, leave, or week-end pass, and industry has experienced, to a minor degree, the same thing ever since it began to look into the problem. Unless, however, such an individual is on the type of job which requires a periodic examination there is no way of determining, as things stand now, whether any change in his physical condition has taken place.

When an individual arrives at a department, in most instances, the supervisor feels that the employee, having passed a physical examination to work in the plant, is capable of performing any job in the department, even though in the process of upgrading, the physical requirements may have increased. Therefore, the suggestion is made that whenever the occasion arises for a man to be transferred from one department to another, the transfer be referred to the medical department for approval.

I am not advocating that there be a steady

round of re-examinations under such a system. Instead, the frequency of re-examinations would be determined by the strenuousness of the job. Neither is it our contention that all ailments brought to light would require treatment by the company but that the condition could be corrected by the individual securing treatment from outside the company. The examination, of course, in competent hands, would reveal whether any necessary treatment or surgery was the responsibility of the company or the employee. The expansion of the periodic examination to employees not now covered by such a procedure does not exclude the continuance of the present practice of special re-examination of those individuals whose performance indicates a decrease in physical fitness.

And now, a word as to the examination procedure. All of us who have ever been sick know that there is more to a physician than his training and scholastic standing. Just as important is his ability to handle the human relationships of an individual employee. It is safe to say that an employee approaches an examination in the plant without the degree of freedom and ease that he would show towards his own family doctor. And in many cases, the fault is ours, not the employee's or the company's. The employee must not only be made to feel that he is getting understanding and competent treatment; he must get it at the hands of a plant physician who realizes that the employee is entitled to and deserves every professional consideration. Pure routine examination may tell the doctor all that he needs to know, but he must go one step farther and win the confidence of the patient. If you do not believe this statement, ask some of the servicemen whom you know what they thought of Army or Navy medical treatment. Now all of us know that the medical men in the services did wonders in keeping the disease rate low, in keeping men healthy, and in educating men who did not have the proper hygiene backgrounds of the importance of keeping well. Their surgery and clinical methods were excellent. And yet, so rushed were many hospital and clinic installations in the service that a large percentage of servicemen grew firmly biased against service treatment, contending that all the doctors could do was issue out "pink pills," and no amount of talking or presentation of the facts is going to change their minds in this respect. Industrial physicians

can learn a lesson from this: If the doctor does not have the respect and confidence of the employee, his professional qualifications are neutralized and he has lost some of his effectiveness and usefulness to his company.

And what does this have to do with safety? Simply this: the employee who finds a genuine interest in his physical and mental condition at the hands of the examining physician, is going to be more receptive to safety men later on in his industrial life. He will more readily believe that they, too, like the doctor, are interested in his safety, health and welfare. And you can do much more towards helping that employee keep well and safe if he has not been rushed through an examination that appeared to him to be incomplete and a "chose" on the part of the examiner whether it actually was or not. Good personal contact can compensate for many other sins, and both of us know this to be true.

There has been considerable thought given to the idea of availability of medical talent on a full-time basis with respect to a 24-hour coverage. It would therefore, be well to bring to your attention the manner in which the best medical talent can be attracted with respect to such 24-hour coverage. To insure capable individuals, the medical position a company offers must be as financially attractive as the possible income of such an individual in a private practice. In addition, there needs to be some sort of insurance or guarantee of the number of years that such an individual would be employed at that equivalent rate. Yet it has also been the experience of the medical profession that whenever an individual reaches the degree of security expressed by such a program, the individual tends to regress in keeping abreast with the progress in the profession. The result would be a decline in the efficiency of the individual rather than the maintenance of the high standard of efficiency found in a physician engaged in a competitive practice. To my mind, this offsets the advantage of having medical personnel on a fulltime basis. From the standpoint of around-the-clock coverage, plant physicians are scheduled so as to insure adequate medical service, if required, at all times. Your experience will back me up in this: many of our industrial injuries today are of such a nature that the plant nurses, who are on duty 24 hours a day and who are the physicians' representatives, are sufficient to cope with these in-

juries. In the case of a serious injury, prior to the arrival of the doctor, these men are well versed in the administering of first aid to the individual. However, in the event the injury is of a minor nature, the patient is always rescheduled for a subsequent examination of such injury by the physician, so that at no time does the nurse assume a responsibility that belongs to the physician.

What makes this system work, of course, is the degree of interest the physician brings to his work at the plant and factory. If he regards such visits as perfunctory, as a stipend for which he does only the minimum amount of work required, then it is time for a company to look for another physician. Happily, you will find that such physicians are in an extreme and dwindling minority. More and more, the physician in industrial health work realizes that the maintenance of worker health offers him rewards that are more than monetary; that he is contributing to humanity in an even more extensive and complete manner than he could ever hope to attain through private practice alone. Because he is also engaged in competitive medicine in his community his standards remain high and his research and study continue. These are brought with him on his visits or calls to his plant. It is a happy arrangement, and, I think, the best arrangement that can be made in the field of industrial health and safety today.

There is one extremely interesting phase of our work as industrial physicians that I would like to bring to your attention also. That is the matter of rehabilitation and it points up dramatically, yet accurately, what a Medical Division can do in cooperation with others in effecting confidence and respect for a company. As many of you will remember in former years, a handicapped employee or returning veteran was often placed on a pension-type job in which he performed inconsequential work of little value to himself or his company, and in which the hours of the day must have rolled by with maddening slowness. No active man can take this sort of thing very long without losing his self respect. No company, in the same light, can bear for long the excessive expenses of employing such men without getting a fair measure of work in return.

The Carnegie-Illinois Steel Corporation, which has been interested in this problem for some time, attacked it in earnest in 1944, when all plants made a survey of thousands

of the jobs in preparation for the handicapped veterans who were on their way back, or would be back after the war's end. These surveys, incidentally, were made by the director of safety in each plant with the assistance from members of each department concerned. And out of them has come a program for the human assistance of handicapped individuals that is a stimulating thing to see. Individuals who have been injured at work have been given special hospitalization which teaches them the use of healing limbs, or, if amputation of a part has been necessary, how to utilize other body members to compensate for the loss of that part. This training of course, implies standard medical methods for the most money cases, but in certain stages, the training may simply be an adaptation of regularly followed company practices. After rehabilitation and recovery is complete, every effort is made to place the individual in a job as close as possible in type to the one he held prior to his injury, and in which he can expend the full productive effort required for the job. In no instance is the work "made easy."

To illustrate the effectiveness of such a concept, let me cite a few examples and statistics. Our company's 1944-45 survey of jobs disclosed, for example, that a returned veteran who is disabled to the extent of drawing a government disability pension can perform the job of ladle lining even though he has lost an eye, or certain fingers, a leg, or has defective hearing. He can perform the job of machinist in case he has lost an eye, or certain fingers, or a leg, or has defective hearing, a nervous condition, or a weak heart.

As of last July in the company, on the veteran's side alone, there were 2,148 handicapped veterans employed, 951 of whom were known to be receiving pensions as the result of their service injuries. There were 29 with an arm or leg missing, 296 men with a foot, leg, or hip injury, and 146 with hands, arms or shoulders injured—all working. There were 70 with a back injury who had been put on useful productive jobs. The listing could go on either through the veteran or injured employee status, and in back of that listing-out in the mills—you would find these once-handicapped employees who are treated as regulars, who are thought of as regulars, and who consider themselves as regulars. Medicine, safety, training and operating personnel have all played a part in their rejuvenation

by showing them that they can do the work assigned; the employees have the courage and the will to make good on the work assigned. And they are doing just that . . .

Again, our inter-relationship is apparent. We do our best to send you able, healthy employees. You do your best to keep them safe. If they should become injured, the physician does his best to get them productive once more. And once again, the safety man surveys the jobs with able assistance and helps the handicapped man put himself to rights out on the job once more.

One last point that I wish to make is the point of standardization. There can be no question but that individual health standards can vary in plant units just as the frequency and severity rates will vary, even though the various units employ the same type of men, handle the same type of work, and manufac-

ture identical or near-identical products. It is up to the medical staff of a company to improve the standardization of health requirements of the job, or job type, as mentioned earlier, so that the physician in any of the units will be able to furnish the supervisor with definite information so that he can readily evaluate his employees as to physical abilities. And if that employee should be shifted from one unit to another, he can be certain that his physical and health rating in one unit will not be changed in his new unit. This standardization with its definite cost reduction assets, can be accomplished in the future by regularly-held staff meetings in which participating physicians and safety men can compare health problems and methods of treatment of disease or injury which will bring benefit to the company as well as to its employees.

## Employee Acceptance of Safety Programs

By SPENCER W. MYERS

Assistant Superintendent of Gary Public Schools

The success of any safety program is dependent upon the extent to which it reaches and is carried out by the employee on the production line. Until the worker accepts the program as being necessary to his well-being, the program remains a paper plan. If this is true, the question well may be asked, "What can management do to get acceptance of a safety program by the worker?" In examining this question it might be well to examine it in terms of the reaction of a rank and file worker. In this paper the writer will attempt to take that point of view.

If a safety program is to be accepted and therefore effective, it must be planned and carried out by the line organization from the top administrative official to the newest worker in the plant. This does not mean that the staff organization, i.e. the safety director, safety engineer, personnel department, training department, etc. need not be concerned—they can be of great help in the planning but final responsibility for the success, and thereby the acceptance of a safety program, must lie in the exercise of line authority and responsibility. It is therefore essential that in planning or carrying out a safety

program that the working committee be made up of representatives of top management, of supervision, and of the working staff, assisted to whatever extent they are able by the pertinent staff organization. No safety program can succeed, no matter how well conceived, if it is superimposed upon an organization that is not really concerned about the welfare of the total working group. Such committee participation in the planning and improvement of safety programs is the most important final factor in the success or failure of such a program.

It is suggested that a successful working committee might be made up of,

- a top line production official such as the vice-president in charge of production,
- a supervisor from each important production unit in the plant, and
- one or more workers from each important production unit in the plant.

Where a union is involved, it is probable that the union is in a position to supply the worker representatives on the committee to the best effect. This also makes it possible for management and the union to cooperate in an activity that is of mutual benefit and which

does not involve the discussion of wages, seniority, etc.

One of the major difficulties in establishing safety as an important part of the total plant production program and thus creating employee acceptance, is the failure to emphasize the importance of safety early enough. Too often safety is considered as a separate activity which is not related to production. If this difficulty is to be resolved, emphasis on safety in the plant should be initiated from the moment that a person becomes a prospective employee. This means that there should be a definite safety emphasis in the initial interview. It becomes the responsibility of the employment department to initiate this emphasis. If the interview is properly planned, it is possible many times to eliminate certain prospective employees who are accident prone. In all cases it is possible to give the prospective employee a feeling that every precaution is taken in the plant for his safety. This makes the prospect more interested in becoming an employee and gives him the earliest possible initiation into the safety program of the company.

Another activity in which emphasis can be placed upon the safety program is the orientation program. More and more companies are developing such programs to familiarize the new employee with the organization in which he is going to work and the rules and regulations of that organization. The failure to emphasize the importance of safety in the orientation program, is a failure to convince the new employee that the company is vitally concerned about the safety of its workers. This is one place where the use of visual aids can be very effective. One of the best sources of films in safety is still, "A National Directory of Safety Films" 1945-1944 edition, printed by Business Screen Magazine, Chicago, Illinois.

Another essential step in safety emphasis which implements employee acceptance of the safety program is a properly developed on-the-job training program. Teaching the new employee to do his job the safe way is a must. A large percentage of industrial accidents occur at the job site and usually derives from ineffective initial job training.

Unless some such program is a part of the safety picture, the safety program will never be completely accepted by workers because safety never becomes related to the method of performing the jobs in the plant. Sec-

ond on-the-job training is impossible without good supervisory training. The supervisor teaches job performance to new employees and only through adequate supervisory training is it possible to provide supervisors with the techniques that are necessary to make safety a part of on-the-job training.

Even where effective on-the-job training is carried out, based upon supervisory knowledge of effective on-the-job training techniques, retraining is often forgotten when new machinery is purchased or new methods adopted. It is just as important that workers be taught to perform a job a new way, safely, as it is to teach them to do the job safely, originally. Management should insist that procedures for job performance be written and used whenever new methods are adopted, or new machinery is utilized.

No safety program, even though adequate in original concept, can remain so, unless continuous publicity is given to the program. There are many publicity techniques that can be used. One of the commonest is the plant or department bulletin board. For emphasis the safety bulletin board should be separated from that which is used for routine announcements. It should be a permanent structure, preferably in color, and should be adequately lighted at all times. Notices of safety contests, of safety records, and of safety rules and regulations should be prominently displayed.

The house organ or plant publication is another source of safety publicity. In the house organ, the safety program should be romanticized. Routine reports of safety records are usually ineffective in giving emphasis to the safety program. One of the most usual space grabbers in house organs is the routine reporting of accident frequency and severity rates. These reports usually mean very little in table form. Effective use of charts, using individual figures of workers to represent so many hundred or thousand cases is usually much more effective. Even better is the use of the cartoon or comic strip. When the cartoon or comic strip can be combined with a cartoon character, such as "Safety Sam" or conversely, "Accident Andy", a message can be brought to workers in a most effective fashion. A few plants have used a comic book edition of their house organ, annually or semi-annually, which deals solely with the topic of safety. Although the use of the so-called "horror" technique is not recom-

mended for frequent use, an occasional article or illustration showing the effects of unsafe acts upon a worker's health, finances and family life may be effective. Where possible, this should be contrasted with the health, financial and family situation of a comparable person who has not committed an unsafe act.

The employee handbook, frequently used to supplement the orientation program, is another source of publicity. The least it can do is to provide a list of the safety rules for the department in the plant involved; the best thing that can be done is to outline in brief form the total safety program, how it works and the necessity for the safety rules that are listed.

The local press is another source of publicity for safety. Here certain cautions should be observed. Newspapers are much more apt to print well developed publicity releases with accurate facts, spelling of names, etc. than they are to develop an article on the basis of a telephone conversation. In many cases the local press will agree to print a series of articles on the safety program of a particular plant but such a series should be carefully developed in advance and discussed with and approved by the appropriate editor. Another item in which the local press is usually interested is action taken by management to remove unsafe conditions. While it is acknowledged in advance that many unsafe conditions are inherent in the production procedure, it is also true that many such conditions are not necessary. It is the responsibility of management to remove as many unsafe plant conditions as is possible. Newspaper reports of the steps taken to remove such unsafe conditions are news and will be reported when properly presented by the plant publicity department.

Safety posters are another source of plant publicity and are easily available from the National Safety Council. The most common criticism that can be made of safety posters is that they are not placed in a prominent place and that they are not changed frequently enough. Posters in color are always more effective than those that are not, and when they are limited to a picture and a few words and placed at eye level, they can be one of the better publicity mediums in the plant.

One little used source for safety publicity is the annual report of the company. As the base of stock ownership broadens in many

companies, the strict financial accounting report becomes less meaningful and the interpretative report more effective. The company that has an effective safety program and does not interpret that program in its annual report is passing up a bet that is used to great effect in many parts of the country.

The American worker seems to be competitive by nature and safety competitions have been used to good effect in a considerable number of places. Safety reports by departments, when effectively presented, lead to an aspect of competition to the safety program. The positive aspect of safety should be emphasized in such reports rather than the negative aspect. A safety banner awarded periodically to the department with the best safety record is commonly used. In many plants, dinners, bonuses, prizes and similar activities reward the departments or individuals who have the best safety record, or who have done the most to promote the safety program. In at least one company a part of the savings in compensation and insurance cost is given in the form of bonuses to supervisors and workers with the most effective safety records. Another agency that can be used competitively is the plant suggestion system. It is true that suggestions regarding safety devices, safety guards and safety procedures cannot be measured in terms of reduced production cost as easily as can direct production suggestions. Nevertheless if emphasis is to be given to the safety program, the rules and regulations of the suggestion system should be so organized as to allow liberal rewards for effective safety suggestions.

Probably the most important statement that can be made about safety rules is that no plant should have any safety rule that is not, or should not be enforced. A common criticism that can be made of many safety rules is that they are unnecessary and are either unenforceable or are not enforced. One of the functions of the safety committee, therefore, should be to hold a periodic review of safety rules and regulations, with a view to eliminating unnecessary rules and establishing the procedures by means of which the remaining rules should be enforced. Generally speaking, it is better not to have a safety rule at all than to have one that is not enforced strictly and to the letter. If it is carefully explained to workers in the orientation session and in the initial on-the-job training period, that the rules are necessary, giving

the reasons for them, along with the penalties for breaking them, there will be little trouble with this matter. When this procedure is followed, workers will recognize that the safety regulations are for their own protection. They will not accept such rules simply because they are published.

Too often the review and analysis of accidents is made by the office of the safety director or by the research department. This makes for very neat accident classification but it does not result in an understanding of accident causes, by top management, supervision, or the working force. While the routine of

accident analysis might be carried on by the above mentioned departments, it is essential that the safety committee make a periodic review of accidents. It is only in this way that accidents can be classified as to cause—that is, unsafe acts or unsafe conditions. When this classification is made by the line operating organization, it is possible for supervision and the working force to work in the direction of the elimination of unsafe acts, which is their province—and management to work in the direction of the elimination of unsafe conditions, which is its area of responsibility.

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THURSDAY AFTERNOON SESSION  
October 9, 1947

Presiding: F. W. KELSEY, Supervisor, Safety and Welfare, Jones & Laughlin Steel Corporation

### Accidentally Speeking—Are Hernias?

Chairman—S. F. DOLAN, Personnel & Safety  
Mgt., Federated Metals Div., American  
Smelting & Refining Co.

#### Answering the Question

Participants:  
Dr. PAUL McGEORGE, Mercy Hospital, Pittsburgh, Pa.  
A. L. SHEPLER, Safety Eng., Westinghouse Electric Corp., East Pittsburgh Works.

#### Typical Compensation Court Hearing

Referee—ALVIN DRILLMAN, Workmen's Compensation Bureau, Pittsburgh, Pa.  
Attorney—JAMES J. LAWLER.  
Claimant—WILLIAM HART, Safety Eng., Universal Cyclops Steel Corp.  
Medical Advisor—Dr. PAUL McGEORGE.  
Safety Engineer—A. L. SHEPLER.

CHAIRMAN DOLAN: Due to the great number of diversified industrial companies operating in the State of Pennsylvania, the subject of hernia has been controversial to the safety engineer, his legal counsel and the workmen's compensation insurance carriers. We feel this same controversy crops up numerous times in many other states, but as we are only familiar with the Pennsylvania law, we are presenting this program under the

rules and regulations of the Pennsylvania Workmen's Compensation Act. A hypothetical hernia case will be developed through all its steps in a typical compensation hearing.

MR. A. L. SHEPLER: We intend to develop for you a controversial hernia case where there is evidently some doubt as to whether or not this particular hernia is of an industry origin.

I as safety engineer have called together

our company physician and our company attorney, for the purpose of discussing with them this controversial hernia case. We hope that in the development of this skit, we may get an expression of opinion and ideas from these men relative to the part that they as physician and attorney play in establishing what hernia claims should be accepted without reservation, and those which should be denied.

As the safety engineer, I have asked these gentlemen to sit down at a conference table with me at our plant to talk about this particular hernia case.

MR. SHEPLER: I have asked you to sit down with me for a few minutes to talk about a hernia case that has come to my attention and where there is some doubt in my mind as to its origin.

I was out on the shop floor and one of our employees approached me and told me this story:

A man who was scheduled to work a five-day go-home week, had worked on an overtime basis the previous Saturday. He told me that on Saturday afternoon, he was performing his regular job which consisted of pushing a loaded hand truck up a slightly inclined track. The truck was in good condition. It was loaded with approximately 250 lbs. of material. He said that while pushing this truck, he felt a pain and some discomfort in his right groin. He didn't say anything to anyone about this, but he finished his regularly scheduled day's work and went home. This incident occurred about 2:00 p.m. on Saturday. When he approached me on Monday morning about 11:30 a.m., he told me that on arising from bed he noted again this feeling of discomfort and pressure in the groin area and upon self-examination he noted that there was some protrusion in that area or a lump had appeared. He didn't think much of it, feeling that it was something of a temporary nature and would probably disappear.

In his normal routine manner, he prepared himself for work, came to work, went on his regularly assigned job and worked at it until he saw me that morning. He did nothing, he tells me, that was unusual during Monday morning. The nature of his work was light. However, this feeling of pressure and discomfort as he called it, persisted. There was no acute pain however. As a result

he came to me and said that he thought he had been injured the previous Saturday afternoon.

In questioning him at length, I found that on the previous Sunday, he had taken his family on a picnic. On the way to the picnic grounds, his car developed a flat tire. He had a most difficult time changing that tire inasmuch as the wheel lugs were hard to remove. He exerted considerable effort on the tire wrench and while doing that, he experienced this pain again. At this time, the pain, according to him, was so acute that he had to refrain from changing the tire and got a garage mechanic to complete the job.

Several hours later, the pain subsided and he appeared to be normal. According to his statement, however, on Monday morning, he noted the lump in the groin.

Now, Doctor, when I got this story, you know that I referred this employee to you for examination because I suspected that he had a hernia. As you know, you found a very definite hernia existing. Tell me, does there have to be a severe blow in the abdominal region or extreme effort exerted in lifting to produce one? How does a hernia come about? I wish you would tell me a little about these things, Doctor.

DR. McGEORGE: I presume that you are primarily interested in hernias of industrial origin, and I have therefore confined the discussion primarily to a discussion of causes and types of hernias seen in industry, and I have confined the discussion primarily to inguinal hernias because they are our large problem in industrial compensation hernias.

A hernia, or in the old parlance, a rupture, is simply a protrusion of a viscous or organ from the cavity it normally occupies. The hernia as you may know, may occur through an acquired or a natural opening or ring. If it occurs through a natural opening, it occurs usually through a ring or opening that exists for the passage of nerves, blood vessels, or some other important structure. Abdominal hernias are classified according to the location of the hernial ring through which the herniation takes place, namely, the external, internal or incisional.

External abdominal hernias, and inguinal hernias represent 82 per cent of all hernias. Of these, inguinal hernias, 75 per cent or 94 are indirect inguinal hernias and 25 per cent are direct. The inguinal hernia is an oblique

hernia that descends through the inguinal canal. The direct hernia is an inguinal hernia that protrudes straight out through the floor of the inguinal canal.

Femoral hernias are found in industry and they comprise about  $4\frac{1}{2}$  per cent of our industrial hernias.

Umbilical hernias are found in industry. They protrude through the umbilical or navel ring and they comprise 3 per cent of our abdominal hernias.

Epigastric hernias represent less than 1 per cent. They are seen in industry and are sometimes compensable. They protrude through a defect in the abdominal wall above the umbilical ring and below the chest. There is then a group of miscellaneous hernias which I presume would be of little interest to you, such as scrotic and that is rarely seen as an industrial problem. There is a group of internal abdominal hernias which are very rare, the commonest of which is a diaphragmatic hernia.

I, myself, have never seen one as an industrial problem, but it is certainly true that one could occur. This hernia would take place through the hiatus of the diaphragm. The diaphragm is the large, muscular leaf which separates the abdominal cavity from the chest cavity and the hiatus is the opening that exists in the diaphragm for the passage of the esophagus or swallowing tube and hernias of the stomach through this ring can occur.

The last group of abdominal hernias are incisional hernias and they comprise about 8 per cent of all abdominal hernias. The incisional hernia does not primarily concern the industrial surgeon. They are primarily a problem to the patient who has the hernia and the surgeon who made the surgical closure. They are of significance in present day examinations for the reason that an individual may have had an abdominal operation and become employed in industry and at a later date developed a hernia through his incision which he might attempt to attribute to his work.

So far as the etiology or cause of inguinal hernias, there is almost unanimous agreement among the surgical profession today that defective closure of the processus vaginalis is the main predisposing factor in the etiology of these hernias and the existing fact of suddenly increased intra-abdominal pressure together with relaxation of the so-called in-

guinal shutter is the mechanism by which these hernias come about. Of the predisposing factors, hernias through one of these fascial rings or defect in the abdominal wall is of paramount importance. This is true in view of the fact that most of these abdominal hernias that we see occur through these defects or natural openings in the abdominal wall. The inguinal hernia is an example. The indirect inguinal hernia comes down through a natural opening in the inguinal canal. The femoral hernia comes through the femoral ring high in the thigh. The umbilical hernia, the scrotic hernia or suprapubic hernia come through natural openings which are pre-existent.

A second predisposing factor is the consideration of the fact that man now walks on two feet and he has a lower abdomen which was not built or designed to withstand the forces and pressures which exist in bipedal locomotion. This sort of thing is not a problem to four-footed animals. In considering the causation of these hernias, some degree of understanding of the anatomy and embryology of the inguinal canal is necessary.

The transversalis muscle and the internal oblique muscle constitute a large part of the support of the lower abdominal wall, and they are fastened to Poupart's ligament, which runs from what you know as the hip bone down to the pubic spine near the midline. The support of the lower abdominal wall comes off three structures, the external oblique muscle, the internal muscle, and the transversalis muscle. This external ring is a ring or defect in the closure of the lower abdominal wall and it exists in the external oblique muscle. The next two layers of muscle going inward through the abdominal wall are the internal oblique and transversalis and the internal inguinal ring is a ring up here that exists in the transversalis muscle.

In the embryo, the testes arise in the abdomen. The testis migrates outward from the abdomen through the internal ring which exists in the transversalis, pushes down through the inguinal canal to emerge through the external ring and descends into the scrotum.

There is a similar process in the female in which the round ligament which is a supporting structure of the uterus comes out through the internal ring and descends through the external ring and inserts into the inguinal and drags with it the canal of Nuck. When the testis descend through this

inguinal canal, it drags with it a fold or funnel of peritoneum which is the lining of the abdominal cavity. It is a funnel shaped process and is known as the funicular process or processus vaginalis. When the round ligament in the female descends through that canal, it drags with the canal of Nuck, which is very similar to the processus vaginalis.

Now the fact that the embryo and the development and maturation and descent of the testes occurs that way is important in the consideration of the cause of hernias because that funicular process of the funnel of peritoneum which it drags down there should close at birth and it doesn't always close. In fact, in 30 per cent of male children the funicular process fails to close well approximately the fourth month of life and is approximately 10 per cent of males, it never closes. It leaves the individual with a potential hernia sac.

The same mechanism can take place in the female in the canal of Nuck which exists instead of the funicular or funnel shaped process and that predisposes the female to hernias because she has a potential sac already existing. This mechanism, together with the fact that the patient, by trauma or violence may sustain a suddenly increased intra-abdominal pressure is the essential mechanism which operates for a production of an inguinal hernia, an indirect inguinal hernia.

Now the indirect inguinal hernia, the sac comes out through the internal ring and descends into the inguinal canal, if it descends clear out through the external ring into the scrotum, it is known as a complete, indirect, inguinal hernia. This internal ring which is a defect in the transversalis muscle is the superior border of what is known as Hesselbach's triangle. The rectus muscle is the main strap muscle of the abdomen. The cruetus muscle forms one of the borders of Hesselbach's triangle. It proceeds from the internal ring to the cruetus muscle and down to this level. It is the floor of the inguinal canal, and it consists of the transversalis muscle and fascia and the internal oblique. A direct hernia is a hernia which comes straight out from the abdominal cavity through Hesselbach's triangle or the floor of the inguinal canal, and that direct hernia has essentially the same mechanism of production as the indirect hernia. It is a hernia which occurs through a potentially weak point in the abdominal wall, and it occurs

after some form of violence which increased suddenly the pressure within the abdomen.

The femoral ring lies immediately beneath Poupart's ligament, on the anter-medial side of the thigh. There is a femoral ring there for the passage of some major blood vessels. This ring, together with relaxation, particularly as the years go by, plus sudden violence, is the cause of femoral hernia. This particular hernia is seen usually in later adult life. We see almost no femoral hernias before the age of 30 and it is the one form of industrial hernia that is seen more frequently in the female than the male. There are three things as many femoral hernias in the female.

In recapitulation then, the existence of a weak or potentially weak point with or without the existence of a potential sac, together with some insult to the area, or some increase in the pressure within the abdomen is the essential mechanism by which these hernias are brought about.

There is one other point discussed in the cause of these hernias and that is a relaxation of the so-called inguinal shutter. The floor, this triangle, is composed of the internal oblique and transversalis muscles which are inserted in Poupart's ligament. They affect a closure of this defect. Because it is a muscular floor, it is capable of relaxing, and we feel that many men sustain their hernias particularly by a sudden slip or fall because at the time he does so, this musculature or inguinal shutter is relaxed and its relaxation permits a widening of the internal ring and a weakening of the floor of the inguinal canal, so that the result of such an accident might be either indirect inguinal hernia which is going to come out through the internal ring and descend through the canal or result in a direct inguinal hernia which is going to come directly and immediately through the triangle.

These compensation hernias that we see are acquired hernias. The individual that may have a funicular process, does not have a true hernia. He has a potential sac but it still requires some insult to his abdominal wall to produce the hernia, and we therefore speak of it as an acquired hernia, but we see in infancy and in teen-age children congenital hernias which exist because of the failure of that funnel shaped process to close. When the child begins to walk there is increased pressure against his lower abdomen and he brings the sac out. We are still sure that it

is a congenital hernia at that age and that the funicular process or the existence of it is the reason for his hernia. All hernias are then classified according to the degree of involvement of these inguinal hernias, femoral, incisional, navel, any of them, and they are reducible. That is, the contents that come down into the sac, which may be bowel or omentum or bladder are capable of being reduced or returned to the abdominal cavity.

A strangulated hernia, on the other hand, cannot be returned to the abdomen because of the constriction of the blood supply. The patient with a strangulated hernia is a problem for emergency surgery.

To recapitulate briefly then, the factors which function in the production of all these hernias are the assumption of the erect posture, the existence of these potentially weak groins, and then some insult or trauma to the individual which is capable of increasing the pressure within the abdominal cavity or the pelvis.

Our treatment of these hernias today is largely surgical. There are three methods by which the problems of correcting a hernia can be attacked. One is by taxis, which is the fitting of a truss or brace or belt. It is not curative, but in many instances it will support the hernial sac so that the contents remain out of the sac and in the abdomen where they belong. This form of treatment is used primarily in poor surgical risks, in the aged and the debilitated.

There is a form of treatment of these hernias by injection of the sac. This method consists of the injection of a sclerosant or mild irritating agent into the sac in the hope that by the healing of the inflammation, enough scar tissue will be produced to close off the opening of the sac. It is sometimes a dangerous procedure, particularly if there happens to be content in the sac at the time of injection, gut, omentum, mesentery or bladder. We feel that sclerotic or the injection method in the treatment of hernia offers the possibility of one cure in eight.

The usual method of attack today is surgery. There are three types of surgical procedure being used extensively in the United States today for the closure of these hernias. The commonest is a Ferguson repair, named for an American surgeon who first devised the repair and it is an anatomical approach to the problem. The surgeon delivers the cord, opens the cord, finds the sac, opens the

sac to make sure there are no contents in it, ties it off high, closes the covering of the cord and does an anatomical repair of the inguinal canal. He lays the cord back down on the floor of Hesselbach's triangle, the internal oblique muscle and the transversalis, and he closes those structures tightly on this ligament under the cord so that the cord lies where it normally should. He then closes the processus oblique muscle over the cord. He has performed an anatomical repair in which the structures have been returned to the normal or anatomical position. Ferguson repair is used in females, in children, and in some selected cases of adult males who have indirect inguinal hernias.

The most commonly used type of repair for the direct hernia is a Bassini repair, named for an Italian surgeon, who first devised the surgical attack, a modified Ferguson repair in which the transversalis muscle and the internal oblique muscles are closed beneath the cord to Poupart's ligament.

The other repair used is a Halsted repair, named for a prominent surgeon, which is the same as Bassini's except that the external oblique aponeurosis, the outermost layer is closed under the cord instead of over the cord. It simply increases by one layer the closure of this Hesselbach's triangle or defective floor of the inguinal canal, and it is used primarily for the closure of a direct inguinal hernia.

MR. SHEPLER: Thank you very much, Doctor. In spite of the funicular process, Hesselbach's triangle and omentum and the rest of those 75 cent words, I know a great deal more about hernias now than I ever did before, but I am still not satisfied that we should accept this particular hernia case without reservation.

MR. LAWLER, I wish you would take a few minutes if you will, and tell us what our legal responsibility in hernias in general are.

MR. JAMES J. LAWLER: You did well in making a complete investigation of the facts of the case because much litigation could be avoided when a workman is injured if there were a complete investigation made of the facts.

Another thing you did was to have this man examined by Dr. McGeorge, and that is important, especially in a hernia case. Only after a doctor examines one of these cases are you in a position to get a diagnosis as to whether or not the employee has con-

genital hernia or whether it is one that is compensable, that is, one that has been caused by accident. Now the history of hernia has been a confused history and a confused experience, probably because it is highly technical, but basically it is what I just mentioned, you have to arrive at a station as to whether the hernia, admitting that the injured employee has a hernia, whether the hernia is congenital, that is, a natural weakness and one he has been born with, or whether it is the result of violence to the physical structure of the body caused by accident. If you can make that distinction, then you have the answer to the hernia question.

MR. DOLAN told us that this meeting and our discussion would be confined to Pennsylvania hernias as far as it is concerned. I want to be confined to that, as I have a tough time keeping up with the compensation laws of Pennsylvania, let alone spreading it around the 48 states. In Pennsylvania, prior to 1915, we had no compensation law. When a man was injured to the extent of his employment he had the right to sue his employer in common law and you can readily understand what happened.

The case was heard by jury, and the verdicts were varied. The verdicts awarded so much to the injured worker that the employer panicked that unless something was done, he was going to have to quit business. The Workmen's Compensation Act of 1915 is still the fundamental compensation act of the state. I presume that in nearly every state and especially those where we have large industries there are some similar laws that protect the workman and I know that our own law is drawn up so as to give the workman compensation for almost any type of injury.

In the act of 1905, there was nothing said about hernia. For 12 years any hernia claim that was presented in the city was handled just exactly like any other form of compensation claim. In other words, it was a question of whether it was an accident. It was first of all a question whether it was a hernia, an injury, and then there was the usual requirement to prove a causal connection between the accident and the injury. It wasn't until 1917 that there was something actually written into the law in Pennsylvania with reference to hernias. That came about again because there were a great number of

hernias in the state. I understand there have been about 6 million hernia and rupture cases in the United States. How many we had in Pennsylvania I don't know, but at any rate, there were a great number of claims presented against the employers and a great lot of money paid for them when there was a question as to whether or not the hernias, as I said before, were congenital or whether they were the result of accident.

I have mentioned the word "accident" here a number of times, and I say to you, Mr. Shepler and these ladies and gentlemen here today, that basically the word "accident" is the most important word in any compensation law, and it is the most generally misunderstood, because in any kind of compensation case, including a hernia case, unless you prove an accident, there isn't any recovery. The word has been misunderstood and because of that fact there has been considerable misunderstanding between the employer and the employee.

"Accident" has been defined in our state and in Webster's dictionary and in other states as a sudden, unexpected, unusual or fortuitous event. The word I think describes an accident better than any other is the word "unusual," so that if a man is doing his work in the usual, ordinary way that he does day in and day out, and is injured, it is questionable whether it is compensable. There is a distinction which I will point out a little later. Now, I think inasmuch as the word "accident" is so important in considering any compensation case, and especially in considering a hernia case, I can illustrate a couple of cases that I have had some personal experience with that may bring out what I am trying to tell you. I remember a number of years ago, I represented a man who worked in a mill down in Amherst, Pennsylvania. That is in Beaver County, adjoining Allegheny County. I was young and enthusiastic and I didn't have many clients and this man came to see me with this story about having been hurt. After I talked to him a while, I was convinced that the man had been hurt. I talked with the doctor and discovered that he had a heart condition. He told me that one day he and a fellow employee were carrying a heavy table weighing in the neighborhood of 250 pounds. After he had walked maybe 10 or 15 feet with the table, he suddenly collapsed due to the weight of the table. The fact that the table weighed 250 lbs. consti-

uted the unusual event, as the man actually told me that he did light work, sweeping and such things as that. We filed the claim for compensation and we went before the compensation referee and everything went fine until the other attorney cross examined my client. My client admitted reluctantly that he did lift, with other employees, a lot of heavy material that often weighed 250 lbs. He also admitted on cross-examination to the other attorney that he didn't have an original heart condition, but that he had had a heart condition long before this accident happened.

In other words, all that we proved was the aggravation of a pre-existing heart condition. We didn't win the case.

I remember by way of illustration another case, much more recent because the decision with reference to this case was handed down by our superior court within the last 60 days. I represented a company in Pittsburgh, Allegheny County, in opposing a claim filed by a workman alleging that he had received an accident in the course of his employment and he was entitled to compensation. Well, I had been given a preview of the case and I never did think the man had an accident. This man proved in front of the referee that he had been working as a haffer and in connection with his job he had to lift what were called generator poles. They were about 30" long and cylindrical in shape, weighing 100 lbs. or thereabouts, and at the hearing this claimant testified that he lifted on an average of 33 of these poles every day. On this particular day, when he was lifting the poles, a pole slipped while he was in a stooped position. He felt a sharp pain in his back and was frozen in that position. Another employee had to come and take the generator pole out of his hands.

It was brought out that these poles that he used were always greasy because of the nature of the job and there was nothing unusual in what happened this particular time. These poles had slipped many, many times before.

Well, the referee ruled against me and of course, I couldn't understand it, but he could. I took the appeal to the Workmen's Compensation Board and they ruled against me. I took another appeal to the County Court of Allegheny and they ruled against me. Every one in my office, including my partners felt I should drop the thing. At any rate, I went through to the Superior Court and they ruled

in my favor on the basis that at the time this man received his injury, he had an injury to his back. He was simply doing his usual, ordinary, daily work in the usual ordinary manner and there was nothing unexpected or unusual or fortuitous or undesigned about it.

That may illustrate in a sense what I mean by the word "accident."

I do want to say, in addition to what I have already said about that last case I just mentioned, that this man had had a prior accident in the spring of the year where he had filed a claim against the company that I represent. He had been working for a coal mining company in Fayette County, that is another county adjoining Allegheny County and he received an identical injury in the lumbar region of his back and filed a claim against this company. I got a copy of the record from the compensation people and offered in evidence the report. It showed that three weeks before this man came to work for our company, he had been receiving compensation for this identical injury. I think that had a lot to do with the way the case went!

I have spent considerable time telling you people about the word "accident". I have pointed out that it is an unusual thing, and that it is due to something external, that is, violence directed at the physical structure of the body. But I don't want to leave the subject in exactly that situation because there is another type of accident called a pathological result. That is where there is severe damage to the physical structure of the body. In other words, a fractured vertebra, torn tissue, something of that nature. We can have a case like that and the man can be doing his usual, ordinary job in the usual ordinary way and still we have an accident because of the result. In other words, in our Pennsylvania case, courts held that the nature of the injury in itself is sufficient to be unusual, and that is only true of the ordinary workmen's compensation case, but it is also true with reference to a hernia case. The workman can be doing his usual job in the usual ordinary way. He does that day in and day out, and still he can recover compensation and it has been so held in a number of cases in our state.

There is a case where a workman was lifting a heavy cake of ice above his head. He did it day in and day out. He was putting it in the cooler of the locomotive and while he

was doing that he felt a sudden pain in his hernial region and of course the Superior Court said that constituted an accident.

Of course, in these cases the court examines the whole record and this man did have a severe injury. He felt immediate pain in the inguinal region and he stopped his work almost immediately and he reported it to his employer. All the elements of a hernia were there, although he was doing his usual work. The court held that because of the pathological result the severe damage to the tissues of the body he was entitled to recover.

Up to this time, I have spent considerable time discussing the accident. I haven't said much about hernias and as I said before, there was nothing specifically in our laws in Pennsylvania with reference to hernias until 1927 and then because there were a great number of claims being recovered, there were provisions written into the law that made it more difficult for a man to recover on a compensation claim for hernia. In other words, under that act, the injured employee had to produce conclusive proof that the hernia was precipitated and caused by sudden effort or strain and he also had to prove that there was immediate pain in the hernial region and prove that he reported it to his employer within 48 hours. To that provision in our act of 1927 was added another in 1939, a requirement that the pain had been so severe that the worker had to stop work immediately. If he didn't prove those things he wasn't able to recover. Ever since the first act of 1915 when the act in our state went into effect, the Superior Court has taken a liberal stand in workmen's compensation cases. Even between 1915 and 1927 when there was no law on the books with reference to hernias, they always looked at them from a common sense point of view. They always looked at the record and after these provisions were put in the act of 1927 and 1939 which, strictly construed, made it almost impossible for a workman to recover, our Superior Court still interpreted the law liberally. They took a common sense view. They looked at the whole record and they certainly didn't pin the claimant down to the exact requirements of those acts by any means. In other words, if a man got a real hernia, he didn't have to throw his tools up in the air and quit right away. In many cases where there has been recovery in our state, the man remained at work and did some type of light work the

rest of the day after he was hurt. However, there is one thing they have been strict about and that is in giving notice within the 48 hours. They interpret that provision in the act literally.

Our latest act which deals with workmen's compensation in Pennsylvania, the act of 1945, has only one provision with reference to hernia and that is that the employee give notice to his employer or representative of his employer within 48 hours after the happening of the alleged accident. That is all it says. There is nothing in our law any more with reference to the so-called sudden descent, conclusive proof of immediate pain or immediate work stoppage. However, I venture to say that our courts will still interpret the act as they have in the past because I believe Dr. McGee will agree with me that unless you have these manifestations of acute pain and such severe pain the workman has to stop within a reasonable time, you don't have industrial hernia.

There is another thing about this hernia question, which causes a great deal of controversy between the employer and the employee. The average workman thinks that because a hernia might last on an average of six to eight weeks, that the employer should pay every hernia case. When you consider that there have been 6,000,000 hernial and rupture cases in the United States, this thing gets into big business, and the employer just can't afford to be paying money out like that.

About this notice within 48 hours, I think I should mention something about that because that is still a requirement and as I say our courts are strict about enforcing that requirement. Now in computing the 48 hours, they don't under our statute include Sundays or holidays. If your workman was hurt on Friday and reported on Monday, he would still be all right and in bringing notice to the employer or the representative of the employer, the employee can do that in a number of ways. He can do it by going to somebody in charge, some representative of the company and advising them that he has got a hernia by naming it, or a rupture, or he can simply exhibit the lump if it is there.

In your particular case, Mr. Shepler, there are a number of things that certainly would make me hesitate, if you are asking me as your counsel, to pay this claim without going into it more fully. As I understand it, this



man was pushing this truck up an inclined platform or a track with 250 lbs. of material on it. Well now, I don't remember exactly whether you said that this man had done heavy work, but I think he did. I would want to know whether that is part of his regular job, and there are a lot of other things that I think we should know before we allow this claim. For that reason, I think that justice would be done to all parties concerned, the employer and the employee if you let this matter go to the referee.

MR. SHEPLER: Thank you, Mr. Lawler. I noted in your discussion you pointed out that you felt there was nothing unusual about what was occurring and what occurred in this particular case and in view of the information I received from both yourself and Dr. McGeorge, there still remains the question in my mind as to whether or not this hernia was of industrial origin.

I don't believe that I am satisfied to accept it voluntarily without reservation. As a consequence, I will advise this particular employee if he so chooses, he has recourse then to filing a petition with a workmen's compensation bureau. Thanks a lot to both of you.

MR. DOLAN: This concludes the first act of our little drama and after a change of the

props, we will follow through on this case, assuming that the employee in question has at a later date filed a claim of petition of the compensation bureau alleging he has suffered a hernia while pushing a loaded truck up the incline.

MR. DILLMAN: In the particular district where I operate, the 8th in Pittsburgh, we have five referees, a large waiting room and each of the referees has his own hearing room. Usually the cases are scheduled for the day and some person steps into the outer hall and announces the case that is next to be heard by the referee to which it is assigned and so to give it some semblance of reality, I will now call the case of William J. Hart vs. Bridgeville Coal and Iron. Is the claimant here?

MR. WILLIAM HART: I am.

MR. DILLMAN: I must point out here too, that I was asked the particular question by some lawyer here from Missouri whether or not the claimant would be represented by counsel. He is entitled to counsel if he so desires it, but if he has neither the money nor the wish to hire a lawyer, then the referee is required by law and it is part of his oath that he will represent and take care of the claimant to the best of his ability.

BEFORE THE  
STATE WORKMEN'S COMPENSATION BOARD  
COMMONWEALTH OF PENNSYLVANIA

WILLIAM J. HART, Claimant

vs.  
BRIDGEVILLE COAL AND IRON COMPANY, Defendant  
Bridgeville, Penna.

Case No. 112

Heard on Thursday, October 9, 1947  
at 2:45 o'clock P.M. in the Ballroom  
of the Stevens Hotel, Chicago, Ill.

BEFORE

Alvin Dillman, Referee

APPEARANCES:

For the Defendant: James Lawler, Esq.

Reported by: F. M. Benson

THE REFEREE: The Claimant, William J. Hart, is present, and is the Defendant represented?

MR. LAWLER: Present.

THE REFEREE: Will the Claimant be sworn.

WILLIAM J. HART, the Claimant, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

THE REFEREE:

Q. What is your name?

A. William J. Hart.

Q. Where do you live?

A. Bridgeville, Pennsylvania.

Q. And for whom do you work?

A. Bridgeville Coal and Iron.

Q. What is your occupation?

A. General laborer.

Q. How much do you receive as wages?

A. \$1.10 an hour.

(Referee Dillman: I might here remark that sometimes before the case gets this far that Counsel for both sides will agree to certain facts; after a petition is filed, the Defendant is given an opportunity to make what is called an Answer. Sometimes in the Answer certain facts are agreed to in addition to those written answers. There may also be agreement of Counsel, and so that it might seem more like a hearing, I will now ask Mr. Lawler if there are any facts which he can now agree to that we need not take up by direct examination.)

THE REFEREE: Mr. Lawler, will you agree that those wages are right?

MR. LAWLER: That is correct.

THE REFEREE: Anything else?

MR. LAWLER: That is all.

THE REFEREE:

Q. When did you last work for the Bridgeville Coal and Iron?

A. I am still employed by them.

Q. Did anything happen to you while you were employed there?

A. Yes, it did.

Q. When?

A. On April 3, 1947.

Q. Can you tell us in your own words what happened to you on that date?

A. I was pushing a four-wheel truck loaded with 250 pounds of material along a track, going up a slight incline. I felt a sharp pain in my right side.

Q. Your right side?

A. Yes, my right side.

Q. Will you stand and indicate to the referee where you had this pain?

A. It was in this area, here.  
(The Claimant indicated the right inguinal region.)

Q. What did you do next?

A. I stopped and rubbed myself for a few minutes and thought maybe the pain was getting a little bit less in degree.

Q. Did you continue with your work that day?

A. Yes, I finished out the shift after I rested for five or ten minutes.

Q. And you left the plant?

A. Yes.

Q. What did you do next?

A. Saturday afternoon there wasn't anybody in the plant and I left at four o'clock and caught my rider and got home.

Q. Did you consult a doctor?

A. No, not right then, I didn't.

Q. When did you see a doctor?

A. I saw the doctor on Monday morning.

Q. Did you tell anybody at work what had happened to you?

A. No, I didn't.

Q. When you returned on Monday, did you tell any person?

A. Yes, I saw Mr. Shepler, our safety engineer. I explained to him what had happened to me on Saturday afternoon.

Q. What did you tell Mr. Shepler?

A. I told Mr. Shepler the same story I just told you, that I felt this pain in my right side while pushing the truck and that it had gone away. In addition to that, I told him this morning upon getting out of bed I noticed a lump there.

Q. But you did tell Mr. Shepler you felt the pain while you were pushing the truck?

A. That's right.

Q. Did you explain to Mr. Shepler how you were pushing the truck?

A. Yes, I told him I had to push rather hard because the thing had stalled on something there on the track and I had to push with extra effort.

Q. Would you say this was a hard or easy job?

A. Ordinarily on level ground it's easy, but on this big inclined track you have to push with more effort than you ordinarily do.

Q. Do you use this truck every day?  
 A. Oh yes, every day for some reason or other.  
 Q. It is your regular work?  
 A. That's right.  
 Q. Tell us what Mr. Shepler did for you.  
 A. Mr. Shepler listened to my story, made out some kind of a report and sent me to Dr. McGeorge for an examination.  
 Q. You hadn't seen Dr. McGeorge before that time?  
 A. No, I hadn't.  
 Q. Where did you see him?  
 A. At our plant hospital.  
 Q. Did you tell Dr. McGeorge what had happened?  
 A. I had told him the same story I told you.  
 Q. Do you have any witnesses with you today that saw that thing happen?  
 A. No, I haven't.  
 Q. Do you have any hospital or doctor bills?  
 A. No, I never received any.

THE REFEREE: You may cross-examine, Mr. Lawler.

#### CROSS EXAMINATION BY

##### MR. LAWLER

Q. Mr. Hart, how long have you worked for the Bridgeville Coal and Iron Company?  
 A. I have been with them about seven years.  
 Q. During that time what has been your occupation?  
 A. General laborer.  
 Q. What are your duties?  
 A. I just do general labor work about the plant. For about the past year I have been engaged in pushing this buggy I spoke of.  
 Q. You mean the plant tractor?  
 A. Yes.  
 Q. Well, when you push this tractor that you speak of, is it always loaded with metal?  
 A. Well, one trip it may be and then going back again from the furnace back to the stock it may be empty, it all depends on which way it's going.  
 Q. Do you know how much the truck itself weighs?  
 A. No, I can't say that. I imagine 500 or 600 pounds.  
 Q. Well, you say that you push this truck on the unloading dock at the furnace, is that

right?  
 A. That is right.  
 Q. Could you tell us about how far that is?  
 A. Oh, about 300 feet.  
 Q. You always go the same way to this unloading dock to the furnace?  
 A. Yes, I do. It is on a track and you have to go the same way.  
 Q. Did you tell us how old you were?  
 A. I am 36.  
 Q. And this work which you say you were doing, you say it is hard work?  
 A. On this particular occasion it was because the truck stalled on the inclined ramp.  
 Q. Well, of course, what I am trying to get at is this: Your usual work was hard work, wasn't it?  
 A. Oh yes, this is hard work.  
 Q. And it wasn't unusual for you to lift or push heavy obstacles?  
 A. No, I wouldn't say it was.  
 Q. And on many times prior to this particular occasion you had pushed this truck with 250 pounds?  
 A. Yes, I have.

Q. Now you have testified, Mr. Hart, that on April 5, 1947 while pushing this flat truck with 250 pounds of material on it, you got a pain in your right thigh. Is that right?  
 A. That is correct.  
 Q. You were going up this slightly inclined track, as I understand it.  
 A. That's right.  
 Q. There wasn't anything that happened there that was out of the ordinary, was there?  
 A. The truck stalled on me.  
 Q. The truck stalled on you?  
 A. Yes.  
 Q. You didn't slip or fall or anything like that, did you?  
 A. No.  
 Q. The truck didn't go off the track and pull you with it or anything like that?  
 A. No.  
 Q. You always go up this track to unload?  
 A. Yes.  
 Q. Now, Mr. Hart, on this particular day you speak of, that was a Saturday, wasn't it?

A. That is correct.  
 Q. You were working overtime?  
 A. Yes, I was.  
 Q. I suppose it wasn't unusual for you to work overtime?  
 A. I do it occasionally.  
 Q. This pain that you speak of, was it just a slight pain or was it a severe pain?  
 A. It was a sharp pain at first and then sort of became an uncomfortable feeling.  
 Q. At that time, I mean the first time since you felt the pain, did you notice any swelling?  
 A. I didn't examine myself.  
 Q. Did you feel any pain after that?  
 A. It was then I examined myself and noticed this lump.  
 Q. When was that?  
 A. On Monday morning.  
 Q. Did you have any conversation with Mr. Shepler about this alleged accident yourself?  
 A. I talked to him on Monday after the accident and explained to him what had happened.  
 Q. You know Mr. Shepler, the gentleman on my left, don't you?  
 A. He is a safety man in the plant.  
 Q. Correct. Do you remember what you told him?  
 A. Just the story I told here.  
 Q. You told him nothing else than what you told us right here?

DR. PAUL McGEORGE, a witness for the Claimant, having been duly sworn, testified as follows:

#### DIRECT EXAMINATION BY THE REFEREE:

Q. Let us have your full name and address.  
 A. Dr. Paul McGeorge, Ambridge, Penn.ylvania.  
 Q. Are you licensed to practice medicine in the Commonwealth of Pennsylvania?

A. I don't remember anything I told him.  
 Q. Isn't it a fact you told him something about changing a tire on Sunday while you were at a picnic?  
 A. Oh yes, I mentioned that. I didn't see how it fitted into this case.  
 Q. Well, what did happen when you were changing this tire?  
 A. Well, I was driving along and had a flat tire, and of course, in the attempt of changing the tire, I had to use effort to remove the nuts from the wheel and I experienced a slight pain at that time.  
 Q. A slight pain, or more than a slight pain?  
 A. Oh, this doesn't have anything to do with this case, does it?  
 Q. It may have. I am simply asking you as a matter of fact you told Mr. Shepler you had a terrific pain, didn't you?  
 A. It was a little bit worse than it was on Saturday. It lasted a little longer.  
 Q. At that time, did you feel your side?  
 A. No, I didn't.  
 Q. As I understand it, you didn't find or observe any lump until Monday morning?  
 A. That is correct.  
 Q. When was the pain most severe? On Saturday or Sunday or Monday?  
 A. Well, I guess the pain was a little bit worse on Sunday than it was on Saturday.  
 Q. How long did it last at any time?  
 A. Well, the pain lasted—I shouldn't say pain, the uncomfortableness lasted an hour.  
 Q. That is all.  
 THE REFEREE: Mr. Hart, did you bring a doctor with you?  
 MR. HART: Yes, Dr. McGeorge.

A. I am.  
 Q. Will you admit the Doctor's qualifications Mr. Lawler?

MR. LAWLER: We will admit the doctor as a physician and surgeon duly qualified to practice in the Commonwealth of Pennsylvania.

THE REFEREE: Let the record show that the defendant has admitted the qualifications of Dr. McGeorge.

Q. Do you know William Hart, the Claimant in this case, professionally?

A. I do.

Q. When did you last see him?

A. April 7, 1947.

Q. Did he give you any history of any accidental occurrence?

A. Yes, he came in and told me that on April 5 at about two o'clock in the afternoon while pushing a truck loaded with 250 pounds up an inclined plane that he suddenly noted the onset of pain in his right groin.

Q. Did he tell you anything about any unusual effort or that the truck had been stopped at that time?

A. He stated the truck had stalled and it took increased effort to start it again.

Q. In any event, Doctor, did you examine at that time?

A. I examined him and he has a right inguinal hernia.

Q. Now Doctor, taking into consideration the history that this man has given you, the findings that you found on your examination, and your professional experience in this matter, are you willing at this time to give us your opinion as to whether or not there was any causal connection between the incident described and the condition that you found?

A. The man has a definite hernia, and I believe from the history that the individual gave me that he sustained enough trauma that he might have developed the hernia as he alleges, on Saturday.

Q. Would you say it was brought about by this incident?

A. I believe that it was brought about by the original trauma sustained on Saturday.

Q. All right. One more question, Doctor. Is this hernia disabling?

A. It is, totally.

Q. He is totally disabled as a result of this hernia?

A. That is correct.

THE REFEREE: You may cross-examine.

CROSS EXAMINATION BY  
MR. LAWLER

Q. Dr. McGeorge, you say he has a right inguinal hernia?

A. That is correct.

Q. What is a right inguinal hernia?

A. A protrusion of the sac into the inguinal canal with or without content.

Q. Did he have that when you first examined him?

A. He did.

Q. When was the first time you examined him?

A. Monday morning, the 7th of April when I was asked to examine him by Mr. Shepler.

Q. Have you ever examined him since then?

A. I haven't seen the individual since then.

Q. Well, Doctor, when you examined him the first time, did you receive a history from him?

A. Yes, he stated as I have testified that he had been pushing a truck up an inclined plane and developed discomfort in the right groin.

Q. At the time of your first and only examination, Doctor, did you make a diagnosis?

A. Yes, I did.

Q. I presume that was a right inguinal hernia?

A. That is correct.

Q. You stated that in your professional opinion as a causal connection between this incident that he speaks of that happened Saturday afternoon, April 5, and this inguinal hernia, is that right?

A. That is correct.

Q. Doctor, upon what do you base that opinion?

A. That the individual has a hernia and that in my opinion he could have sustained the hernia by the effort involved in pushing the stopped truck.

Q. In other words, you are confining your opinion to the fact that the injury that you found was sustained on Saturday afternoon when he was pushing this truck.

A. That is my opinion.

Q. You were sitting right along side of him a minute ago when he testified. That is correct, isn't it?

A. Yes.

Q. Doctor, did you hear him testify about removing a tire from his automobile on Sunday, the day after this incident happened on Saturday?

A. I did.

Q. Now Doctor, in view of this additional information and additional history that you now have about this incident that happened on Sunday, are you still of the same opinion?

Q. Well, the individual was not examined until Monday. I don't believe that I can say, I don't believe any surgeon could say whether he sustained the hernia on Saturday or Sunday, inasmuch as he has described two accidents, or two episodes, either one of which in my opinion could be capable of producing the hernia which he now presents.

A. That is all.

THE REFEREE: That is all Doctor, you are excused.

Mr. Hart, do you as the Claimant, have any other witnesses with you?

MR. HART: No, I haven't.  
(I might say in passing that we have simplified this greatly. In most hernia cases there are opposing counsels. The claimant has a counsel and he may if he so chooses be ex-

amined by his own physician. Then we have the testimony of the claimant's doctor and the company doctor. This however, was simplified and I will say now to Mr. Hart, as I say in all cases that come before us, the referee never decides any case immediately after the close of the hearing. Sometimes it is necessary for us to have the testimony transcribed and our reporter give us a transcript and we have to reread it. Sometimes it is reread a dozen times before we make up our minds what we have to do.)

THE REFEREE: Mr. Hart, my findings will be forwarded to the Workman's Compensation Bureau and they will in turn forward you a copy of my decision. From that decision you and the Defendant will have 30 days to appeal. That case is now closed.

MR. DOLAN: This concludes our program. No decision has been rendered for after all, this was a hypothetical case and further, the purpose of this program was to acquaint you with a typical compensation hearing on a controversial subject.

*Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME XVI

MINING SECTION

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#### Mining Section

#### MONDAY AFTERNOON SESSION

October 6, 1947

Presiding: C. E. McKnight, Mine Captain, Lake Shore Mines, Ltd.

#### Use of Diesel Powered Equipment in an Underground Limestone Mine

By RAYARD MAGEE

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Presented by M. C. M. POLLARD

Safety Director, National Gypsum Company, (Buffalo, N. Y.)

It has been a relatively short period of time since practically all haulage in tunneling and mining operations generally was accomplished by means of man or mule power. From a safety standpoint only, it might be difficult to improve upon this method of transportation. The necessity for movement of greater tonnage, however, required the use of some other kind of power for transportation. The electric locomotive, either the storage battery type for short hauls or the trolley type for longer hauls became popular for this service several years ago. The use of this equipment, however, especially the trolley locomotive, introduced some additional hazards in the transportation problem. Therefore, people engaged in mining and tunneling operations, who were always looking for haulage methods which would reduce costs, were, in addition, looking for ways to reduce these hazards.

Several European countries, notably Belgium, experimented with the use of Diesel powered equipment underground in the early Twenties. Later experimentation with this type of haulage began in this country. When the construction of the Delaware Aqueduct, a continuous hard rock tunnel, seventeen feet in diameter and eighty-five miles long, was begun in 1927, the United States Bureau of Mines, cooperating with the contractor and the New York State Department of Labor made exhaustive tests on Diesel powered locomotives for the haulage. The saving in time and cost as a result of the use of Diesel powered equipment on this job, plus the reduction in hazards was an important factor contributing to the increased popularity of Diesel powered equipment for underground use in recent years.

As a broad general statement, there are two inherent hazards introduced when Diesel powered equipment is used underground. First, and of lesser importance, is the fact that since the Diesel engine uses oxygen from the air in burning the fuel, there is a possibility of an atmosphere existing in the mine deficient in oxygen. In practical operation of a Diesel engine underground, however, this condition could not in all probability exist because the amount of fresh air required to dilute the toxic constituents of Diesel engine exhaust gas is of such magnitude as compared with the total volume of exhaust gas, that the excess nitrogen due to consumption of oxygen by the engine is insignificant in contributing to oxygen deficiency in the general air where normal air is drawn into the engine. The other hazard inherent to the Diesel engine is that of creating an atmosphere which is objectionable, or harmful to health or even with sufficient toxic gases present, to be dangerous to life as a result of exhausting the products of combustion underground. The manner of handling this problem is being covered in another paper to be presented at this meeting and no attempt will be made to discuss in any detail this phase of our problem.

But let us take a moment and examine the exhaust constituents of a Diesel engine that may create an objectionable or harmful environment. We will normally find present in the gases, carbon monoxide, oxides of nitrogen and sulphur, carbon dioxide, aldehydes, and smoke.

Carbon monoxide is a colorless and odorless gas. It is of slightly lighter weight than air, diffuses easily into the surrounding atmosphere but may accumulate in the top of

working places that are not well ventilated. It is extremely dangerous to breathe. A carbon monoxide content of 0.20 to 0.25 per cent in air that is breathed produces unconsciousness in approximately thirty minutes; a concentration of 0.04 per cent causes headache and discomfort within two or three hours. It is, therefore, obvious that we must carefully guard against any appreciable concentration of carbon monoxide in the mine air. The maximum concentration of carbon monoxide considered permissible in a working environment is 0.01 per cent, or one hundred parts per million. This standard is used by virtually all private, government and state groups.

The toxic oxides of nitrogen is applied to the toxic oxides of nitrogen (NO) and nitrogen peroxide (NO<sub>2</sub>) or mixtures of them. The oxides of nitrogen are formed by the reaction between oxygen and nitrogen composing the air, heated to a high temperature inside the cylinder of a Diesel engine. The fuel oil does not enter into this particular chemical reaction in the cylinder and the oxides of nitrogen result solely from the reaction between nitrogen and oxygen of the air brought about by high temperatures in confined spaces. Inhaling of these gases causes a formation of nitric and nitrous acids in the respiratory organs. The presence of only a small percentage of oxides of nitrogen may ultimately cause death. The maximum allowable percentage of oxides of nitrogen in mine air in various states ranges from 0.001 to 0.004 (ten to forty parts per million). The maximum percentage of this gas considered permissible in the working environment by the Bureau of Mines is 0.0025 per cent (25 parts per million by volume).

The sulphur content of fuel oil is oxidized to form sulphur dioxide (SO<sub>2</sub>) and sulphur trioxide (SO<sub>3</sub>) but these are usually represented as sulphur dioxide. Sulphur dioxide is a colorless, suffocating, irritating gas with a strong, pungent, sulphurous odor. It is poisonous even when present in small percentages and although 0.04 to 0.05 per cent (400 to 500 parts per million) is considered dangerous to persons on exposure of thirty to sixty minutes, the gas is so irritating to the eyes and respiratory system that it is intolerable to remain in and breathe an atmosphere containing a dangerous amount of sulphur dioxide unless the victim is unable to escape from it. Fuel oil that is virtually free from

sulphur is readily available and most Diesel engine manufacturers specify the maximum permissible sulphur content of the fuel.

Carbon dioxide is a colorless and odorless gas. It is heavier than air and may accumulate near the floor of inadequately ventilated tunnel or mine workings. When breathed one-half of one per cent (0.5 per cent) of carbon dioxide causes a slight increase in lung ventilation, i.e. causes deeper breathing, and two per cent causes about 50 per cent increase in lung ventilation. Carbon dioxide is formed in the complete oxidation of the carbon in the fuel oil. The Bureau of Mines recommends that the maximum allowable carbon dioxide content of the atmosphere in mines be less than 0.5 per cent.

Aldehydes are a product of the incomplete oxidation of the hydrocarbons in the fuel oil. Aldehydes have a characteristic sharp, suffocating odor and even in extremely small quantities can be irritating to the eyes and respiratory passages and their presence in the exhaust gas is largely responsible for the so-called acrid exhaust from Diesel engines. It is the only odor that can be detected from the exhaust gas because the other gases, except the slight traces of oxide of sulphur which may be present, are odorless. The Bureau of Mines recommends that Diesel engine exhaust gas, as diluted and discharged into the atmosphere, contain no more than ten parts per million by volume of aldehyde under any condition of operation.

The smoke content of the exhaust gases of a properly maintained and operating Diesel engine will be so small that its effect, with proper ventilation, will be negligible and need not be considered here.

From the foregoing, it is obvious that the exhaust of a Diesel engine can create an atmospheric condition which represents a real hazard to life. Experimentation has proven that the amount of the toxic gases produced in the operation of the engine is largely dependent upon the air and fuel in the cylinders during combustion or in other words the air fuel ratio. The ratio is expressed in terms of weight, i. e. pounds of air per pound of fuel. The air fuel ratio is at its minimum at the minimum power output or when the engine is idling. The ratio is maximum at full load and speed as when the engine is working at its highest capacity. The air fuel ratio at maximum power output or full throttle

is the most significant as the weight of the exhaust gases is at a maximum when the engine is working at capacity and requires full throttle or injection of fuel oil. The chemically correct mixture for maximum oxidation of the carbon in the fuel oil to carbon dioxide is about fifteen to one but at this ratio large quantities of carbon monoxide and hydrogen are formed as well as a small amount of methane. However, operation of the engine at a higher air to fuel ratio will very materially reduce the amount of toxic gases contained in the exhaust of the engine.

Therefore, the successful operation of a Diesel engine underground from a standpoint of producing a minimum of harmful gases in the exhaust is dependent upon the air fuel ratio which should always be not less than twenty to one. Periodic inspection and maintaining the Diesel engine in first-class condition are also essential in holding the toxic constituents of the exhaust gases at a minimum. Even though these conditions be fulfilled it is also obvious that ventilation of the mine workings is extremely important. Adequate ventilation is required not only for safety but for the creation of an atmosphere in which the content of irritating gases is so small as to be unobjectionable. The United States Bureau of Mines recommends the circulation of a minimum of 75 Cu. Ft. of air per minute per brake horse power. This minimum requirement is based on the premise, that, by the circulation of this amount of air an atmosphere will exist in which the toxic gases are considered to be of such small content that they are not harmful; but in actual practice, we believe that it will pay dividends to increase the amount of air circulated well above this minimum. If the underground workings are such that the drifts

can be used as air ducts reducing the friction to a minimum, the cost of circulating this air is not great. For instance in the National Gypsum Company operation at Kimballton, Virginia, we are setting up to circulate 80,000 cubic feet of air per minute with an expenditure of only 15HP in energy.

Summing up very briefly, the following represent the chief advantages which we have found in using Diesel powered equipment underground: Greater flexibility of the haulage system (using rubber tired equipment). Under certain operating conditions, especially during the development stages of a mining operation or in tunnel driving, there is a very substantial reduction in haulage costs. Last, but by no means least, a reduction in hazards as compared with other conventional methods of haulage. The following are the chief disadvantages experienced: objections on the part of workmen in mines to the odor of the exhaust from a Diesel engine; the necessity of having laws revised in many instances to permit the use of Diesel powered equipment underground. We believe that a quotation in part from Information Circular 7388 published by the United States Bureau of Mines in July, 1945 is a suitable conclusion for this paper. "From the experience gained in foreign countries and from investigation and tests by the Bureau of Mines in the laboratories and in tunnel driving in the United States, it appears that most of the objections to Diesel locomotives in mines have been overcome, that they offer a method of underground transportation far less hazardous than the trolley locomotive system and that they are at least on a par with trolley locomotives from the very important viewpoint of efficiency and cost of hauling materials."

## The Advantages and Disadvantages of Using Diesel Equipment in Underground Workings

By J. H. EAST, JR.

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Diesel-powered equipment, when used underground, has both advantages and disadvantages that are not well-understood by many people in the mining industry. There is probably no other type of mining equip-

ment now being introduced into American mines about which less is known and about which there is more misinformation.

Any equipment installed underground brings with it hazards that were not present



before, and it is the purpose of this paper to present both the advantages and disadvantages of using Diesel equipment in underground workings and to outline briefly how Diesel engines can be used underground with relative safety.

The Diesel engine adjusted to work in underground mines should not be confused with the same engine when it is adjusted for use outside the mine. The adjustment of the air/fuel ratio for engines that are used on the surface is intended to give the maximum fuel economy, and little or no attention is given to the chemical composition of the exhaust gas produced. Many of these engines are poorly adjusted and perhaps poorly maintained, with the result that the engine emits smoke in quantity as well as the disagreeable odor familiarly associated with diesel engines. The air/fuel ratio in the case of diesel engines operated on the surface is generally around 15:1, that is, 15 pounds of air to burn 1 pound of fuel.

Diesel engines that are adjusted to work underground usually have an air/fuel ratio of 20:1, as at this ratio the minimum quantity of toxic gases is given off in the engine exhaust. A diesel engine operating underground should be equipped with an exhaust-gas washer, or scrubber, as it is frequently called. The exhaust-gas washer or scrubber removes most of the disagreeable odors from the exhaust gas, but does not remove the toxic gases. Diesel engines that are used underground must be maintained in better condition than similar engines used on the surface; otherwise, the smoke emitted in the exhaust becomes objectionable if not undurable.

The toxic constituents of diesel-engine exhaust gas are carbon dioxide, carbon monoxide and oxides of nitrogen. The characteristics of the first two are fairly well known to those connected with the mining industry, but the dangerous effects of breathing oxide of nitrogen are not well-known, although these are the most dangerous of the toxic gases in the exhaust.

Carbon dioxide is an odorless, colorless gas, heavier than air, and may accumulate near the floor of a mine working that is not properly ventilated. The carbon dioxide in the exhaust gas is formed by complete oxidation of the carbon in the fuel oil.

Carbon monoxide is also an odorless, colorless gas and is slightly lighter than air. It

diffuses easily into the surrounding atmosphere but may accumulate in or toward the top of a working place that is not well-ventilated. Carbon monoxide in the exhaust gas is formed by incomplete oxidation of the fuel oil; contrary to the belief of many people, carbon monoxide is always present in the exhaust of a diesel engine. It is extremely hazardous to breathe, even in small volumes.

"Oxides of nitrogen" is the term applied to the oxides of nitrogen or mixtures of them. The most serious consequence of inhaling these gases is the formation of nitric and nitrous acids in the respiratory organs. The maximum proportion of this gas considered permissible in a working environment is only 25 parts per million, or .00025 per cent. The oxides of nitrogen in the exhaust are formed solely by the reaction between the oxygen and nitrogen composing the air when air is heated to a very high temperature by the pressure inside the cylinder of the diesel engine. The fuel oil does not enter into this chemical reaction.

The relative order of toxicity of oxides of nitrogen is shown by comparison with carbon monoxide. An atmosphere containing one half of 1 per cent (.050) to 1.0 per cent of carbon monoxide is likely to be fatal to a human being in less than 30 minutes of exposure, whereas as little as .007 per cent of oxides of nitrogen may be fatal in the same time.

Practically normal air is required for safe operation of diesel engines underground or in confined places, and failure to provide virtually normal air for diesel engine operation is almost certain to result in trouble. The Bureau of Mines engineers have determined that the air in which a diesel operates in confined places should contain less than one-half per cent of carbon dioxide and at least 20 per cent of oxygen. In a test, a diesel locomotive was run in a confined place until the carbon dioxide concentration in the atmosphere was approximately 1 per cent and the carbon monoxide was 0.01 per cent; visibility was blanked out, and the odors were sickening.

The odor associated with the exhaust of a diesel engine is caused by the aldehydes; it is the only odor that can be detected in the exhaust gas because the other gases, except the slight traces of oxides of sulfur that may be present, are odorless. The odor of aldehydes greatly resembles that of formaldehyde,

which is the aldehyde of formic acid. The maximum concentration considered permissible in a working place is based upon the comfort of the persons exposed to the atmosphere. Aldehydes are so irritating to breathe that it is unlikely that men could continue to work in an atmosphere containing dangerous amounts. The maximum concentration considered permissible by the United States Public Health Service and many State Health Departments is 10 parts per million.

Mention of the toxic constituents of diesel-engine exhaust gas and their characteristics has been made to call attention to this hazard in connection with the underground use of the diesel engine. The prevention of danger from this source is simple—the machines must be kept in good repair, and enough ventilating air must be provided to dilute and carry away the toxic gases from the exhaust of the diesel engine. The minimum volume of ventilating air required for operating diesel engines underground is about 75 cubic feet per minute per brake-horsepower; this volume of air is required for each diesel engine in service and is in addition to the volume of air required for normal ventilation. However, if excess ventilating air is supplied a working place for other reasons, it is possible that no additional air will be required if a diesel engine is placed in operation. Take, for example, a nonsassy coal mine which requires a minimum of 70,000 cubic feet of air per minute to maintain the mine air at the correct quality and it is desired to operate two diesel 65-horsepower locomotives for haulage. The total ventilating air required would be:

$$2 \times 65 \times 75 = \frac{70,000 \text{ cubic feet per minute (minimum)}}{2,750 \text{ cubic feet per minute for the diesels.}}$$

Total 79,750 cubic feet per minute.

This would be the minimum total volume of ventilating air that would need be supplied to maintain the mine atmosphere at the proper quality level.

However, if at this same mine it is necessary to supply 100,000 cubic feet of air per minute to keep the methane content of the mine air within the 0.25-per cent limit, no additional air would be required to operate the two diesel locomotives.

Washers or scrubbers are used to remove

most of the aldehydes from the exhaust gas. The apparatus generally consists of a container or tank of water through which the exhaust gas is passed; baffles tend to break the bubbles of gas. Water is one of the best absorbents of aldehydes, but considerable care should be taken to keep the proper amount of water in the washer and to change the water before it becomes saturated with aldehydes and cannot function. It is important to remember that a washer does not remove the carbon monoxide from the exhaust gas but does remove much of the aldehydes and some of the oxides of nitrogen. A properly designed, well-maintained washer will remove most of the typical diesel odor and usually decrease employee opposition to the use of diesel equipment.

Flame arresters on both the intake and exhaust of diesel engines used in underground coal mines is a "must" because of the ignition hazard if an explosive mixture of gas and air is encountered. In metal mining, the use of flame arresters is not so important, unless there is a possibility of the presence of an explosive gas as in the case of some western tunnels and mines. However, flame arresters on the exhaust are desirable in any type of mine, as they minimize a possible fire hazard.

Relatively few diesel engines have been used underground in American mines, but in Europe more than 1,300 such mine locomotives are in service. The locomotives range in weight from 2.5 to 30 tons, with engines of 30 to 300 horsepower. In England, some coal mines use two 100-horsepower units connected in tandem and operated by one engineer for main line haulage. These units have a drawbar pull of about 16,000 pounds. The most common size locomotive used in European mines for main-line haulage is the 10-ton, 50-horsepower unit.

In the United States, so far as is known, only four diesel-powered locomotives are in use underground. Two of these are in metal mines, one in a clay mine, and one in an underground limestone mine. Diesel powered trucks and other diesel equipment have been in use in the underground limestone mines in the Central States for over 10 years. The limited use of diesel equipment in American mines is due chiefly to the lack of knowledge of the actual hazard of diesel engines and of means for removing the hazard, adverse mining laws because of the lack of this knowledge,

and absence of information on the successful performance of diesels in European mines. Some States have laws and regulations prohibiting the use of internal-combustion engines underground; these laws were intended originally to prohibit the use of gasoline-powered equipment and were enacted before the diesel engine was developed to its present stage of safety and efficiency.

It is important to understand the difference in the chemical composition of the exhaust gas of a diesel engine and a gasoline engine insofar as the toxic gases are concerned. The carbon monoxide content of the actual exhaust gas of a gasoline engine may amount to as high as 14 per cent, while the carbon monoxide in the exhaust of a diesel engine adjusted for underground use and in good mechanical condition will range from 0.08 to 0.05 per cent. However, if the Diesel engine is not in proper adjustment for underground service and is not in good mechanical condition, the exhaust of the diesel engine can be very hazardous—practically as serious as that of a gasoline engine.

The exhaust gas of a diesel engine when properly adjusted contains an excess of oxygen, even when the engine is working under full load and at maximum speed. Typical exhaust-gas analyses when the engine is working under full load and when idling are shown in table 1.

Table 1.—Typical Diesel-engine Exhaust-gas Analyses

|                                          | Engine Under               |                        |
|------------------------------------------|----------------------------|------------------------|
|                                          | Engine Idling,<br>Per Cent | Full Load,<br>Per Cent |
| Oxygen                                   | 19.65                      | 14.98                  |
| Nitrogen                                 | 79.40                      | 80.63                  |
| Carbon dioxide                           | .89                        | 4.31                   |
| Carbon monoxide                          | .05                        | .05                    |
| Methane                                  | .05                        | .05                    |
|                                          | 100.00                     | 100.00                 |
| Oxides of nitrogen,<br>parts per million | 80                         | 45                     |
| Aldehydes, parts<br>per million          | 40                         | —                      |

The limestone mine in Ohio in which these exhaust gas samples were taken is opened by two shafts 2,800 feet deep; the two-entry room-and-pillar method of mining is used. The entries are driven 16 feet wide and 17 feet high; the rooms are driven 20 feet wide

and 17 feet high for 600 feet. On retreat an additional 12 feet of top rock is mined making the final room size 30 feet wide and 29 feet high; the pillars are not recovered. The mine is operated two shifts per day, and the daily production averages 1,800 tons of limestone. Approximately 70 men are employed underground on each shift.

Ventilation is induced by a reversible fan operating blowing. Approximately 66,000 cubic feet of air per minute is forced through the mine in two splits. The haulageways are ventilated by return air when it is possible to do so.

The diesel equipment used underground at this mine includes six-cubic yard-capacity trucks powered by 107 horsepower engines, a bulldozer, a tractor loader and a service truck. Analyses of the samples of the general mine atmosphere taken in two working faces and in the main return at the shaft bottom where three Diesel trucks had passed in the preceding 7 minutes are shown in table 2.

Table 2.—Analyses of General Mine Atmosphere

|                      | Main return       |                   |                    |
|----------------------|-------------------|-------------------|--------------------|
|                      | Face of<br>Room A | Face of<br>Room B | at shaft<br>bottom |
| Oxygen               | 20.42             | 20.72             | 20.92              |
| Nitrogen             | 79.02             | 79.08             | 79.08              |
| Carbon dioxide       | .06               | .16               | .05                |
| Carbon mon-<br>oxide | .00               | .00               | .00                |
| Methane              | .00               | .04               | .05                |
|                      | 100.00            | 100.00            | 100.00             |

The successful use of diesel-powered equipment at this mine is significant. The mine shaft is 2,800 feet deep, and ventilation of the working places is induced by mechanical methods. The volume of fresh air taken into the mine is adequate to dilute and carry away the toxic gases of the exhaust from the diesel engines, and analyses of the samples of the general mine air indicate that the air in this mine is better than that ordinarily found in mines, notwithstanding the use of seven, and sometimes nine, units of diesel-powered equipment.

The very brief mention of diesels, the hazards caused by their use and the successful use of diesels at an American mine have been

given before discussing the relative advantages of using diesel equipment in underground mines in order to show that, notwithstanding the hazards introduced by installing diesel equipment underground, they can be used with safety if certain very feasible precautions are taken.

The advantages of using diesel equipment in underground mines are many, particularly in those mines with mechanical haulage or where mobility of equipment is essential. Electric-trolley and storage-battery locomotives are used in all types of mining, but electric-trolley haulage has been supplanted in some metal and nonmetallic mining districts by storage-battery locomotives. Electric-trolley locomotives are used in most coal mines.

Many metal mines use storage-battery locomotives for level haulage, and electric-trolley types are used for main-line haulage because of the power requirements for handling the large cars ordinarily used in main-line haulage, and frequently because of adverse track grades.

The great advantage of Diesel-powered locomotives compared with storage-battery locomotives lies in the greater capacity and greater speed of the diesel. Storage-battery locomotives of equivalent capacity are much larger and far more costly to purchase and maintain than Diesels of the same power. Battery-charging stations must be maintained on each level for storage-battery equipment except for the very small types of battery locomotives which can be moved from one level to another handily on the cage. Spare sets of batteries must be maintained charged in order for the locomotive to be used in multi-shift mines. In one instance, it was determined that, on a 3-mile haul with the required load, the 60-horsepower 12-ton storage-battery locomotives available, when hauling a load of 64 tons with a draw-bar pull of 1,900 pounds on a level track, developed a speed of 8 miles an hour and could make five round trips in 8 hours but that it would be necessary to change the battery after each round trip. The cost of additional charging sets and batteries, providing space in the tunnel for the charging sets, and other factors were prohibitive and diesel engines were substituted. The diesels hauled seven round trips 5 miles in an 8-hour shift. The cost was about 60 per cent of storage-battery locomotive estimates.

The center of gravity of a storage-battery locomotive is usually much higher than for a diesel locomotive, making the storage-battery locomotive more subject to derailment and also more difficult to rerail than a diesel.

Storage-battery locomotives can be used to advantage over level grades on short hauls, particularly in those places where adequate ventilation cannot be maintained; in virtually all other places, the diesel locomotive has the advantage because of cost, power and speed.

The diesel locomotive has many advantages when compared with the electric-trolley-type locomotive. They are much more flexible, as the diesel obviates the necessity of extending trolley lines into new workings, maintaining existing trolley lines, bonding rails and maintaining the bonds. The extension and maintenance of the electric-trolley system are important items of cost at mines using this system of haulage. Elimination of the trolley lines also eliminates the need for guarding them to prevent personal contact with the wires. In coal mines alone, between 1930 and 1944, 466 fatalities were caused by contact with trolley lines and locomotives, an average of 35 fatalities a year.

The trolley wires are a prolific cause of mine fires and of explosions in coal mines. Between 1930 and 1944, 30 mine fires and 50 explosions resulted from this cause, and 355 workers lost their lives. Fires and explosions from this cause may be eliminated by using diesel locomotives, since European statistics reveal that no mine fires or explosions have been caused by diesel locomotives in coal mines.

Another great advantage of the diesel mine locomotive is elimination of the necessity for using direct-current electricity underground and the consequent danger of stray currents. At one large metal mine, it was necessary to abandon electric blasting and return to fuse-and-cap blasting because of stray currents, which, it was determined, originated in the electric-trolley system. In another metal mine, trolley haulage was abandoned in favor of storage-battery haulage in order to be able to continue electric blasting, which had been made hazardous because of stray currents from the trolley system.

The use of diesel-powered trucks for haulage units in some mines, such as the underground limestone mines in the Central States and lead-zinc mines of the Tri-State district,

has definite advantages compared to rail haulage. The roads can be made to follow a uniform grade or to follow the dip of the formation, and the roads can usually be maintained at small cost. The original cost is less than with rail haulage, and the method is much more flexible.

The mobility of diesel-powered equipment underground commends itself to many mining officials; the equipment used underground includes bulldozers, tractor loaders to clean up spilled rock, tractor mounted drill jumbos, portable air compressors and trucks. Some diesel-powered shovels are used, but most of the shovels are electric driven.

Some European coal mines do not permit electric equipment to be used underground because of the fear of causing an explosion from electrical causes. These mines use diesel and compressed-air-driven equipment. Compressed air motors are used for the shacking-conveyor drives, and both diesel and compressed air locomotives are used for haulage.

The principal disadvantage of using diesel engines underground is that virtually normal air must be maintained in all parts of the mine in which diesel engines operate. This can hardly be classed as a disadvantage, but it is certainly a "must" if diesel engines are to be operated successfully underground. Many metal mines are hot, and an excess volume of ventilating air is provided working sections to cool the mine atmosphere; obviously, in these cases additional ventilating air is not required if diesel engines are installed.

The diesel mine locomotives now manufactured stand too high above the rails to work in many coal mines. To use diesels in these mines would require extensive enlargement of the haulageways, and the cost probably would be prohibitive. Presumably lower-height diesel locomotives can be provided if a market develops for them.

The diesel-fuel tanks for the underground storage of fuel oil constitute a definite fire hazard. Diesel fuel oil is by no means as dangerous to store nor as likely to be ignited as gasoline, but it is hazardous, and not over one day's supply of fuel oil should be kept underground. The fuel tanks should be placed in a room of fireproof construction; the doors should close tightly and should be locked when not in use. The tanks should be arranged so that the fuel-supply tanks on the engines can be filled without spillage. Spilled

oil should be removed promptly, preferably by soaking it up with dry sand; the oil-soaked sand should be taken to the surface for disposal.

A discussion of the relative hazards of gasoline versus diesel engines has no place in this paper; however, it is pointed out that gasoline is far more dangerous to handle and to store underground than diesel fuel oil and that the exhaust gas from a gasoline engine is extremely dangerous to breathe at any time, particularly in a confined place. The Bureau of Mines condemns the use of gasoline-powered equipment underground at any time.

The haulageway in which a diesel engine is operating should be on a separate split of air when it is possible to arrange it, to prevent the odors, which may be objectionable, from reaching the working face.

A definite fire hazard is introduced in non-coal mines, particularly those that are heavily timbered, when the diesel engines are not equipped with flame arresters on the exhaust. Any internal-combustion engine will back-fire under certain conditions and emit flame of considerable length from the exhaust pipe. This flame can ignite dry timber, bark, or other combustible matter and cause a disastrous fire. The use of flame arresters on the exhaust of diesel locomotives used in European mines is mandatory.

A diesel engine working underground must be kept in good mechanical condition at all times, to reduce the amount of smoke in the exhaust and to have only the minimum amount of toxic and odoriferous gases in the engine exhaust. Diesel mechanics that can maintain a diesel engine in proper repair are more difficult to find than competent electricians; however, if a demand exists for such service, it is possible that enough capable mechanics can be developed.

Diesel engines can be used safely in underground mines if adequate ventilation is provided. The ventilation should be induced mechanically so that circulation of air can be controlled at all times. The atmosphere in which a diesel engine works should be essentially normal air as otherwise trouble is virtually certain to be experienced.

Mine officials who are responsible for the workers in the mine should have a thorough understanding of the hazards introduced by using diesel equipment underground. The plan of ventilation should be worked out before the units are installed, and samples

of the mine air should be analyzed at frequent intervals after the diesels are first installed underground, to check the effectiveness of the ventilation. Periodic analyses of the mine air, particularly along the haulageways, should be made while the diesels continue in operation, to check the mechanical condition of the diesel engines as well as the ventilation.

The diesel mine locomotive is less hazardous in underground operation than one of the electric-trolley type. A study of American coal-mine statistics reveals that 75 fatalities were caused by electric-trolley systems in underground mines from 1930 to 1944, while European statistics show no fatalities caused by the use of diesel locomotives in underground coal mines.

The diesel mine locomotive is preferable

to the storage-battery locomotive when heavy loads and steep grades are considered. The original cost of equipment and the cost of maintenance definitely favor the diesel, in so far as now known.

For coal mines a "permissible" diesel engine should be used because of the danger of possible ignition of gas-air or coal-dust mixtures by flame from the exhaust. Up to the present time no "permissible" diesel mine locomotives are on the market.

The advantage gained by the use of the diesel equipment underground far outweighs the disadvantages; in fact, the principal disadvantage—that adequate ventilation must be provided in those parts of the mine where a diesel engine is operated—can be classed as advantageous from the health and efficiency points of view.

## TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: G. E. McKnight, Mine Captain, Lake Shore Mines, Ltd.

### Lake Superior Mines' Safety Council—History and Growth

By A. H. TRESTRAIL

Range Safety Inspector, Pickands Mather and Company

The presence of copper in Lake Superior district was probably first reported by early explorers in 1696. The Chippewa Indians knew its presence and used it for crude ornaments. According to the reports of the U. S. Geological Survey, there is evidence that mining was carried on as far earlier period. There are evidences that possibly the ancestors of the aboriginal tribes possessed the ability to mine and utilize the copper. Weapons and domestic utensils of good finish and temper are still found in mounds and sand dunes on Lake Superior's southern shore. The year, 1844, marked the beginning of copper mining in this district. This branch of the mining industry advanced to the point where at one time, it was the nation's chief source of copper. Its maximum production we believe was in 1890 when 103,890 long tons were mined.

Iron mining in the Lake Superior district had its beginnings in Upper Michigan. Discovered first on the Marquette Range in

1844, iron was soon found to be the prevalent mineral of the entire Lake Superior district. The production of iron has been enormous and shipments reached their high point in 1922 when over 90,000,000 tons were shipped.

In these beginnings, mining necessarily was very crude and attended with great danger. Some miners who have lived to see the blessings of safety recall vividly the days when some mines carried out a least one dead miner per week. Public opinion demanded that greater precautions be taken and in Michigan, county mine inspectors were engaged as early as 1867. Wisconsin and Minnesota also employed men in the same capacity. Their efficiency was necessarily impaired by the large territory they had to cover, and progress in safety was consequently very slow. The management was cooperative, but minor supervisors sometimes had a very meager notion as to what constituted reasonably safe conditions.

Then, too, it was practically bred in the

bone of workmen that a real miner had to be rugged and part of that ruggedness consisted in being indifferent, if not actually careless, in regard to the inherent hazards of mining. There is reason to believe that many of them scoffed at the idea of safety and in many cases engaged in practices, foolhardy in themselves, and which workmen today recognize as practically suicidal.

Such, generally, were mining conditions in this district and, undoubtedly, the same general atmosphere prevailed in mining regions throughout the country.

In or about the year 1910, companies were beginning to show an increasing interest in safety and some had selected safety committees with the thought of improving working conditions. These committees functioned with varying degrees of success and several of the companies made more serious efforts to prevent accidents by appointing full-time safety departments. It was in 1912 at Milwaukee, Wisconsin, that this Mining Section of the National Safety Council came into being. Mine safety did improve and men interested in safety were beginning to think in terms of coordinated ideas and benefits that might be derived from some type of organization of Lake Superior Safety Engineers. Such thoughts emanated from a company conference in Duluth, November 12, 1918.

It remained for an engineer of the Bureau of Mines to initiate the steps that led to forming such an organization and on April 21, 1919, in response to an invitation from Mr. Byron O. Pickard, District Engineer of the Bureau of Mines, a meeting of safety engineers and county mine inspectors was held. The attendance at this first meeting was very small and was held in Houghton, Michigan. The object of this meeting, as stated in the invitation, was that county mine inspectors might "become acquainted, discuss their common problems, and listen to addresses on safety problems by some of the corporation safety men."

There was considerable enthusiasm at this meeting and it was followed very promptly by a second meeting which was held in Duluth. Those present included State, Federal and County safety inspectors, some representatives of safety equipment manufacturers as well as safety engineers from various Lake Superior mining companies. Nineteen mining companies were represented.

The committees to make arrangements were three in number consisting of Program, Meeting Place and Hotel Accommodations and the Reception and Luncheon Committee. The report of the first meeting stated:

"The meeting was enthusiastic and well attended and a resolution was passed that the Bureau of Mines make such conferences annual affairs in the Lake Superior District."

Here, according to one of the speakers, is a body of men with about eight years of safety experience, attempting to attack the problem of accident prevention. This speaker stated men familiar with industrial conditions were convinced that 90 per cent of mine accidents were preventable. He also stated, "It is not intended to minimize the value of safety work, but the fact should be recognized that in spite of every effort that may be exerted to prevent personal injury, there is a fluctuation in the number of accidents from year to year that is beyond our control." In that early convention the value of safeguards was recognized but education of employees was acknowledged to be the paramount and difficult problem. This, from this record of the first meeting, showed that those present were cognizant of the basic problem in accident prevention.

The first three annual conferences were presided over by the district engineers in charge of the Bureau of Mines activities in the district. The promotion of the first conference was largely in their hands although there was some counsel from the various safety engineers of the mining companies. The proceedings of the conferences were carefully recorded and regularly published following each convention. In the first five years, the attendance doubled, and in the first ten years, attendance increased almost five times.

An idea of attendance is revealed in the annual registration from 55 at the first meeting in 1919 to 125 in 1924, 274 in 1929, 400 in 1940 and 680 at the 1947 convention. As previously stated, 19 companies were represented at the first meeting, and in the 1947 convention, 24 had men in attendance. This would indicate that there was an early and genuine interest of practically the entire field of operators. If it be true that safety should begin at the top, we have evidence that the operators in the Lake Superior district were early cognizant of this fact. The attendance

has changed from a meeting made up primarily of professional safety men and sales

representatives to include supervisors in all capacities.

### The Lake Superior Mines Safety Council Aims— Objectives—Activities—Organization

By B. G. BEST

Supervisor of Safety, Oliver Iron Mining Company

The Lake Superior Mines Safety Council is an organization sponsored and supported by the mining companies of the Lake Superior District to supplement and coordinate the safety programs of the individual companies. Cooperating with the mining companies and holding membership in the Council is the personnel of the U. S. Bureau of Mines at the Duluth Safety Station.

Contributing in no small way to the successful operation of the Council is the fact that the mining companies of the District have a real interest in safety work. They have an honest desire to reduce accidents and not only have they furnished the money necessary to carry on the Council's activities, but they also have supported the Council in other ways. They have been willing to have their safety men take time from their regular duties to act as officers or committee men for the Council; they have been willing to have both safety men and members of the supervisory forces prepare and present papers at meetings of the Council; they have taken operating men—superintendents, foremen and workmen—off the job to attend Council meetings; they have had mechanics and shop men make models of safety devices to be exhibited at the Annual Conference; and they have been agreeable to the free and complete interchange of accident data and similar information.

The Council has three major activities:

1. Monthly meetings at various places in the Lake Superior District.
2. An annual safety conference in Duluth.
3. The interchange of information and accident data.

Monthly meetings are held from September to May, inclusive. At the September meeting plans are made for the year's activities, and a tentative program for the annual conference in June is drawn up. The May meeting is

given over to checking preparations for the conference. Between September and May most or all of the meetings are held on the ranges—from Ely, Minnesota to Ishpeming, Michigan. In the year 1946-7 attendance at the range meeting varied from 55 to 106.

The Annual Conference in June is the culmination of the year's activities. It is a two-day session, with papers on carefully selected subjects by carefully selected speakers. The mining companies set up exhibits of safety devices developed and used at the mines, and manufacturers of and dealers in safety equipment exhibit their products. On the evening of the first day there is a banquet, with a good speaker, music, entertainment, and attendance prizes. Registration at the last few conferences has been in the neighborhood of 600, with a record breaking high of 680 in 1947.

Most of the companies holding membership in the Council participate in the exchange of accident data, and send to the secretary description of interesting or unusual accidents. The secretary selects reports which he considers most interesting and informative and has copies made for distribution to the participating companies. In this way each company is kept informed of accidents throughout the entire district and is able to profit by the experience of other operators.

The organization necessary to carry on these activities is simple and can be divided into two parts. The first part is the executive committee. The second is the operating organization, consisting of a president, vice president, secretary, treasurer, committees in charge of monthly meetings, and, for the annual conference a recording secretary and the following committee: registration, program, exhibits, banquet, and prize award.

The executive committee is the policy making body and has general direction of the

activities of the Council. It consists of seven men representing seven different mining companies. These men are experienced, of mature judgment, and are familiar with the policies of the Council and of the companies they represent. Members hold office indefinitely, and when a vacancy occurs it is filled by a man selected by the remaining members of the committee. Meetings are held at the call of the chairman.

The president is the operating head of the organization. He is elected at the annual conference, holds office for one year, and is usually the top safety man of one of the mining companies. His duty is to see that the Council functions efficiently and effectively and that it furnishes the mining companies with services commensurate with the support given by them. He appoints all operating committees and in doing so makes an effort to see that each company gets suitable representation and that none gets more than its equitable share of the work. The proper performance of his duties will require, in addition to the time spent attending regular meetings, the equivalent of at least one month's time on his regular work, and he should be in a position to devote this much time to the Council.

The vice-president is elected at the annual conference for a term of one year, and his election to the presidency the following year is almost a certainty. In selecting a candidate for this office the nominating committee considers not only individual qualifications, but company affiliations as well, for it is the policy of the Council to rotate the presidency among the various companies. The duties of the vice-president are not arduous, so that during his term of office he has an opportunity to become familiar with the inner workings of the Council and lay plans for his year as president.

The treasurer is also elected for a one-year term, but is usually reelected. He solicits money from the mining companies, keeps the customary records and accounts, and keeps the executive committee advised of the financial status of the council.

Like the treasurer, the secretary is subject to reelection and usually serves several terms. In addition to sending out notices of the

meetings, preparing and sending out the minutes, and performing other work customarily connected with the office, the secretary has other important duties. He handles the exchange of accident data, arranges with the hotels for holding the annual conference and other meetings, sees that these meetings get suitable newspaper publicity, has charge of the preparation, printing and distribution of the annual proceedings, is familiar with the detail work connected with the various activities, and keeps the president and committee chairman advised of many matters that otherwise might be overlooked. In addition to the personal qualifications necessary to the performance of his duties, the secretary should have available the services of a stenographer, and should be in a position to devote a considerable portion of his time to Council work.

Committees in charge of monthly meetings on the ranges are composed of local safety men and have the responsibility of making complete arrangements for the meetings. Because these meetings are held close to the scenes of operations at frequent intervals over a period of six or seven months, they have a marked effect on the standing of the Council with the mine operators. Committee chairmen are expected to bear in mind that taking 75 men off production to attend a safety meeting costs the mining companies something like \$1,000.00, and that they are justified in expecting a meeting in keeping with that expenditure.

In the year 1946-7 between 35 and 40 people were on the working force of the Council, either as officers or members of committees. Some had more than one assignment, but except for the president and secretary, no one was called upon to take a great deal of time from his regular work.

The continued support—financial and otherwise—given by the mining companies and the prestige enjoyed by the Council as an outstanding mine safety organization bear witness to the soundness of the Council's activities, and the fact that these activities can be carried on smoothly and efficiently by a group of men scattered all over the Lake Superior District indicates that the type of organization is well suited to the needs of the Council.

## The Lake Superior Mines Safety Council—Summary

By FRANK E. CASH

Supervising Engineer, Bureau of Mines, Duluth, Minnesota

A small group of safety men, through their fore-sightedness, realized the need for unifying or pooling their assets and efforts in reducing and preventing injuries in and around the mines of the Lake Superior district.

Action along these lines was initiated and took concrete form in two meetings during 1919. From its organization through the years, the Lake Superior Mines Safety Council has grown in interest, members, and accomplishments from year to year.

The success of the Council's activities can be attributed largely to companies, organizations, employers, and their willingness to put their cards on the table and work together in preventing injuries.

Incidentally, although we are by no means satisfied, we definitely have a feeling of pride in the accident experience trend in the Lake Superior district over the years.

As set up in part II of this presentation, the three major activities are:

1. Monthly meetings.
2. Annual conference.
3. Inter-change of data and information.

During a Council or Conference year, August 1 to July 31, there are usually nine monthly meetings, three in Duluth and six at various locations on the iron ranges. These meetings are climaxed by the annual conference. These meetings, due to their locations and attendance, require different types of programs. For example, the Duluth meetings are attended by 25 to 40 safety supervisors, engineers, and inspectors. The range meetings, in addition to 15 to 30 safety men, are attended by 25 to 75 operating men. And again the interests on the Mesabi range are largely open-cut, and on the Gribble they are largely underground. The annual conference is attended by approximately 500, representing safety and operating personnel of all the ranges, iron and copper, in the Lake Superior district, as well as other metal-mining districts of the United States and Canada.

To handle the activities of the Council there are 13 essential elected or appointed individuals and committees. These are: Executive Committee, President, Vice-President,

Secretary, Treasurer, Recording Secretary, Range Meeting Committees, Program Committee, Banquet Committee, Exhibits Committee, Prize Awards Committee, Registration Committee, and Audit Committee.

The actual time devoted to the work by the various individuals and committees varies, but in a conference year it will total approximately 700 man-days.

The Council has gained, needs and enjoys the following support:

1. The moral and financial support of practically all operating companies in the Lake Superior district.
2. The active participating support of the personnel of the U. S. Bureau of Mines, the officials, supervisors, both safety and operating, of the mining companies and of the rank and file of their employees.

3. The careful preparation and presentation of desired subjects at the various meetings by representatives of mining and other industries from other sections of the country.
4. The mining companies and industrial supply concerns provide exhibits showing devices and equipment used, or suitable for use, in the prevention of injuries in and around the mines.

5. The mining publications and the local newspapers in publicity contribute to the success of the Council.
6. Mining organizations, industrial concerns, other than mining, inspection departments, and individuals from other mining districts, in various states, contribute to the meetings by their attendance.

As a result of this support, the Council serves as a clearing house, a bureau of information, or a solution to many operating and safety problems. In so doing, it has become essential to the safe and efficient operation of the mines in the district.

Although an anti-claim, a few words of caution or advice to any section or group who propose or contemplate organizing or operating such a council successfully or efficiently, do not undertake it without serious consideration, study, and planning.

1. You should have, or be able to get, the

moral and financial support of the operating companies you contemplate serving.

2. You should have, or be able to get, the active participating support of company officials, supervisors, and employees.
3. You should arrange to operate on a strictly business and efficient basis.

4. The treasurer should have available \$1,000 to \$1,500 a year for operating expenses.
5. A relatively small number of those individuals interested and affected must be willing to spend many days of hard but gratifying work to make a success of the undertaking.

### Safety Devices and Methods Used in Mines of the Lake Superior District

By A. J. STROMQUIST  
Safety Director, Cleveland Cliffs Iron Company

No one can figure the exact value in dollars of the safety devices used in the Lake Superior district but many of them have certainly increased production, and no doubt saved life and limb. Some of the devices have become as much a part of the operation as the drill machine or scraper hoist.

The mines of the district have had a fairly good safety record compared to other mines of the United States. During the five years, 1940 to 1944 inclusive, an average of 130 mines reported 45,451,068 man-hours worked. There were an average of 749 accidents/210,328 days lost giving a frequency of 17.06 and a severity of 4.955. Although this record is thought of as good in mining, there is still much to be desired in the accident prevention work. In most underground mines the individual must be trained in safety because it is next to impossible for the supervisors to be on hand at all times. Many supervisors see their men only twice a day, which leaves the employee to judge and plan much of his work. Underground mining has always been considered hazardous and some mines are much harder to operate safely than others because of existing conditions.

In order to assure safe operation, many safety devices have been introduced. For instance, when a main haulage drift is in rock which has a tendency to slough off in the back, four-inch steel "H" beams can be used to support the back with cedar and tamarack placed over the caps. A 16-inch spiral metal ventilation pipe is hung in the upper corner on one side. Air used at the breast of the heading is exhausted through the ventilation pipe to the shaft so the contaminated air does

not enter the rest of the mine air. Water and air pipes also are supported on the side of the drift and out of the way of the haulage trains. Ditching is done as the heading is driven forward so as to handle any water encountered and that used in the drill machines, misting nozzles and water blasts. Sixty-pound rails are used which are bonded and cross-bonded.

Forepoaling in soft ore is a major safety measure and most companies insist that they be installed ahead of the last set of timber with lagging crossed over the poles before the miners are allowed to work in the breast or heading. Furthermore, sides of the slice must also be supported. Falls of ground take the greatest toll of life in the underground mines and are a constant source of worry. When ground is heavy or there is rock or ore in the back, 4-inch steel "H" beams are also used to support the back.

In extremely weak ground which may run before the timber set can be erected, the forepoles are frequently installed prior to blasting the round. This is done by drilling large holes with a special auger bit. Holes are drilled from over the cap of the last set of timber and poles are pushed into these holes and wedged. The round is then blasted.

Where there has been a run of rock, forepoles are forced into place ahead of the last set of timber by use of a home-made spilling driver. The device often utilizes the power of the scraper hoist. It is made of a 30-inch length of 6-inch pipe with one end slotted to receive a six-inch pulley. A 2x4 inch piece of steel is placed through slots just above the pulley, providing a seat for the spilling poles.

This device does away with much hazardous labor.

A chain clamp can be used successfully to support staging in top-slicing. The clamp is a piece of "J"-shaped metal with teeth on the upper outside, a chain slot at the top, and a chain for fastening the stirrup around the timber leg. To fasten the clamp, the chain is pulled closely around the timber leg and fitted into the slot while the stirrup is held away from the leg. As the clamp is pushed down, the chain is tightened and the teeth imbedded in the post. Four clamps support two rails, one on each side of the drift, across which the staging planks are placed. Planks are usually 3" x 12" sound fir, long enough to reach across the drift or slice.

When driving rock-headings it is desirable to keep dust counts as low as possible, with a count of 5 million particles per cubic foot as the recommended maximum limit. In order to keep below this limit a number of things must be done; namely, effective ventilation sweeping the face of the heading, wet drilling, water-blasts during blasting and a short period afterwards, wetting down the rock pile before and during mucking operations, water curtains in the drift and also in the ventilation tubing if the fan is exhausting air from the breast. These last two are absolutely necessary if the air is to be used in any other part of the mine. Tests taken after blasting in a heading when the water blast was not used showed over 200 million dust particles per cubic foot. After passing through this one set of four misting nozzles the count dropped to slightly over 6 million particles. Each misting nozzle uses less than 2 gallons of water per hour at 80 pounds' pressure.

There are several types of fog nozzles and water blasts used in the Lake Superior district. They are made to create a voluminous fog in dry ore headings and to make a water blast for rock headings where it is desired to wet down the pile as well as alloy dust in suspension during and after blasting. The water blasts and fog nozzles use both water and compressed air to create the blast and fog. When in operation, two streams of air and water emitted from around the periphery of the nozzle are impinged against each other producing a fog.

A scraper hoist installation in an underground mine should have a guard in front of the operator to provide protection against backlash in event the cable breaks. The op-

erator should wear safety goggles, a hard hat, a dust respirator and safety shoes. Closely-spaced grizzly rails prevent employees from accidentally falling into the chute.

Electric locomotives for main haulage should have "windshields" or more properly guards, to provide protection for the motor-men in event of derailment or wreck. It is best if made of 14-inch plate reinforced with angle irons and braced to the frame with 50-pound rails. Other safety features are (1) a tool basket attached to the windshield, (2) insulated handhold on trolley pole, and (3) canvas cover over motor.

A trip light and bell is attached to the rear of each train. The standard electric cap lamp with a red lens serves as a source of light, and a cowbell mounted on a coil spring provides audible warning. Because most underground haulage trains are pushed to the inside of the mine, this equipment is a necessity. Some companies have the brakeman precede the train into cross-cuts and other places where men are at work on the haulage level, or if there is any powder smoke, mist or haze.

A switch signal light is used to indicate the position of the track switch to the motor-man of an approaching train. The signal light is mounted on a stand opposite the switch throw. Two light boxes, each containing two light bulbs and colored lenses, are mounted at 90 degrees to each other on the top of the vertical shaft. Thus, when the shaft is moved from one position to the other, the opposite colored light is visible from both directions. Nearly all mining companies of the district require a block signal system on each level where more than one haulage train operates. It is important to have fire maps in a strategic location. The case contains surface maps showing locations of extinguishers, fire hose and hydrants and underground ventilation maps showing all mine workings and lists of all mine rescue men with their addresses and phone numbers.

Most stench injectors are made in the mine shops and contain Ethyl Mercaptan in a glass flask. Most stench injectors are located on the compressed air line on the mine side of the receiver. In case of emergency the flask is broken by screwing down a valve stem attached to the body of the injector and then opening top and bottom air line valves which allows the liquid to enter the main compressed air line where it vaporizes and enters

the mine workings. Employees are instructed to leave the mine immediately when they detect the odor. Actual tests are made about once each year to acquaint miners with the odor.

A carbon monoxide alarm, connected to the compressed-air line on surface, provides for continuous sampling of the compressed air delivered underground. If the concentration of carbon monoxide is above 0.05 per cent the alarm sounds in the compressor room. The attendant then stops the compressor and prevents the poisonous gas from entering the mine and affecting the workmen. Such condition might arise from overheating of the compressor or an oil fire in the receiver. The same type of alarm has been used for a number of years on the exhaust air side of a sealed mine fire, and it will ring a warning bell and turn on a warning light should the CO concentration pass 0.05 per cent.

An underground fire truck should be provided for emergency fire fighting of incipient mine fires. The tank has a capacity of 200 gallons of water which is kept under pressure at all times. One hundred feet of water hose is attached to a reel and is of the same size as air hose so that additional hose can be added readily if necessary. Also attached to the tank is a compressed air hose which may be connected to the air line to build up pressure when refilling the tank. The unit is track mounted and can be handled from level to level on the cage. Usually each level is provided with a fire truck to supplement other fire fighting equipment.

A shaft gate to the cage compartment at the end of the man tunnel from the change house is an important safety device. This loading point is exclusively for men, and a similar tunnel is provided below, so that both cage decks can be loaded or unloaded simultaneously. A "No Smoking" sign on the gate and securely suspended pipes and electric cables on the right side of the tunnel are additional safety features. Shaft gates on the opposite side of the shaft and at all shaft plants are built close to the floor of the tunnel, have a 6-inch "H" beam horizontally across the gate at car bumper or coupling height to prevent cars, trucks or locomotives from accidentally entering the shaft. As an added precaution all tracks leading to cage side of the shaft from the main line are provided with spring switches and car stops or derails.

An annunciator (white panels at the right of the engineer operating the hoist controls) indicates the level from which a hoisting signal originates by flashing the level number on a white illuminated screen. This is a safeguard against the cage being moved on a signal from a level other than where the cage is located.

Various types of tripping devices are used to test the effectiveness of safety catches on mine cages. The catches are tested monthly by the drop test.

The cage is supported by two 12 by 12-inch timbers placed across the shaft at the collar. The hoisting rope is disconnected from the cage, and the tripping device is installed between the rope socket and the cage. The cage is hoisted a few feet above the timbers, the device is tripped, and the cage allowed to fall until the safety catches function.

Twenty to thirty minutes are required to make these tests and if the catches function in a drop of 3½ inches or less, their action is satisfactory.

A truck body safety block is used to block truck bodies in a raised position when repair work is necessary. This bar or rod has an angle piece welded to the lower end which seats on a cross-member of the truck frame, and the top end seats in a natural socket or angle between the body bottom and its cross-member. The body is raised, the rod put in place, and the weight of the body lowered on the bar, making it impossible to accidentally fall and injure a repairman.

Tire snap ring guards prevent serious injuries during the inflation of heavy truck tires when the snap rings have been known to fly off. Such a guard is made of aluminum, is light-weight, easily handled, and clamps to the wheel by five movable fingers which fit into the wheel openings. The fingers are operated simultaneously by a lever on the back or outside. When in place the tire is inflated but the ring cannot come off and strike the repairman.

The prevention of accidents requires constant planning and foresight on the part of every official and employee. The few safety methods and devices already discussed are only a small part of those used in the district. There has been a continual improvement in safety methods and devices, but with new equipment and new mining methods the safety engineer must keep abreast of the times. Much mining equipment is manufac-

tured without thought of safe-guards. This equipment should be inspected immediately and guards placed where necessary.

With all the guards, safety devices and safety methods used in the district there still are more than enough injuries. The open-cut mines have made some very good safety records and have quite consistently had better frequency and severity records than underground mines. This is mainly because all operations can be more closely supervised and nearly all work can be readily seen. The underground employee must look out for himself for the greater part of each shift, and he must also be a good judge of ground conditions in order to protect himself. Proper

training of employees, including supervisors, will probably do more to lessen the number of injuries in the district than anything else. This of course would be a major task, but it most likely will be a part of every accident prevention program in the near future. Safe working methods are a habit and can be developed. Every man should know how to do his work and when the foreman is in doubt he should show the man how the work is done, as well as tell him. Mechanical safe-guards should be kept in place and all equipment kept in first class condition. Supervisors should try to instill worker responsibility in overall safety programs and teach that safety goes with production.

### WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: C. E. McKnight, Mine Captain, Lake Shore Mines, Ltd.

### The Merits of Frequency and Severity Rates

By W. C. JAMES

Director, Statistical Division, National Safety Council

Frequency and severity rates are defined as follows:

Frequency rate = 
$$\frac{\text{Number of disabling injuries} \times 1,000,000}{\text{Number of Man-Hours}}$$

Severity rate = 
$$\frac{\text{Total time charges} \times 1,000}{\text{Man-Hours}}$$

From the above definition, it is evident that the frequency rate expresses the number of disabling injuries which can be expected in any period of a million man-hours, granted that the accident experience continues at the level established during the period for which the rate is computed. This interpretation is simple and direct although it involves some considerations which are not always recognized, and which I shall mention in more detail later.

The severity rate is not subject to quite such a simple interpretation. In fact, there is widespread misinterpretation of this rate in most discussions of the statistical evaluation of accident experience. Almost every-one, in response to a question about the

meaning of the severity rate, replies "It tells us how severe our injuries are." Apparently, the statement means that, in the opinion of the person defining it, a high severity rate means more severe injuries, and a low severity rate means less severe injuries.

This relationship is true when the number of injuries are the same—on most occasions, when the frequency rates are the same. Two organizations with the same frequency rate and significantly different severity rates can certainly conclude that the one with the lower severity rate has the least severe injuries. In general, the severity rate is a weighted frequency rate, in which each injury contributes a weight equal to the time charge assessed against that injury. For example, suppose we are comparing one month's experience of two plants with the same number of man-hours. In one plant two injuries, each of one day's duration, occurred during the month. In another plant, only one injury occurred, but that injury necessitated lost time of 10 days duration. If each plant had worked 10,000 man-hours during the month the severity rate of each plant would be identical.

tical, 0.50, although the severity of injury in the second plant is ten times that in the first one. True, there were fewer injuries in the second plant, but the one injury was relatively severe.

I feel that a misconception of the nature of the severity rate is largely responsible for much of the searching for a rate which will "combine frequency and severity." The severity rate does exactly that. It provides a measure of frequency which is weighted by the severity of the injuries. The contribution of a death to this rate is six thousand times the contribution of an injury with one day's absence from work and no permanent results. An amputated finger contributes 300 times the amount that a one day's temporary total disability contributes, but contributes only 1/20 of the amount that a death contributes.

In many instances, a group of firms in a competition may not want to give such heavy weights to deaths and permanent injuries. In that case they can agree to use another scale of weighting in which the spread between minor injuries and deaths and permanent injuries is not so great. The fact remains, however, that the severity rate does provide us with a measure of both the frequency of occurrence of injury and the severity of the injuries which do occur.

Another illustration may help to clarify this point. In 1946 the frequency rate of the steel industry was 7.19 and the severity rate was 1.69. The frequency rate of the coal mining industry was 61.70 and the severity rate was 10.53. By the common interpretation of these rates, it would be concluded that coal mining injuries are not only extremely frequent, but are also, on the average, more severe than those in the steel industry. But this is not the case. The average time charge per injury in the steel industry is 234 days and in the coal mining industry is 171 days per case. A large number of relatively less severe injuries will materially increase the severity rate.

I mentioned earlier that even the frequency rate must be interpreted with caution. While this is always true, it is particularly true when the frequency rate is calculated on relatively few man-hours. Probably all of you have seen the characteristic saw-tooth chart which is almost the inevitable result of tabulating frequency rates month by month, unless the establishment is extremely large.

These sharp fluctuations from month to month are not ordinarily due to any changes in the accident prevention activities, or the effectiveness of these activities in an organization. More likely, they are chance fluctuations attributable, perhaps, to the fact that a man was hit by a box falling off a head truck this month, whereas when a box fell off last month no one was hit. The fact that frequency rates are influenced somewhat by chance differences when the hours of exposure are not great should not be taken to mean that there are a lot of unpreventable accidents. Practically all accidents are preventable. Nevertheless freak accidents do occur in some months, while in other months employees escape without injury the consequences of an accident which, by all ordinary criteria, should have resulted in a disabling injury. The safety director who is elated over a drop in the frequency rate from one month to the next and depressed by a corresponding rise in the following month fails to appreciate the part played by chance factors in these differences.

Statistical methods are available for calculating the range beyond which variations in the frequency rate might be considered significant. In general, however, it is hardly necessary to use them. When rates jump up and down in saw-tooth fashion the safety director can be reasonably certain without applying complex statistical methods that the true rate, which reflects the status of accident prevention in his plant, lies somewhere between the maximum and minimum rates over the period and probably about halfway between those maximum and minimum rates.

It might be of interest to see a concrete illustration of what these variations mean. Consider a plant with 100,000 man-hours per month. Suppose this plant has a frequency rate of 20 injuries per million man-hours in the first month and 40 injuries in the second month. In terms of actual number of injuries, the change was from 2 injuries to 4 injuries, which does not seem especially significant. As a matter of fact it can be shown that with an average rate of 20, the rate could go as low as zero with 100,000 man-hours of exposure and as high as 50 without there being any real reason to conclude there had been a significant improvement or significant change for the worse in the accident prevention activities of the plant.

On the other hand, a plant operating a million man-hours per month, with the same frequency rates, would experience 20 injuries in the first month and 40 in the second. These changes are much more likely to be significant. In fact, if the true rate of the larger plant was 20 injuries per million man-hours, a rate below 10 or about 30 could well be due to significant changes in the accident prevention activities.

Similar reasoning applies to the severity rates, but the fluctuations are likely to be considerably wider because of the heavy weighting which is given to permanent disabilities and deaths. Although it is not necessary to compute statistical measures of this variation in most cases, it is certainly important that a safety director be aware of the fact that sharp changes from month to month, provided they are not always in the same direction, generally mean nothing.

I am often asked how this difficulty of interpretation can be overcome. My only suggestion is that a sufficient number of months be taken to determine a reasonable average for the plant; or to report experience regularly on a moving average or moving annual basis, dropping one month as another

is added. When this is done, a full twelve months experience is given by the rate published each month.

To summarize: There are two well known measures of the success of accident prevention activities in a plant or industry. The first of these is the frequency rate, which becomes more reliable as larger numbers of man-hours are used as a base. The calculated frequency rate may be interpreted as an estimate of the true expectancy of accident occurrence in a million man hours. For most purposes it is unnecessary to state these rates to more than one decimal point. Sometimes where competition is keen between plants it may be desirable, in order to determine rank, to extend the rate to two or more decimal places. But it should be clearly understood that rates so close together as to be distinguishable only by fractions represent no real difference in the quality of accident prevention activities.

The severity rate is a weighted measure of accident frequency. It, therefore, combines frequency and severity in the sense that both the number of injuries and the average severity of these injuries in terms of time charges are reflected in the size of the rate.

### Some Outstanding Safety Records Established in the Coal, Metal, and Non-Metallic Mining Industries

By R. G. WARNCKE

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In a discussion on the outstanding safety records achieved in the mining and allied industries consideration must be given to the diversified nature of mining in order to evaluate the record. Coal mining has the gas and dust hazard which is present to only a limited extent in other branches, while nonmetal mines encounter some hazards and conditions not ordinarily found in coal mines. Likewise, different types of hazards are found among the different operations of the same type of mining, even within the same area, due to differences in physical conditions and in methods of mining. Since the hazards and risks involved are not comparable in all branches of the mining industry, it is desirable that

outstanding safety records in each should be considered apart from those of other branches or types of the mining industry. In the following, no attempt is made to compare one record with another, but rather to point out those that are outstanding in their own branch or classification, as shown in the tabulations.

Collectively, the mining industry is considered to be the most hazardous of the major industries of the United States, and it has long been criticized because of its high rate of accident occurrence especially in connection with fatalities. These criticisms are largely justified when comparisons are made with other major industries, for mining has an



accident frequency rate about seven times that of the average of about 38 major industries of this country, as based on reports of the National Safety Council including both coal and noncoal mines up to 1945. In 1945 mining was separated into coal mining and noncoal mining, and noncoal mining ranked 39th out of 40 industries listed, being exceeded by coal mining which ranked last, with a severity rate of 11.94, or more than twice that of noncoal mining with a rate of 5.56, while the average of the 40 industries was only 1.16. In frequency rates coal mining was almost 10 times that of the average for all industries and about 2½ times as great as noncoal mining. However, consideration must be given to the fact that a mine worker encounters essentially all of the risks of work in other industries plus numerous additional hazards found only in mining.

As dark as this picture may seem for the mining industry, there are many bright spots to show that concentrated efforts are being made to place safety in its rightful position in the operation of mines. A major disaster, especially if it is an explosion, usually causes a flood of adverse publicity, a clamor for a change, and many of the shortcomings of operation and maintenance are exploited and very frequently magnified with the result that the whole industry is put in the proverbial "doghouse." These occurrences always overshadow the sincere efforts of those who have tried to make mining a safer industry and little or no publicity is given to those mines that have made outstanding records. It thus appears that the mining industry receives the "brickbats," but few, if any plaudits of the general public. Many of the achievements made in safety in the mining industry compare with and a few surpass those of far less hazardous industries, and this paper gives some information concerning those records.

The Joseph A. Holmes Safety Association has in a limited way been trying to bring the good safety records and accomplishments of the mining industry before the public through the presentation of suitable awards. This association, organized in 1916 and composed of about 39 national organizations of mining, metallurgical, and allied industries or organizations interested in the forwarding of safety, was created to bring safety in the mining industry before the public and to stimulate interest in the safety movement in the min-

eral industries. This is being accomplished in part by recognizing good safety records in the mineral industries through the granting of suitable awards. From 1919 to 1947 awards were issued only for heroic action or service of individuals, but in 1947 it was decided that awards also should be made for exceptional safety performance of individuals, organizations, or parts of organizations connected with the mineral industries. Since that date the association, under the guidance of D. Harrington, who, as secretary, was the "parting" of the organization, has issued 1,516 awards for meritorious safety records to mines, plants, companies, associations, and individuals in the mining and allied industries during the 30-year period 1917-1947.

The 1947 awards are only a small percentage of the number of records studied and screened before the awards are made. Annually, several hundred records are submitted for consideration by the members of the Safety Award Committee, who, after reviewing all known conditions, select the best records for awards. The records of those selected are again checked by inquiries in every case before the awards are issued, thus establishing an authentic record in every case.

The records and files of the Joseph A. Holmes Safety Association were studied for the records appearing in this paper as they were the only available source of information that cover the safety performance of the mineral and allied industries to any considerable extent. Some records probably surpass those that follow, but this study was made strictly from the files of the Joseph A. Holmes Safety Association.

Miners usually are fatalistic and this designation probably applies to many, if not most of those engaged in management, as it is (or at least has been) a fairly general belief that a certain percentage of men working underground will sustain injuries, in many cases of a fatal nature. This fatalistic attitude is gradually being superseded by the idea that by the use of the right amount of the right kind of effort, mine accidents of all kinds can be reduced very greatly.

The record indicates that 189 individuals have worked for 50 or more years in and around mines without sustaining a lost-time injury. This is a marvelous feat for any kind of work, and when it is known that these 189 individuals have been able to work 50 or more years without a lost-time injury, the

question arises: Why can't others do as well?

TABULATION GIVING INFORMATION AS TO MINES WORKERS WITH 50 OR MORE YEARS WITHOUT AN ACCIDENT

| Years Worked | No. of Individuals |
|--------------|--------------------|
| 50-54        | 106                |
| 55-59        | 34                 |
| 60-64        | 19                 |
| 65-69        | 5                  |
| 70-74        | 5                  |

These 189 men worked in coal and noncoal mines in several states and their activities cover practically all types of working conditions.

In 1946 a large coal-mining company in Western Pennsylvania submitted detailed data concerning 197 employees who had worked more than 35 years in and around coal mines without a lost-time injury; 17 worked from 30 to 34 years, 19 from 45 to 50 years, 60 from 40 to 44 years, and 101 from 35 to 39 years. For those who are statistically inclined, this gives a total of 7,999 work years or approximately 16,000,000 man-hours without a lost-time injury.

Smaller records, although few, if any, as outstanding as the above, have been made by several coal mining companies. Achievements of this type tend to disprove the idea that all underground workers are sure to be injured and very often a mine can be made only as safe as its workers will permit. Evidently the above individuals believed in working safely and practiced safety throughout their working careers, and unquestionably this paid ample dividends to the employees as well as to the employer and his family.

In selecting outstanding safety records in the mining industry a discussion of what constitutes outstanding records is in order. The industry is large and scattered and it has many branches, some of which are somewhat similar, but others very greatly. Thus a record that might be considered outstanding in one branch or type of mining might be fair or even poor in other types. A fairly representative picture of outstanding records is obtainable by placing mines or companies having more or less similar methods and conditions under the same classification. In general, two types of records are given under each classification: (1) those established on a no lost-time basis; and (2) those based on periods of non-fatalities; also consideration to

production achieved with minimum loss of life, limb, or suffering due to accidents.

The duration of the period, the number of men employed and the man-hours of exposure are all considered either singly or together in selecting the outstanding records. The amount of material mined is given where available in metal mining, while in coal mining, the tonnage of coal mined, without fatal or other accidents, was generally used in selecting the most outstanding records, because in most cases reasonably accurate data on man-hours of exposure were unobtainable.

During the past 30 years the iron-ore mines and mining companies in the Lake Superior Region received more than 85 per cent of the awards issued to the metal mines and metal-mining companies of the United States. Metal mines in other sections of the United States have established many creditable safety records but relatively few have been brought to the attention of the Joseph A. Holmes Safety Association as compared with those from the Lake Superior Region.

Some underground iron mines in this region have operated from periods varying from 1 year to nearly 3 years without a single day being lost by any worker on account of injury. Some of these mines have had more than one period of accident-free operation, other ones of which would be outstanding, and some mines have had periods of several months to a year without an accident.

A mine with a small number of employees can be worked as safely as a larger mine. In general this is unusual since the small mine is usually accident-free; in fact, the small mine is usually an accident offender. However, it is notable that the mines with the smallest number of employees have the longest accident-free periods, indicating that small mines can be operated safely.

Some of the open-pit iron mines have made outstanding records by operating periods of no lost-time accidents ranging from 2 to 11 years while one mine operated over 17 years with only a lost-time accident.

The Hall-Rust Mine of the Oliver Iron Mining Company has a remarkable record in this group in that it worked 2 years and 7 months with a total of 1,514,996 man-hours and handled nearly 20,000,000 tons of material without a lost-time accident.

Four of the open-pit iron mines in this group have a small number of employees and again it is shown that small operations can be con-

ducted safely. These mines worked from over 5 years to nearly 18 years without an accident and the man-hours of exposure during this period compare favorably with the larger mines when the number of employees is considered. The Richmond Mine worked 30 employees eleven years without an accident and in a 19-year period the mine had a severity rate of only 0.01.

So many of the open-pit iron mines in the Lake Superior District have worked one or more years without a fatality that it was difficult to select the outstanding records; however, any record of operating over 15 years without a fatality should be considered outstanding. The Cleveland-Cliffs Iron Company has worked 5,225 employees for nearly 8 years with a total of 12 1/4 million man-hours without a fatality.

The Mahoning Mine handled nearly 47 million tons of material in 12 years, 8 months, while the Scranton Mine handled more than 27 million tons in 23 years, 5 months, both without a fatality.

These very excellent safety records made in both the underground and open-pit iron mines of the Lake Superior District show the effectiveness of well-rounded safety programs. This district has the most active section of the National Safety Council, devoted to the prevention of accidents in the mining industry. Safety meetings are held monthly and attended by officials, supervisors, and workmen. The interest in safety has permeated the whole working force from management to worker and the operations of these mines are performed in accordance with printed safety rules, well-guarded machinery, personal protective equipment, and the use of innumerable safety devices.

Outstanding records have also been made in the field of safe operations of open-cut copper mines. The Utah Copper Company handled 75 million tons of material in 11,000,000 man-hours in a 3-year period without a fatality.

The safety achievements of two bituminous strip mines which moved 98 million tons of overburden within a period of nearly 7 years without a fatality in Mine No. 11, United Electric Coal Company, Illinois, is a feat difficult to surpass. The vast difference in tonnage of overburden handled, 98 million by Mine No. 11 in Illinois to 15 million by the Rosbead Mine in Montana in comparison to the tonnage of coal produced, is a good illustration of the different conditions encountered in mining the same product at different locations. Both safety records are so good as to be entirely out of the ordinary.

Underground metal mines have also operated long periods without fatalities. A study of the available figures shows that safety is not bound by geographic limits to one section of the country but is obtainable by application of suitable effort throughout the industry as shown by the outstanding records made in different sections of the country.

One remarkable safety record in this group is that of the Miami Copper Company, Miami, Arizona, in raising of 15 1/4 million tons of ore from an underground mine with a total of 602 employees working more than 5 1/2 million man-hours in a 6 1/4-year period without a fatality. The Empire Mine, Grass Valley, California, a gold-producing property, worked 7 1/4 years with more than 4 million man-hours without a fatality. The Climax Molybdenum Company, Climax, Colorado, mined 7 1/4 million tons of ore in 1 1/4 years without a fatality. The records of these three mines producing different ore under entirely different working conditions illustrate the remarkably good results obtainable from active safety programs.

The records of iron-ore mines in this group are outstanding not so much on the basis of man-hours worked but on the duration of the record. The Davidson Ore Mining Division, Iron River, Michigan, worked the mine from its opening in 1910 until it was closed in 1943 or nearly 33 years without having a fatal injury. It produced a little over 2,000,000 tons of ore and gives an excellent example of long-time safe operations of a small underground metal-mining property.

Some of the most outstanding records established in the mining industry have been made by cement plants and quarries. The making of these records are almost entirely the result of the continuous safety campaign carried on for over 20 years by the Portland Cement Association for its member plants. The activities of this association and the marvelous safety achievements resulting from those activities constitute a concrete example of the effectiveness of a well-coordinated and consistently applied accident prevention program.

In 1925, when the Portland Cement Association inaugurated its definite plan, not one of the plants operated without a lost-time

injury. Since that date and through continual safety training, a safety record of less than 1,000 days without a lost-time accident is not considered a very great feat, as many of the member plants have worked more than 1,000 days, several with more than 2,000 days without a lost-time accident, and more than half of the 125 or more member plants have had 1 or more years of operation without a lost-time accident.

The most marvelous safety record in the cement industry and believed the best in the whole mining industry is that of the Iola Plant of the Lehigh Portland Cement Company, Iola, Kansas. This plant worked 12 years 9 1/4 months with an exposure of 3,579,883 man-hours in producing more than 30,000,000 sacks of cement without a single lost-time accident. This record is believed to be so exceptional that it is likely to be many years before it is equalled. At one of the smaller plants, the No. 2 Quarry, Clinchfield, Georgia, worked 2 1/2 years over 14 years without the loss of a single day from injuries.

The Ironton mine, Alpha Portland Cement Company, Ironton, Ohio, worked 8 years 4 months with a total of 677,007 man-hours without a lost-time accident. While not connected with the cement industry, the No. 5 Limestone Mine, an underground limestone mine operated by the Tennessee Coal, Iron & Railroad Company, Muscoda, Alabama, established one of the best safety records for any underground nonmetallic, noncoal mine in working 919,287 man-hours in 5 years 8 months without a lost-time accident.

Coal mining is not only the most hazardous branch of the mining industry but it is considered the most hazardous of the major industries, not only in the United States but in all countries that produce coal in quantity.

The rates per million man-hours or per thousand persons employed for both fatalities and nonfatalities in either anthracite or bituminous mines exceed by far the rates found in the other branches of the mining industry. Although the rates in coal mining may never reach those of the other branches of mining, definite progress is being made in safety and the fatality rates for 1946 were the lowest in the history of the industry. Although there has been a steady decline in the rates for a number of years, they are still too high and need a more determined effort on the part of both management and labor for a greater reduction in accidents.

Coal mining has changed greatly in the past two decades, and the older hand methods of mining have been largely supplanted by labor-saving devices and machinery. The application of these machines has the advantages of concentrating the responsibility for safety in the hands of a relatively few instead of many as in older methods of mining; at the same time, maintenance and supervision must be considerably intensified because the hazards are greatly increased in many ways.

Far too many coal mines are operated in the belief that coal mining is so inherently hazardous that accidents will inevitably continue to occur. Coal mining can be conducted for long periods without fatalities and even without lost-time accidents. Many mines have worked from 12 to 31 months without a lost-time accident. An outstanding record was made by the Russellton Mine, Republic Steel Corporation, Russellton, Pennsylvania, which operated for a period of 15 months with 448 employees working 1,165,284 man-hours in the production of 841,072 tons of coal without a lost-time injury. This record is the more remarkable in that it was made during the war years when the industry was handicapped by loss of the younger, and in many ways more capable, mine workers to the armed forces and to higher-paying war jobs, and the inability to replace or repair equipment, much of which was practically worn out or out of date. The record of this mine exceeds any other known accident-free record in underground coal mining on the basis of both tonnage mined and exposure. This mine was operated on a 31 per cent mechanical-loading and 69 per cent hand-loading basis and about 70 per cent of the coal was from pillars.

Several underground coal mines with employment up to 500 persons had periods of 90 lost-time operation exceeding 500,000 man-hours.

Of the smaller mines, the Hellier No. 2 mine, Caudill Ward Coal Company, Hellier, Kentucky, worked 31 months with an exposure of 269,250 man-hours in the production of 251,042 tons of coal with a total of 43 employees without a lost-time accident from an operation 100 per cent mechanized. Several other mines, with fewer than 100 employees, had accident-free records for periods of 12 to 24 months.

The Alloy mine, Electro-Metallurgical Com-

pany, Alloy, West Virginia, operated 34 months without an accident in mining 323,619 tons of coal in 682,979 man-hours. This is the longest accident-free period of any available record in the coal-mining industry.

These outstanding safety accomplishments are much more impressive when it is considered that during the years that the records were made, 1931 to 1946, from 94.93 to 60.27 men were injured for each million man-hours worked while from 152.32 to 82.71 were injured for every million tons of coal produced in bituminous coal mining in the United States as a whole.

Some very creditable no-fatality records have been established in the coal-mining industry in the past 17 years. Not many years ago it was thought impossible to mine a million tons of coal without a fatal accident; in a study of the no-fatality records in the files of the Joseph A. Holmes Safety Association, it was found that 394 awards were given to coal mines for having mined more than a million tons without a fatality. Several of these may have been duplication having had the record run for two or more years. The tonnage of the 394 awards were divided as follows:

| Tons without a fatality | Number awards |
|-------------------------|---------------|
| 1 to 2 million          | 227           |
| 2 to 3 million          | 118           |
| 3 to 3½ million         | 27            |
| Over 3½ million         | 20            |

A table was compiled from the best records of mines that produced more than 3½ million tons selecting those that had both the highest tonnage and the most years of duration, fatality-free. The mines in this table are fairly representative of the coal fields in the United States and under varied conditions of mining. The duration of the fatality-free records ranges from 2½ to 21½ years and from approximately 4¼ to 10½ millions man-hours of exposure.

The best record in this table is that of the Ford Collieries Company, Curtsville, Pennsylvania, which worked for more than 9 years or a total of 10,451,398 man-hours in producing 7,770,651 tons of coal. This record is exceptional also due to the time that the record was made from 1930 to 1939, in the early days of the safety movement when relatively few coal mines paid much attention to safety.

The record of Mine 58, Peabody Coal Company, Taylorville, Illinois is one of the best of the known records established in recent years; this mine operated from June 1941 to March 1947 for 5,175,335 man-hours in the production of 7,031,035 tons of coal with 430 employees in a 100 per cent mechanized mine without a fatality.

The longest-known no-fatality record of the larger or medium size coal producers was established by the Odin Coal Company, Odin, Illinois, which worked over 21 years for a total of 8,120,284 man-hours in producing more than 4 million tons of coal.

The Penn Anthracite Mining Company, Scranton, Pennsylvania worked for over a year in producing 2,027,461 tons of coal in a total of 5¼ million man-hours, an exceptional record for anthracite. At the time this record was made 4½ men were killed for each ton of anthracite mined by the anthracite industry as a whole.

The Pine Hill Coal Company, Misenville, Pennsylvania, was the first anthracite mine to produce a million tons of coal without a fatality insofar as shown by the files of the Joseph A. Holmes Safety Association; this record was the result of a definite safety policy adopted by the company, which included safety meetings, adoption of a safety code, and the enforcement of safe practices. Thirteen different coal beds ranging from 3¼ to 16 feet in thickness and pitching from 0 to 90 degrees were mined at this property.

Falls of roof or coal cause 50 or more per cent of the fatalities and about 35 per cent of the nonfatalities in coal mines year after year. It is one of the few causes in which relatively little progress has been made in accident prevention in the coal mines of the United States. However, some mines have accomplished what is considered the impossible by far too many in the mining industry—the prevention, or at least the material reduction, of roof-fall injuries.

It is interesting to note that, with a few exceptions, the records mentioned were made before the war, several before 1935 when both the fatality and nonfatality rates were considerably higher than for the past 6 or 7 years. A definite reason cannot be given for this, but it may be due to the reduction in training and discipline in the past 10 years. Prior to 1937 or 1938 most coal-mining companies provided first-aid training for their employees, but since the passage of some law

which were interpreted as penalizing off-shift training plus the effect of the war in restricting the holding of meetings to conduct training, because of fatigue of workers, shortage of gasoline and other travel restrictions, first aid and other types of safety training in and around coal mines almost disappeared. It has been definitely proved that first-aid training is one of the best methods of interesting a worker in safety and making him safety conscious; hence, the very great decrease in this work during the past decade has had a decidedly detrimental effect on certain types of mine accident-prevention work.

The records established by the mines and companies and individuals in the preceding discussion indicate that accidents in the mining industry can be very greatly reduced even though they probably can never be eliminated. These records were the results of in-

teigent planning, and of intensive effort and training on the part of management and the cooperation of workers who believed that accidents can be very largely avoided even if they cannot be entirely prevented. The mines and individuals establishing these safety records have shown what can be achieved by education together with a willingness of all concerned working together in a joint effort toward benefiting not only all persons in the mining and allied industries but also the entire public.

The records discussed here indicate what can be done and have more or less established a goal for the whole mining industry to surpass or equal; certainly the mining industry can do as well in the future as it has done before; with equal certainty, the coming years could bring safety accomplishments far exceeding those achieved in the near or far distant past.

### East Malartic Mine Fire

By M. O. LAFONTAINE

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Shortly after 1:00 A.M., on April 24th 1947, an underground fire in No. 4 shaft of the East Malartic mine caused the death of twelve shaftmen and involved a material loss of approximately \$750,000.

East Malartic is a gold mine located in Eastern Canada, in the Western section of the Province of Quebec. In normal times, the Company, which employs around 400 men, has a daily milling capacity of 1500 tons.

Underground operations at East Malartic are being carried out to a depth of 1760 feet through a four compartment vertical shaft known as No. 5. Levels have been established approximately 150 feet apart. The tenth or 1520-foot level, is the bottom operating level.

Two years ago, it was decided to provide the mine with a new shaft, known as No. 4, including a modern reinforced concrete headframe and surface plant which are now partially finished. No. 4 shaft, inclined at 64 degrees and measuring 10' by 25½ feet in section, has five compartments. Pilot raises were first driven from the 2nd, 4th, 6th, 8th and 10th levels. The shaft was then slashed to its full dimensions and timbered. For fire

protection, a fog nozzle system was nearly completed from surface to the 8th level.

The British Columbia fir, used for timbering, and peeled logging of local timber (mostly spruce) used for packing the hanging wall, have been treated by immersion in an Omocite solution, which is advertised as a wood preservative and fire retarding chemical.

On the day of the fire, No. 4 shaft was still being sunk and the bottom was 619 feet along the incline below the 10th level. Stations had been cut on the 11th and 12th levels. No. 4 shaft was strongly downcast while No. 5 was upcast. From the 10th level to the bottom No. 4 shaft was ventilated by a differential air flow.

On the 10th level, Nos. 3 and 4 shafts are approximately 1400 feet apart. Haulage was carried out with a 250-volt D.C. trolley locomotive, the trolley line going only as far as the North compartment of No. 4 shaft. A 550-volt junction box protected with NOFUX circuit breaker and a 550/110/220 volt 25 KVA air cooled transformer are located 85 feet from No. 4 shaft. The lighting distribu-

tion panel is situated 110 feet from No. 4 shaft. The following were on the lighting circuit: station lighting through a 3-conductor No. 10 Spencer cable; lights at the hoists through a 3-conductor No. 12 Teck cable split in two circuits and the floodlight at the bottom of the shaft through a 110-volt 3-conductor No. 12 type S cable. Another circuit also protected by plug fuses in the distribution panel, included lights on the 11th and 12th stations, and the hoisting signal system consisting of the buzzers on the deck, 10th, 11th, 12th stations and also at the 13th level. Lights at the deck were on a direct circuit connected to the distribution panel.

Because of the delay in the delivery of machinery and equipment, the main hoisting plant on surface was not quite completed, and a temporary sinking arrangement had been provided underground. One hundred and eighteen feet above the 10th level, two air hoists had been installed in Nos. 2 and 4 compartments.

Thirty feet below the hoists, a slash in the footwall of the shaft provided the space required for the temporary deck. From the deck down to the 10th level, Nos. 3 and 5 compartments had been lined and were used as bins to dump the rock hoisted from the bottom of the shaft. The foot wall and hanging wall were double lined with 4" lagging so that no rock would spill alongside a chute into the shaft. The hoisting was done in a bucket suspended on a carriage rolling along an I-beam fastened to the hanging wall. Both bins were equipped with a steel chute gate operated by a compressed air cylinder. The rock was pulled at the 10th level station and trammed to No. 3 shaft. A 1/2 inch water hose was connected and hung coiled to a post fifteen feet from the shaft.

In order to protect the sinking crew from the cold air coming down No. 4 shaft, a small temporary lunchroom, measuring 8'0" wide by 14'0" long, had been built adjoining the South compartment of the shaft. The posts and caps were made of 8" by 8" timber. The floor and outside walls consisted of 2" by 8" planks, while the roof was made of peeled 4" lagging. The benches around the lunchroom were also built with two inch plank. The open space above the lunchroom between the wall rock and the top of No. 5 or South chute had been sealed tight with lagging so that there would be no possibility

of anything dropping into the lunchroom or in the shaft. Two 100 watt electric bulbs were connected to a 250/110 Spencer Cable, hung under the lagging roof. A wall phone, placed on the 8" by 8" post in the South-West corner of the lunchroom, was enclosed in a wooden box measuring approximately 10" by 12" by 18" in which were stored a galvanometer and a box of hot wire lighters.

A weather proof socket holding a 40 Watt electric bulb was lying on the bottom of the box to keep moisture away from the phone. This socket was connected to a cable cable, type S, entering the box through a hole in the bottom, going up along the post, running on top of the lagging roof, and spliced about 14 feet from the lunchroom into the 250/110 Spencer cable of the station lighting circuit.

On April 29th, 1947, the shaft sinking crew of 16 men, 2 hoistmen and 1 deckman, assembled in their lunchroom at No. 4 shaft station by 11:40 p.m. One hoistman climbed to his hoist, 118 feet above the 10th level, and hoisted the other hoistman and the deckman to the deck just below the hoist. As usual, the remainder of the crew, while waiting, placed their lunch pails on a shelf; some ate an apple or an orange and most of them lit cigarettes. Since their duty was to "muck out" the bench, blasted at the end of the previous shift, the others were not needed and several men left them on the bench in the lunchroom.

Around 12:01 A.M., April 29th, the shaft leader and 15 shaftmen would be working at the shaft bottom, six cleaning the blasting set. Practically no scaling was required. They were mucking on both side of the shaft bottom and the work was proceeding satisfactorily.

As was his custom, the shaft leader rode on one of the buckets and came up to the 10th level station, arriving there around 12:30 A.M. He then walked to No. 3 shaft for a pail of drinking water and, on his return, rested at the station for about five minutes. The shaft leader was a non-smoker. Around 12:05 A.M., he went to the shaft bottom for the second time.

The fire must have started in the lunchroom, shortly after, and must have been sudden, for around 1:15 A.M., a chute puller on the 10th level smelt smoke 100 feet from No. 4 shaft.

At 1:20 A.M., the shaft hoistmen and the

deckman smelt smoke at their working places, 100 feet above the 10th level station; a sudden puff of smoke with intense heat followed immediately and the lights at the hoist went out as a warning signal. One hoistman jiggled No. 1 bucket several times at the bottom of the shaft and the three men left their stations, climbed to the 8th level and went to No. 3 shaft. The alarm was immediately given to surface by phone. One hoistman waited for an All Service gas mask on the 8th level and returned to his post at the hoist around 1:30 A.M.

The first sign of trouble at the No. 4 shaft bottom was when the floodlight went out. When Strand, one of the shaftmen and at one time a hoistman, saw No. 1 bucket being jiggled, he suggested they get out. Someone replied that the hoistman might be playing with the bucket. The two spare buckets were then mucked full with the floodlight out. The electric buzzer signals still worked, but there was no response by the hoistman.

Probably around 1:25 A.M. the shaft leader started to climb the ladders from the bottom to find out why the hoisting signals were not being answered. The rest of the shaftmen smoked and joked for a period estimated at 15 minutes. Around 1:40 A.M., they all noticed a faint smell of smoke. Strand took to the ladder and said "It's time to get out." The others did not follow immediately.

At this time, the shaft leader was probably around the 12th level (242 feet above the bottom) where, after taking a rest he resumed his climbing of the ladders. When he reached the 11th level station, the danger signal of 3 bells was given on the electric buzzer by the hoistman who had come back to his post with an All Service mask. The shaftleader came out at the 10th level station and found dense smoke, which he described as rolling just below the 10th level. He managed to find his way through thick smoke and arrived at No. 3 shaft around 2:00 A.M.

During this time, shaftman Strand, continued climbing and on reaching the 11th level, found the smoke very bad, indicating that the natural ventilation of the shaft was bringing the smoke down fast. He hesitated about taking a rest at the 11th level. On approaching the 10th level, he found the smoke even worse. He closed his eyes completely, covered his face with a wet rag and managed to crawl on his hands and knees to No. 3 shaft.

After giving the danger signal, the hoistman who had returned to his post, hoisted the bucket slowly from the bottom, and two other shaftmen rode up on the loaded bucket. One got off on the 10th level; and losing his way in smoke, he went past the No. 3 shaft crosscut into a dead end, where he turned on an air valve and collapsed. He regained consciousness 2 hours later and came out through No. 3 shaft around 5:00 A.M. The second shaftman, riding the bucket, was hoisted to the sheave wheel 120 feet above the 10th level, because the hoistman could not see the indicator and had to feel his way. Both men then climbed together for a distance of 240 feet to the 8th level where the hoistman collapsed. The shaftman went towards No. 3 shaft where he was assisted by two timbermen. The same timbermen then returned to the No. 4 shaft station and rescued the hoistman. At 2:10 A.M., the shift boss, on the lower levels, was warned of the fire. He checked off his crew and went to surface at 2:20 A.M. The shift boss on the upper levels, was also warned of the fire and at 2:45 A.M., his whole crew was back on surface.

Around 2:45 A.M., two men returned on the 10th level equipped with All Service masks. Very dense smoke and a slight glow was observed at the No. 4 shaft station. The masks were not giving them enough protection and they had to turn back.

At 4:00 A.M., one shaftman was found dead on the 10th level approximately 600 feet from No. 4 shaft. He was the last of the shaft crew that had managed to climb to the 10th level.

After several attempts from 2:30 to 5:00 A.M., a 2-inch water line with fog nozzle was installed on the 8th level, No. 4 shaft. Cage-tenders at No. 3 shaft continued making trips in All Service masks to check the possibility that one or more of the 11 shaftmen entrapped had managed to reach the station.

No one at East Malaric was capable of wearing self-contained oxygen breathing apparatus. A Rescue Crew of 16 men arrived at 7:00 A.M. from Noranda, located 35 miles away. Their main equipment consisted of 5 McCaa's, 3 All Service masks and one oxygen pump. Five other men trained in Mine Rescue also came from the Val d'Or district. The situation was then as follows:

One man was out dead—eleven shaftmen were trapped in No. 4 shaft below the fire



on 10th level—the lower underground workings were very smoky—the ventilation doors on the different levels were in questionable positions—there was no smoke on the 2nd and 4th levels. No. 4 shaft collar had been sealed to cut down the oxygen supply at the fire. Plans, while accurate, did not show the location of grizzlies, chutes, air and water valves.

The first crew of three men was sent down No. 3 shaft to the 10th level at 7:15 A.M. approximately 6 hours after the fire had started, and a second crew at 8:30 A.M. These two crews managed to complete a life line 1,200 feet long on the 10th level from No. 3 to No. 4 shaft. There was no more fire in the lunchroom, but the siding of the chute adjoining the lunchroom was smouldering and flames were visible 10 to 12 feet above. A 1½ inch water hose connected at the station was directed towards the flames and tied to a shaft post. The water pressure was sufficient to reach only about 15 feet up the shaft. One man hammered the air line running down the shaft but received no reply. Compressed air was blowing below. The air line had probably been open at the 11th station by the trapped men. The fact that no reply was received indicated the possibility that the trapped crew was already dead or unconscious.

The third rescue crew consisted of 2 men equipped with McCaa and 2 with the new type of Chemox ¼ hour breathing apparatus. This crew was to attach a fire hose through an adapter to fight the fire. This objective could not be reached until several hours later, for, the crews experienced considerable delay to find the valves and to increase the water pressure. Visibility became nil and the fire was gaining in intensity.

The smoke had gradually filled the whole mine and several hours were spent in trying to close ventilation doors to short circuit the smoke. By 6:00 P.M., it was decided to take no more risks, for, the supply of carbon dioxide had been used several times. In addition, the Noranda and Val d'Or crews were played out and several men were under the doctor's care.

At 7:00 P.M. another rescue crew of 23 men arrived from Kirkland Lake, Ontario, equipped with 12 McCaa and 12 Air Service masks with accessories. Since it has not been possible, up to that time, to maintain contact with the fire, the objective of this crew

was to close all doors on the connecting levels, except the 10th level, thus slowing down the burning rate of the fire and, if possible, to fight the fire from the 8th level. No. 4 shaft was to be kept downcast at least from 8 to 10.

Around 9:00 P.M. a series of tests on the different levels disclosed the following condition of the air:

| Level | CO      | Oxygen     | Remarks                         |
|-------|---------|------------|---------------------------------|
| and   | 0.3%    | good       | No. 3 shaft upcast              |
| 4th   | 0.2%    | good       | Good ventilation and visibility |
| 8th   | 2 to 3% | deficiency | Smoke very dense                |
| 8th   | 3%      | deficiency | Visibility nil—smoky            |
| 10th  | 4 to 5% | deficiency | Smoke very dense                |

Nine successive crews were sent down to close the ventilation doors on the 6th level. This level was found tricky to travel and several crews had to turn back on account of going in the wrong direction and because of the collapse of members of the crews.

During the night 17 men arrived with their equipment from Timmins and joined the Noranda crew, starting at 7:00 A.M. April 25th. At 7:00 P.M. the doors on the 6th level had been checked and blocked; several cases of dynamite and blasting caps were removed from the 8th and 10th levels and a fire hose with a ¾ inch nozzle was finally connected to a two inch water line on the 10th level but the pressure was too low to reach the fire approximately 40 feet above the 10th level.

From 7:00 P.M. April 25th to 7:00 A.M. April 26th, the night shift reinforced by 5 teams from Sudbury, Ontario, managed to improve the water pressure at the 10th level and tied the water hose on a ladder directed towards the fire. After a while the pressure lowered again. The fire was blazing brightly with a considerable amount of rocks and burning embers falling on the 10th level. Around 9:00 A.M. April 26th, the main 6" air line broke in No. 4 shaft with the result that the intensity of the fire was immediately increased and No. 4 shaft became strongly upcast. At this time an explosion lifted the bulkhead on No. 4 shaft collar, which was immediately resealed and the ventilation door on the 10th level was closed and sealed.

Two hours later a second explosion forced a few of the ventilation doors open, and the

bulkhead, at the collar of No. 4 shaft, was again lifted. The seal was reinforced by adding sand and clay. Two other small explosions occurred during the day. At 8:00 P.M., April 26th, five members of a rescue crew, attempting to reach the ventilation door on the second level, were blown to their knees by a terrific explosion, forcing the team to return to surface. This last explosion had again lifted the seal at the shaft collar. Underground work was becoming too hazardous, especially since all hope of bringing the eleven entrapped shaftmen alive, was given up.

Measures were then taken to seal off the whole mine from surface and to introduce water into No. 4 shaft.

From Sunday, April 27th, to Thursday, May 1st, the rescue crews were checking the oxygen and carbon monoxide content of the air at various places from surface, while water was poured down the mine. Temperature and CO content were taken through an existing pipe line in No. 4 shaft, where the average carbon monoxide content was approximately 0.50 per cent. The temperature readings at No. 4 shaft averaging 45° Fahrenheit and remaining constant, it was decided that the fire was out; following this decision, the mine was gradually reopened, beginning about 5:00 A.M. on May 1st. Ventilation was to remain as it was previous to the fire: No. 3 shaft downcast and No. 3 upcast. Details of the first operations were as follows:

| Date    | Time       | Remarks                                                                                         |
|---------|------------|-------------------------------------------------------------------------------------------------|
| May 1st | 3:15 A.M.  | Opened 4" air line at No. 4 shaft—still downcast.                                               |
| "       | 4:30 A.M.  | Opening of 3½ square feet at No. 3 shaft—upcast—CO = 0.3 per cent—no smoke—air cold.            |
| "       | 4:45 A.M.  | Turned on water in 4" line No. 4 shaft—Air at No. 3 shaft still cold and clear—strongly upcast. |
| "       | 6:00 A.M.  | Turned off water of No. 4 shaft—draft strongly downcast.                                        |
| "       | 11:00 noon | Manway completely opened at No. 4 shaft—still heavily downcast.                                 |
| "       | 12:30 P.M. | Surface raises and No. 3                                                                        |

shaft completely opened—CO in No. 3 shaft from Nil to 0.05 per cent.

May 1st 5:00 P.M. Dropped 50 cc. of Ethyl Macaplan into the air flow of No. 4 shaft.

" 5:25 P.M. First smell of Ethyl Macaplan in No. 3 shaft bulkhead.

" 5:30 P.M. As a precaution, water was run down the 4" fire line at No. 4 shaft for 10 minutes in every hour. Ventilation was continued all night.

On May the 2nd, the carbon monoxide content at No. 3 shaft collar varied from 0.01 to 0.05 per cent and rescue crews started to return underground to check ventilation doors on different levels. The highest carbon monoxide reading was 0.75 per cent. It was impossible to go down on the bottom level for the mine pump was out of order and the level was flooded. Water was halted at No. 3 shaft.

On May 3rd, the quantity of air coming out of the mine was gradually reduced until 5:00 A.M. when it became almost balanced. A No. 7 Sirocco blower powered by a 20 H.P. motor and driven at approximately 800 r.p.m. was installed at the collar of No. 4 shaft.

During the following 3 days, the underground conditions improved, and pumps were installed to remove the water from the 10th level. Approximately 7,000,000 gallons of water had to be taken out.

The first trip down to the scene of the fire took place on May 19th, three weeks after the fire.

On June 25th, and 26th, 2 months after the fire, ten of the bodies were recovered on the 11th level station. The last body was found fifty feet below the 11th level. A blood analysis of the victims disclosed that death was caused by carbon monoxide.

All shaft timber except the bearing sets at the 10th and 11th level station, had been burned or knocked down over a distance of 600 feet. This meant that approximately 200,000 board feet of timber had been affected in the shaft.

An 8" by 8" post, forming the North section of a ventilation door frame, and located approximately 300 feet from No. 4 shaft on



the 10th level, had apparently been blown out by an explosion.

At the 10th level station, the shaft compartments, chutes and lunchrooms were still in place. Rocks, timber and debris had flooded out into the station. Both, the mainway and North sinking compartment at the station, showed no evidence of burning, but there was damage from falling material. There was intense charring on the South chute side.

The outside wall of the lunchroom was undamaged, but the inside was badly charred. The roof, consisting of 4" lagging, was completely burned. The phone had been burned off its support and the 8" by 8" stringer above the phone had been burned through, indicating intense heat at this point. On the floor, the remains of the phone, the galvanometer, several hot wire lighters and the remnant of a light bulb, including the base and socket, were found near the post where the telephone box had been located. The remains of the light bulb were later positively identified as being from a 40-watt 120-volt lamp, destroyed by intense heat only.

The remnants of several burned oilers left in the lunchroom by the shaftmen were found in two different locations on the benches. Most of the flooring and the lower parts of the benches were sound.

The only electrical fuses found blown were the two 30 ampere fuses feeding the Spencer cable, which supplied the 10th level station, the lunchroom lighting, the shaft bottom floodlight and the lights at the hoists. Other fuses at the distribution panel might have been blown, but the power had been turned off at 6:30 A.M. on the day of the fire. The examination of the electrical circuits indicated that the source of failure was in the lunchroom.

There is no doubt that the fire originated in the lunchroom a few minutes after 1:00 A.M. when the shaft leader left the station to go to the bottom of the shaft. It does not appear that the fire was due to a short circuit, because the two hoistmen, and the deckman, who were standing more than 100 feet above the lunchroom, wore at the instant that they smelt smoke first and that the lights at the hoists went out at the same time or immediately after the smoke had reached them. This would imply that the flames, which originated in the lunchroom, from an unknown source, had been going

on for several minutes; by the time the smoke reached the hoists and dock, the fire had burned off the insulation around the electric cable in the lunchroom, thus causing a short circuit and cutting the lights off of the whole circuit. Why did the fire spread so rapidly? The lunchrooms had been washed out with a water hose about 12 hours before the fire; the broken rock dumped in the chute compartment adjoining the lunchroom is always wet. But on the other hand the roof of the lunchroom may have been dry, especially at the south end. The fire spread very rapidly, because of the shaftmen's oilers that had been left inside the lunchrooms and were to be used later during the drilling operation. These oilers, with use, became impregnated with rock drill lubricating oil, which is inflammable. If approximately 12 sets of oilers were left in the lunchroom, the rubber and oil of the oilers would produce an intense heat with a heavy and choking smoke within a very short time.

This may explain why the deckman and the hoistmen did not have time to give the danger signals, except to jiggle the bucket, before they left their posts. Apparently the buzzer which is located 70 feet above the bottom of the shaft could not be heard when the men were working. One hoistman wrote a warning note on a piece of board and put it on a bucket, but he could not lower this bucket because of the heat.

It is not possible, at this time, to express a definite opinion as to the cause of the fire. Is it possible that a lighted cigarette may have smoldered for one hour before igniting the miners clothing or others? Was the fire caused by spontaneous combustion from the oxidation of oily or greasy waste? It would be interesting to find the answer.

In case of electric power failure, a standby generator capable of hoisting the rescue crew, was available.

During the first 12 hours of work, only 5 McCaa 2-hour oxygen breathing apparatus, and 4 Chemox 45-minute oxygen apparatus, were available. Considerable apprehension was experienced during the period when crews of 3 men and 4 men were being sent at a distance of 9000 feet from their fresh air base, in a mine, where the location of grizzlies, chutes and obstructions were unknown to them, especially when visibility was at times less than one foot.

Carbon monoxide detectors and Wolf lamps

were used to check the condition of the air.

All service masks were in use whenever the oxygen content in the air was satisfactory.

The new type of Chemox Breathing apparatus has proved very useful because of its easy operation. Specialists wearing the Chemox were sent down, to show the exact location of valves and switches to members of the Rescue crews. Within a few minutes, men could be trained to wear the Chemox; but this self-contained breathing apparatus is approved for only 45 minutes and, for this reason, it must be considered as auxiliary equipment only in a mine.

The highest praise is due to all rescue workers who took part in the operations and several had to be under the care of doctors, sometimes for a few hours. Several men collapsed or were sick while wearing their equipment; the reasons being as follows:

- 3 men collapsed. Probably using their apparatus too soon after eating.
- 1 man - Depleted oxygen due to too frequent opening of by-pass valve.
- 1 man - Improper adjustment of facemask.
- 1 man sick. Failed off mask to speak.
- 2 men - Mouth piece plugged - had to return to surface.
- 1 man - Nod and choke goggles over head harness, causing leak.
- 1 man - Goggles off on re-entering smoke.
- 1 man - Reasons unknown.

The following measures stand out in the East Malarctic Mine fire to prevent future loss of lives in such circumstances:

1. When possible, a signal box including buzzer and light, should be carried with the blasting set during shaft sinking operations.
2. The installation of hoists in the shaft should be avoided.
3. Auxiliary breathing apparatus or gas masks should be available in every underground holeroom.
4. Telephone boxes should be constructed of non-combustible material.
5. Shaft headframes and stations should be kept cleaned of all inflammable material; lunchrooms to be of fireproof

construction and be located away from the shaft.

6. Suitable water lines with a good available pressure and adequate fittings should be conveniently located near every shaft station and in proximity of timbered areas. Complete fire trucks or, at least, a sufficient supply of fire hoses should be readily available for underground in case of emergency.
7. Mine rescue stations are a necessity in every mining community. Every mine should have men trained in mine rescue.
8. Every mine should also have on hand auxiliary breathing apparatus to cope with the most urgent operations until the regular rescue equipment arrives at the property. It might have been possible to extinguish the East Malarctic Fire during the first hour.
9. Care must be exercised when greasing, spilling and dripping of the lubricant at points where it is used or stored may be the cause of spontaneous combustion or may develop a fire very rapidly if in contact with a flame. Oil should be stored in fireproof, closed receptacles and greasing should be done in places where the fire risk is negligible. Beware of greasy rags.
10. Whenever electric lines are installed in timbered areas, they should be carefully insulated and protected from mechanical damage.
11. Smoking in dry timbered areas should be prohibited.
12. It is quite a problem to fight a fire in the hanging wall of an incline shaft, for, it is nearly impossible to play water on the fire. Timbered incline shafts should be equipped with a fogging system.
13. Ventilation control is of the utmost importance to fight an underground fire. Such control is not possible with natural ventilation; thus the importance of mechanical ventilation with reversible fans.
14. Solid and tight fitting fire doors, held closed by a positive latch, should be provided in every crosscut or other opening leading from any shaft.
15. Level plans in mines should take the form of:
  - a) Regular Survey plans showing the



- location of grizzlies, ore passes, chutes.
- Electric service plans,
  - Pipe service plans,
  - Ventilation plans.
- At East Malaric after the fire alarm had been given to surface, nearly one hour was required to hoist the 80 men working in the upper section of the mine. In case of danger a positive and quick system should be provided for warning all underground workmen.
  - It is important that frequent inspections be carried out by qualified persons having the opportunity to visit several mining properties.
  - No definite explanation is available yet as to the cause of several explosions

that occurred during the rescue operations. Were they the result of incomplete combustion of wood and rubber distillates? Was the temperature high enough to cause a decomposition of the fogging water coming from the 8th level and produce an explosive mixture? The answer may be found later on.

- The faculties of Applied Sciences of a great number of Universities may possibly not devote enough time to the problems of fires, gases, ventilation, rescue training and equipment in metal mines. Mine supervision should know how to organize in case of emergency and how to train all underground workmen to be fire conscious.

#### THURSDAY AFTERNOON SESSION

October 9, 1947

Presiding: C. E. McKnight, Mine Captain, Lake Shore Mines, Ltd.

### An Analysis of 100 Fatal Shaft and Hoisting Accidents

By GEORGE GEDGE

Safety Engineer, Hollinger Consolidated Gold Mines, Limited

Shaft accidents constitute one of the principal sources of accidental deaths in mines. According to the experience of a large mining district one-fifth of all fatal accidents occurred in hoisting and shaft work. The following tabulation of 100 typical fatal shaft accidents in this district indicates the general causes and their relative importance:

| Cause                                         | Deaths* |
|-----------------------------------------------|---------|
| Defective hoisting equipment                  | 19      |
| Falls of rock or materials in shafts          | 13      |
| Hoisting equipment in operation               | 13      |
| Failure to close bars or doors                | 11      |
| Loading and unloading cages                   | 11      |
| Sagging, blasting sets and similar structures | 9       |
| Riding sinking buckets                        | 7       |
| Inadequate shaft inspection after blasting    | 7       |
| Signal systems and improper signalling        | 4       |
| De-watering shafts                            | 3       |
| Falls in shafts                               | 3       |
| Other                                         | 14      |

\*Total of deaths exceeds 100 because some accidents had two or more causes.

Nineteen deaths, the largest number resulting from one cause, were due to defective parts of hoisting equipment. Two accidents caused these deaths and additional injuries.

One accident was a disaster (death of five or more men). The rope failed, and the safety dogs did not function properly because of poor design and possibly faulty setting of the linkage or fouling of the draw bar stops.

Tests showed that the rope failed primarily because of internal corrosion which had not been disclosed by frequent and regular inspections.

The other accident was due to the failure of a bolt newly installed on a hoist manufactured about fifty years ago. The bolt connected the clutch band to the drum anchorage. One end of the clutch band was riveted to a forked section forged down to the bolt. This bolt 1½ inches in diameter, was threaded, and two nuts on the threaded portion permitted adjustment of the clutch for wear and for proper locking. The fracture occurred in the threaded portion.

Thirteen of the 100 deaths at shafts resulted from falling timber, pipe and rock. In most cases, the men were engaged in changing guides, building bulkheads, removing pipe lines and performing similar work. The circumstances of most of these accidents show failure to include safety measures in the methods of doing the work.

The frequent unsafe practice of failing to nail some members of a platform, scaffold, staging or similar structure resulted in the death of a shift boss who was inspecting a shaft. A temporary platform had been constructed 250 feet above the set which he was inspecting. One plank, which had not been nailed, was dislodged by the hoisting rope, fell, and struck the boss.

A bulkhead should have sufficient strength to withstand any object which may fall from above, or the men under it should be withdrawn if the bulkhead will not afford adequate protection.

Overhead protection may be impractical on some jobs. In such cases, the working procedure should be planned so that exposure to falling heavy materials is minimized. For example, a man was replacing planks on a shaft six feet above another workman who was boring a divider for plate bolts. One plank fell and struck the lower man on the head, fracturing his skull. The injured man could have done other work until the planks were replaced.

On some jobs it may be necessary to place, remove, or otherwise work with heavy materials, such as pipe, from below. If a safe procedure is not planned and followed, fatal accidents may happen.

For example, a crew was salvaging 2-inch pipe from a shaft by working from below and removing one section at a time. Apparently they failed to hold each section with a wrench while they removed the section below. As a result, the hangers were twisted from the timber, and pipe was loosened at joints about 60 feet higher. When a coupling was struck with a hammer, a long section dropped, struck one man, and fractured an arm and his skull.

Tight lined compartments effectively prevent accidents from falling rock and from dropped materials, which may be deflected into an adjoining compartment and fall on men working there. A shift boss, for example,

was killed by a timber which slipped from the hands of a worker who was loading it onto a cage. The piece went under the divider and down into the adjoining compartment and struck a shift boss who was making an inspection.

The practice of periodically cleaning spillage from shaft timber is helpful in reducing hazards from falling rock but does not completely eliminate the danger. A skip-tender was killed the day after a shaft was cleaned. An investigation indicated that the piece which hit him had been dislodged from a timber.

Special care should be taken not to overload skips. In some mines they are loaded from measuring-pockets, and in others, men are employed to see that the skips are completely emptied, to reduce spillage.

The extreme danger of entering or working in a compartment in which hoisting equipment is operating is shown by the fact that in 13 out of 100 fatalities the men were caught and squeezed to death by the moving skip or cage. In addition to having arms and legs torn off and being otherwise badly mangled, workers often fell hundreds of feet to the bottom of the shafts.

Most of the accidents happened in sinking shafts, doing station work, building and cleaning loading pockets, concreting, and performing similar work. In the large majority of cases the men were attempting to take a short cut through the hoisting compartment or were doing a short job there between movements of the cage or skip.

The cage, properly equipped with a platform, should be used whenever possible in shaft work. Many jobs can be expedited by using the cage for a working platform. Failure to use the cage was the principal cause of four of the 13 deaths.

When the use of a cage is designated for performing certain jobs in the hoisting compartment, the boss or leader should require strict observance of the instructions.

Workers may be kept from entering a hoisting compartment by lining between the hoisting compartment and the manway. For sinking shafts and working around stations, lining should be installed as rapidly as blasting and other conditions will permit. Short cutting through hoisting compartments, which is frequent in such work and leads to many accidents will thus be prevented.



When guard rails and guard planks placed vertically are used to keep men from falling into or crossing a skipway, the installations should not leave openings or other means of circumventing these protective measures. Furthermore, supervisors should observe safeguards and require their men to do so.

Whenever men may be exposed to the danger of moving skips or cages and the hazards cannot be adequately safeguarded, hoisting should be stopped, as usually can be done for short jobs. Most of the fatal accidents happened when the men were doing work which required only a short exposure.

Warnings about entering or crossing hoisting compartments have proved to be insufficient preventive measures. A willful shaftman was given specific instructions about the safe way to reach his working place, but he did not follow them. He climbed down the hoisting compartment. An attempt to telephone the cagetender on an upper level not to lower the skip failed to reach him in time. The man was caught and killed. The responsibility for stopping the movement of hoisting equipment rests primarily on the foreman or leader.

Since a boss is not always present, the men must clearly understand the danger of entering a compartment in which skips or cages are operating, and they should be required to notify the hoistman before entering such compartment. Otherwise a combination of circumstances may result in a death.

When a hoistman is notified not to make a movement, he should observe the order until notified to the contrary by the person who gave him the original instruction. If the instruction carries over to the next shift, he should notify the relieving hoistman and report the fact that he has done so in his log book.

It is unsafe to depend on hearing hoisting signals before crossing a hoisting compartment while making inspections or doing other work. Two men inspecting an inclined shaft depended on audible signals to warn them to get in the clear, or to tell them when to cross the shaft, but they were caught and killed.

Most accidents occur under similar circumstances and from similar causes. Unless preventive measures based on experience are taken, it is likely that other companies may have the same kind of accidents. The fundamental practices that should be observed are:

1. Eliminate hoisting in working areas. The hoistman should be notified by the shaft leader to stop all movement whenever any member of the crew may possibly be exposed to the danger of getting caught.
2. Whenever possible, use a properly equipped cage, and wear safety belts, for performing work in hoisting compartments.
3. Line manways, install guard rails, and take other means for preventing employees from entering hoisting compartments.
4. Inform workers about the hazards. Train them in safe practices and insist that they observe safe practices.

Failure to close the bars or doors of cages and shaft stations was a factor in 11 deaths. Violation of this precaution, however, was not the principal cause of most of the accidents. In one case a defective guide caused the cage to catch while it was being hoisted, and the cagetender was thrown out. If he had closed the doors, he would have remained in the cage, and although he might have been injured, the injuries would not have been fatal.

The bars on some cages were so loose that when they were left in the vertical position, they extended out into the shaft. When the cage was hoisted, the bars caught on shaft timber.

Four deaths were due to a combination of unsafe practices. In each case the cagetenders attempted to hoist long dull steel without lashing it to prevent it from shifting and catching against shaft timber. When the steel got away and caught on timber, the men were thrown out or struck by a flying piece. If the gates had been closed, pieces would not have caught, and the men would not have been thrown out of the cage.

Some companies have eliminated the practice of riding cages loaded with supplies or materials. Between levels, station tenders are permitted to ride only on the upper deck of a two-deck cage carrying a load on the lower deck.

If the doors or bars are not closed, sudden illness may cause a man to fall out of the cage. In one case a cagetender toppled out into the shaft. In another, a man who did not feel well was sent to the surface unaccompanied. The door of the cage was not closed, and the man apparently fainted on

the way up and fell through the open doorway.

Shaft gates also should be kept closed. Two deaths which could have been avoided occurred from falls into shafts at stations. The principal known factor in one of these accidents is that the gate was left open. In the other, the bar was not closed when the cage was taken to a lower level.

Causes of death in the districts indicate that bosses should give special attention to the practices of cagetenders in loading and unloading materials, especially steel. Eleven men were killed because of unsafe practices in performing this work.

Nine men were riding with the loads. They failed to lash steel and timber in the cages, and when the loads caught against the shaft timber, the men were struck by flying pieces or thrown out of the cages. Two men were crushed by cars of steel which overturned as they were being pulled from cages.

Regardless of the distance to be traveled, whether 150 feet or 1,000, the same precaution should be taken. When steel or timber is distributed at various levels, the load remaining in the cage should be secured after each delivery. Neglecting this precaution, failing to close the doors or bars, and opening doors before reaching the station resulted in a number of deaths.

Two fatal accidents which occurred when cars of steel were being unloaded from cages show the possible hazards of this work and the precautions that must be taken. For example, cages should be stopped level with the station track.

Cars designed for carrying steel vertically should be checked for stability and should not be made top-heavy because of too much long steel. Several men were killed when pulling such cars off cages properly stopped at stations or when pulling cars from the side, a position which exposes the men to injury if the load catches.

The outstanding feature in the occurrence of 11 out of 100 deaths was the unsafe construction of working platforms used for making repairs and sinking shafts.

Four deaths occurred because defective timber was used in platforms. The worst accident resulted in three fatalities; the men fell 900 feet. Two 6-inch spruce stulls were laid across a 10-foot opening and covered with planks. One stull broke a few feet from the supporting rock.

Thorough inspection of lumber to be used in scaffolds and stagings is a fundamental requirement for a safe working structure. Selected pieces should have sufficient strength for the load, be reasonably straight grained, and free from shakes, large, loose or dead knots, dry rot, and other defects.

Staging or platform supports should be strong enough to carry at least 2½ times the anticipated load. If they are spiked or otherwise secured to shaft timbers, the method of fastening should have approximately the same safety factor. Using nails too small for the thickness of the lumber or using an insufficient number of the proper size causes numerous deaths.

When blasting sets were used for timbering, three deaths and such serious injuries as broken legs and back cases resulted. In each case the chains or other fastenings were not strong enough.

The least serious accident occurred when a weld in a ring in a sling failed, allowing one end of the blasting set to drop. The safety chain provided for such an emergency also failed to hold. It was attached to a ¾-inch steel rod bent into the form of a hook to fit snugly over the end-plate. Because there were two inches of slack in the safety chain, the hook straightened out from the jar. The load on the safety chain was 1,250 pounds.

The use of safety belts and life lines would have prevented several deaths which occurred to men removing a bulkhead and working from a platform on a cage. Three men, for example, were engaged in removing a bulkhead preparatory to timbering. One lifted an 8 by 8-inch timber, apparently lost his balance, and fell through an opening made by the removal of some planks.

The circumstances of one death show that only men in good physical condition should be employed on shaft work. A shaft man who was subject to fainting spells fell over 900 feet when he fainted while standing near an opening in a manway preparatory to making some repairs.

As seven deaths show, riding the bucket is one of the most dangerous practices in shaft sinking. Therefore, bosses and shaft tenders should give special attention to seeing that sinking buckets are kept in good condition and used safely.

Buckets should be of substantial construction. They should be provided with a cross-





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Warnings about entering hoisting compartments have been given in many ways. In one case, a man was given specific instructions as to the way to reach his compartment. He did not follow them and entered a compartment where the skip failed to stop. The man was caught between the skip and the cage.

Since a hoisting compartment must clearly be marked, and the doors are open, it is required that the man be notified of the danger of entering such compartments. The hoisting of cages should be stopped.

When a hoistman gives a signal for a movement, he should be notified of the condition of the cage until notified to the contrary. The man who gave him the original instruction carries over to the new instruction.

It is unsafe to depend on hearing hoisting signals before crossing a hoisting compartment while making inspections or doing other work. Two men inspecting an inclined shaft depended on audible signals to warn them to get in the clear, or to tell them when to cross the shaft, but they were caught and killed.

Most accidents occur under similar circumstances and from similar causes. Unless preventive measures based on experience are taken, it is likely that other companies may have the same kind of accidents. The fundamental practices that should be observed are:

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Regardless of the distance to be traveled, whether 150 feet or 1,000, the same caution should be taken. When steel is distributed at various levels, the remaining in the cage should be checked after each delivery. Neglecting this action, failing to close the doors of the opening doors before rescuing, resulted in a number of deaths.

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head to prevent swinging, and non-rotating type of rope should be used.

The use of improvised equipment was a frequent factor in the accidents. Improvised equipment sometimes fails in emergencies. In several instances men were taken ill and had to be hoisted out of the shaft. One man was hoisted in a small bucket which spun rapidly as it rose. Apparently dizzy when he stepped out at the deck, he lost his balance and fell through the opening.

Attempts were made to overcome hazards in the use of temporary or inadequate equipment. Men were forbidden to ride, but orders were not enforced by the bosses. The men rode buckets when the distances were short and when they could have gone up a man-way.

Standing on the rim of a sinking bucket should be strictly prohibited under all circumstances. The hazards include slipping, striking against the side of the shaft, and fainting. If there is considerable clearance at the blasting set, a man in stepping off the bucket may slip and fall through the opening.

Deckmen especially should realize how hazardous it is for sinking or dumping doors to be open when buckets are being dumped or loaded. In one case two deckmen were working together. When a bucket was hoisted to the dump, the first deckman closed the dumping door while the second pulled in the chains for the crosshead. The first deckman then hooked on the dumping chains and gave the signal to lower the bucket for dumping.

Because of obstructions resulting from blasting, seven men were killed in three accidents which occurred while men were being lowered. The accidents happened on the first trip after blasting. Apparently no trial runs were made.

Improper signaling contributed to four deaths. Three were partly due to failure to follow prescribed signaling procedure, and the fourth resulted from the failure of a company to provide the hoistman with a line for returning signals.

In the last case, the company was engaged in salvage operations and had installed a temporary hoist near the old hoist room. The signal line to underground stations was transferred to the new hoisting location, but the hoistman's return line was not moved.

The hoistman asked an inexperienced man to make a test of the signal system but failed to specify the number of bells. The hoistman

received a "hoist" signal, but thought the man had not had time to ring, and assumed that the signal came from underground. He raised a cage on which a miner was working, and the miner was caught between the cage and the timber.

The possibilities of serious injuries to cage tenders, as shown by preceding paragraphs are so numerous that these men should utilize all signals specified for their safety. If it is necessary to hoist material with the hood door open, a "slow" signal should be given and returned by the hoistman.

Likewise, he should never go out on a skip to remove a piece of steel or for any other reason without giving the hoistman the appropriate signal. Violations of these and similar precautions have resulted in deaths.

The causes of several deaths at small properties show the hazards of using internal combustion engines for operating pumps at the bottom of shafts. The general practice was to fill the gasoline tank and let the engine run until the fuel supply was exhausted, usually in the late afternoon. The fuel tank was not refilled until the following morning to allow time for the fumes to clear from the shaft.

In such case the engine stopped before the fuel supply was exhausted, men attempted to make repairs, and were asphyxiated.

Rescuers had narrow escapes in most cases. None of the properties was equipped with safety belts and lines, gas masks, or ventilating equipment, and none of the men fully realized the danger of the gas or was trained in artificial resuscitation. The use of internal combustion engines underground is not sanctioned by departments of mines, especially when adequate safeguards are not provided for the men.

Several fatal accidents occurred from falls through openings at shaft stations. In one instance a skip was used to lower wedges, a keg of nails, and smaller supplies. Instead of lifting the supplies out of the skip, the men decided to dump the skip on the level. One man stood on the cross rods to push, and when the skip fell on its side, most of the shaft was open. The man lost his hold and fell over 500 feet. He sustained a broken neck, a fractured right leg, and numerous other injuries.

This study shows that fatal accidents in hoisting and shaft work have occurred repeatedly under similar circumstances. There-

fore, there is no reason to believe that these types of accidents will not continue to occur in the performance of certain jobs and in the use of certain equipment unless preventive measures are taken. Most of these kinds of accidents may happen at any time.

Special preventive measures which supervisors should take are these:

1. Utilize the most up-to-date methods of inspecting, lubricating, and maintaining hoisting rope and other parts of hoisting equipment.
2. Specify the safe procedure for handling pipe, timber, etc., by hand in shaft work.
3. Stop hoisting or take other precautions when men making repairs or performing other work may be endangered.

4. Use of the cage, and see that a safe platform or blasting set is constructed for shaft work.

5. Use first-class sinking buckets and other sinking equipment and train men to ride in the buckets safely.

6. In sinking work, inspect the shaft thoroughly after blasting.

7. Make sure that all loads of steel and timber are properly secured in cages.

8. Eliminate riding on loaded cages.

9. Maintain gates and bars in first-class condition, and require strict observance of rules to close gates or bars of cages and at stations.

10. Require cages to observe strictly all regulations pertaining to signaling and the operation of cages and skips.

### Mine Accident Prevention Education

By T. W. KIERANS

Assistant General Safety Engineer, The International Nickel Company of Canada Limited

The steady and impressive advance in mine safety in the Province of Ontario has paralleled the growth of interest in Mine Accident Prevention Education, as borne out by the annual reports of the Department of Mines.

These reports show that in the first 10 years of the past quarter century, from 1922 to 1931, the average annual frequency of fatal accidents in the mining industry was 2.96 per thousand employees. In the past 10 years, from 1937 to 1946, the same frequency was reduced to 1.48. This decrease in fatal accident frequency was achieved during a 10 year period in which the average annual employment in the industry more than doubled over the first 10 year period, and in which mining shared with other industries the problems created by the Second World War.

An estimate of the effect of this achievement indicates that, during the past 10 years, the lives of well over 400 employees have been saved in the Province of Ontario.

Non-fatal compensable accident statistics covering the same periods show comparable reductions which affected, of course, the lives of a far greater number of employees.

All employees of the International Nickel Company of Canada Limited in Ontario, representing over the last 10 years an average of about 36 per cent of the Province's mining industry personnel, have participated to an important degree in the benefits of sound accident prevention work. In the Company's Mines Section our men have maintained, during this time, a fatal accident frequency 54 per cent below the average figure for all the other mines in the Province.

We have no doubt that with the continued cooperation of men, supervisors and management further reductions in accidents will be effected.

#### The Accident Prevention Plan at INCO Mines

While continuous and progressive changes have been made in accident prevention methods at INCO mines, the safety program is firmly based on the principle that safety is not merely an integral part of the job, but the essential part of it. This principle is, of course, opposed to the consideration of safety as a separate entity not directly associated with production. It is also opposed to



the teaching of only the broad aspects of safety, leaving to the individual the application of these principles to his daily work.

Proven and accepted safe procedures are made applicable to specific conditions at all mines through a system of Standard Practices, while the search for safer methods is encouraged in every possible way. Our employees' suggestion plan has been a valuable source of safety improvements.

Medical examination and the direction of personnel to suitable occupations, safe planning of operations, supervision, the cooperation of employees, and the inspection and maintenance of equipment and working places, are recognized by management for the important part which they take in safe mining. However, no phase of the company's work is held in higher regard than accident prevention education.

#### Mine Accident Prevention Education

The goal of mine accident prevention education is the development of miners who, not only are trained in and apply safe practices, but who think in terms of safety. It is toward this goal that our efforts are directed. In order that such efforts may meet with the greatest possible success, all forms which will to any degree aid in attaining the objective are encouraged.

Induction talks by safety personnel, supervision and employee meetings and conferences, qualifying examinations for specified jobs, publication of accident reports and accident data, posting of safety inspection reports, safety posters and displays, safe practice cards and pamphlets, employee suggestion awards, publications for employees which include accident prevention information, motion pictures, scale models and drawings, safetygraph meetings, departmental safety record displays and safety contests with awards for good accident records, are some of the forms of education which have assisted our safety program. However, our greatest efforts in recent years have been made in planned safety instruction on-the-job.

In both the training of new men in school stopes and in the training of miners to work safely at new jobs, the supervisor is expected and is assisted to develop not only ability to plan and to lead but also skill in instructing.

#### The Development of Safety Instruction On-the-Job at INCO Mines

To keep pace with expansion of operations due to the steady development of new uses for nickel, the company has consistently broadened and increased its work in the safety field, investigating and establishing various new methods of educating its employees in safe practices. The original organization at the mines consisted of general safety committees made up of the superintendent, top supervisors and the mine safety engineer and workmen's safety committees, each of the latter composed of three men, who covered the mine weekly on inspection trips.

As the scale of company operations increased, it was soon recognized that the key to successful accident prevention education would be standardization. In 1931, at Frood Mine, the logical and systematic standardization of every step of the various phases of mining was started. Since then all mines have assisted in the development of the standard Practices, and the system has been extended to our smelters and refineries. The original detailed analysis and study of all mining operations was made by the safety engineer and his assistants. Each analysis and study as it was completed was then taken before the superintendent and the mine supervisors for discussion. Each supervisor brought his experience and intensive study to bear in drafting the final standard procedures, which were closely examined by the general safety department at Copper Cliff to be sure that they complied with the spirit as well as the letter of the Ontario Mining Act. On completion the Standard Practices were compiled into volumes which have since been used as reference books and texts. They are, of course, being continually improved as the result of further experience and changes in methods and mining conditions. Standard Practices continue to be the foundation of Mine accident prevention education.

The original procedure for imparting the Standard Practices to all employees was to organize classes either by occupational groups or by departments, depending on the nature of the material to be reviewed at the time. Free discussion was sponsored by the foreman who took complete charge of the meeting. Such discussions often aided in discovering valuable accident prevention ideas which were incorporated in the Standard Practices. The

meetings were held in safety lecture rooms prepared and equipped for this purpose and seating from 75 to 175 men depending on requirements. Models, blackboards, samples of tools, etc., were provided. The question and answer method of instruction was largely used.

School stope training is an on-the-job method of safety instruction which was developed concurrently with Standard Practices as a means of introducing new employees to the mine and training them for the primary occupation of shoveller. The school stope system is still used for this purpose. It has also been used as a place of training for men qualifying for more skilled stope jobs such as driller, timberman, stope boss and even including shift boss. The "School" is a regular producing stope selected for its suitability as to location, size, and normal mining conditions. All new men, regardless of previous experience, start work in the "School."

In 1934 planned safety instruction on-the-job was extended beyond the school stope system with the initiation at Creighton Mine of a course of training for all supervision in which specific directions for the continuous application of the principles of safety instruction on-the-job were laid down. This course, known as the Principles of Safety, was later given at the other mines and was received by management and supervision as a forward step in mine accident prevention education.

Early in 1934 the company applied to its accident prevention education program the system of safety instruction described in the National Safety Council's recently published "Accident Prevention Manual for Industrial Operations." The basic elements, main steps and key points, together with the instructional steps: preparation, presentation, performance try-out and follow-up are well known as is the key phrase, "If the learner hasn't learned, the teacher hasn't taught." This system has proven to be an effective extension of our existing method of instruction.

#### Present System of Safety Instruction On-the-Job

The results of all the experience described has satisfied the company on the following points:

(1) Safety instruction by trained supervision is the most effective means of con-

ducting mine accident prevention education.

(2) Safety instruction under actual mining conditions is preferable to any instruction that may be given in a lecture room.

(3) Safety instruction in order to be complete, should include not only an explanation and a demonstration of the job by the instructor but an actual performance try-out of the job by the employee with such follow-ups as are required.

At present the application of this experience is conducted as follows:

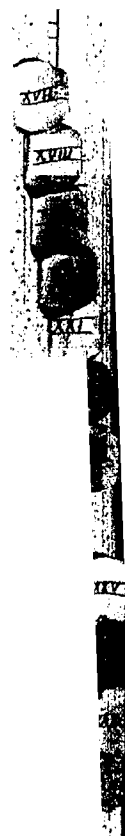
#### Safety Instruction for New Men in the School Stopes

As in the past, all new employees, regardless of the previous experience they may have, start to work in the "School." Following the principles of safety instruction on-the-job, they are instructed in the proper use of simple hand tools such as shovel, bars, rock hammers and saw. They are also taught the general routine of the mine, and the procedure in case of emergency. In most cases new men become sufficiently familiar with our methods and regulations to work under normal supervision within three days. However, even after they have been assigned to a definite working place their safety training on-the-job continues. Their new supervisor checks on their general knowledge and then instructs them in such new work as they will be called upon to do, as their underground experience develops.

#### Safety Instruction for Miners in New York

In the past three years the experience of the company in the use of the principles of safety instruction on-the-job has been applied to the more effective training of men in such jobs as motorman, switchman, chute puller, and chute blaster and other occupations for which "School" training had not been adapted. It has also been applied to the training in their assigned working places of men learning to be drillers, timbermen, slusher-men, pillar leaders, and stope bosses. The manner in which this training is carried out at Frood Mine, for instance, is as follows:

First—The complete mining operation is broken down into such parts as barring, scaling, drilling, blasting, timbering, chute pulling, tramming, raise drilling, ripping, stope inspection, etc.



Second—A tentative training plan on each of these subjects is prepared by the safety department using the Standard Practice Text as reference.

Third—Mine supervisors are then called together, in small groups of from four to six shift bosses and foremen, to a working place where the particular subject under discussion has application. Each foreman and shift boss attends one of a number of such meetings on each subject. Using the tentative text, one supervisor assumes the role of trainee and another the role of instructor. The "instructor" then carries out the safety instruction of the "trainee" on the mining operation for which instruction is being studied. The procedure which was followed is then discussed and criticized by the others at the meeting. When all supervisors have had an opportunity to take part in one meeting, their comments and criticisms are analyzed and a final plan of instruction for the operation is drafted. After approval by the mine superintendent, a pocket size Reminder Card, on which the elements of the instruction are printed, is distributed to all supervisory personnel. Finally, foremen and shift bosses arrange to carry out the instruction, along the approved lines, of all the personnel to whom it may apply. This may be done individually or in small groups consisting of from three to eight men, depending on the nature of the operation.

#### Safety Instruction On-the-Job Demonstrations

When instruction in any particular part of the mining operations is carried out before small groups, the procedure followed is usually referred to as a safety demonstration. A suitable location is selected and prepared, with the required tools and equipment laid out under normal mining conditions. The group is then called together according to a posted schedule, usually just after the lunch period. The shift boss or foreman then carries out the instruction of one member of the group, who, whether experienced or not, is considered to be for the purpose of the instruction, a "new man."

Occasionally the supervisor may ask one of the men, usually a sub-boss, to perform the demonstration. In any case the well known steps of preparation, presentation, performance try-out and follow-up are followed. Comment and criticism from the group is encouraged.

aged and a lively interest is maintained.

Safety instruction on-the-job demonstrations for small groups have been found to extend the scope of the instruction, since they present an opportunity for all miners, especially sub-bosses, to become familiar with its principles so that they in turn will apply them correctly in conducting the safety instruction of such men as are assigned to their charge. The importance of this feature may be realized when we consider that at Frood alone there are several hundred sub-bosses such as pillar leaders, stope bosses, trammer bosses and level bosses. All men receive a copy of the Reminder Card following their instruction. The operation covered, the instructor, the workman attending and the date are recorded. Each workman is scheduled to attend one half-hour safety demonstration each month.

For some of the mine occupational classifications, the miner's training is not considered adequate until he has successfully passed a qualifying examination set by the Safety Department. This examination may be written or oral, depending on the occupation.

The following is a sample Reminder Card, printed on  $2\frac{1}{4}'' \times 4''$  card:

The International Nickel Company  
of Canada Limited

Reminder Card Number Four

#### BARRING

Some of the accidents from barring, occur in the following ways:

- End of bar jerked out of man's hands and striking him on the jaw—Broken jaw and broken teeth.
- Man barring, failed to drop bar and his hand was squeezed between another chunk or a post, or some other material—Broken fingers. Amputated fingers.
- Poor footing while barring, or pushing bar, or failure to provide clear space behind. Workmen may fall on any part of his body and suffer broken bones or cuts.
- Men barring two different objects close together. Flying bar may strike any part of body.
- Not keeping feet in the clear when barring, or not using proper length of bar—Broken feet.
- Failure to bar. Rolling chunks with the hands—Amputated and broken hands and fingers.

- Lifting on bar with back muscles instead of leg muscles—Strained back.

#### SAFE BARRING PRACTICE

- Check working area. Above. Below. Beside. Ahead. Behind.
- Bar. Proper length of pipe. Five feet on grizzly. Seven feet when barring above hip level. Straighten as often as it becomes bent.
- Have good footing. Don't stand encircled by chunks or other material. Check grizzly if you are to bar on grizzly.
- Check material or chunk, or equipment you are going to bar. Is it going to hold together? If a chunk, are there any missed holes in it? Make sure you will be able to control both the bar and the material to be barred. If not, get help.
- Two or more men should not work on different jobs close together, particularly if barring.
- Control the bar, also control your temper. If you "lose your head" you may lose some teeth. Arrange to pull or lift on the bar. Avoid pushing or pressing down as much as possible.
- Never bar a chunk through a "bootleg" hole.
- Avoid barring one chunk over another chunk. Bar chunks down from the mining floor if high on muck pile, or use long pipe.
- When barring large chunks at the toe of the muck pile, watch for settlement of the pile and be ready to drop the bar and jump back.
- Use a proper length of muck hook where possible.

- Never be afraid to drop the bar and jump clear.
- Bar chunks safely. Never roll them with your hands. Lift with your legs, not with your back.

#### Conclusion

In 1941 the John T. Ryan Trophies were first presented to the Canadian Institute of Mining and Metallurgy by the Mine Safety Appliances Companies for annual competition among Canadian metal and coal mines, with a separate section for each. The awards are based on the frequency of accidents per thousand men employed at any one mine. An accident is considered, for the purposes of the award, to be one in which the injured person has to be off work for more than six days because of his injury. Three hundred man-shifts are considered equivalent to one man-year of employment. Since 1941 an INCO Mine has always won a position in the Metal Mining Section of the Dominion-wide Award, not lower than 3rd place. In 1944 our Frood Mine won 2nd place, standing highest in the Province of Ontario. In 1945 our Garson Mine won 1st place and in 1946 our Levack Mine won 1st place. Creighton Mine has won 2nd place three times in the past six years. Furthermore, the average accident frequency for the past three years at our Frood, Creighton, Garson, Levack and Murray Mines has been 12.75 accidents per thousand employees per year as compared with 18.01 for the three previous years, representing a reduction of almost 30%. These facts show, we believe, that the efforts spent in developing safety instructions on-the-job have been highly beneficial in maintaining the downward trend of mine accident ratings.

*Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME XVII

PULP AND PAPER SECTION

NATIONAL SAFETY COUNCIL, INC.  
20 NO. WACKER DRIVE • CHICAGO 6, ILL.

## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

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## MONDAY AFTERNOON SESSION

October 8, 1947

Presiding: E. A. PAGE, Superintendent of Personnel, Kimberly-Clark Corporation

## Review of the 1946-47 Paper and Pulp Accident Experience

By FRED W. BRAUN

Vice President and Chief Engineer, The Employers Mutuals

The frequency and severity rates for all companies reporting their experience to the National Safety Council for the year 1946 were 22.27 and 1.63, respectively. These rates were based on the reports of 381 separate establishments operating more than 400,000,000 man-hours during the year. Although the frequency rate is somewhat higher than the rate in 1945, a comparison of the experience of just those companies which reported in both years revealed a 2 per cent decrease. In other words, the slightly higher industry rate resulted from the inclusion of some additional reporting units with higher rates. Regarding the severity rate, on the basis of just those companies which reported both 1946 and 1945, the rate in the latter year is 2 per cent higher. These percentage changes of -2 per cent in frequency and +2 per cent in severity compare with no changes in the rates for all industries combined.

Of 40 major industries for which injury rates were compiled in 1946, the rate of 22.27 for the paper and pulp industry ranked 30th. The severity rate of 1.63 ranked 27th. Both rates were well above the averages for all industries combined of 14.16 for frequency and 1.28 for severity.

Fatal injuries occurred at a rate 9 per cent higher in 1946 than in the previous year and the increased time charges which resulted more than offset decreases in the severity rates of the other two types of injuries, viz: permanent partial injuries and temporary total injuries. The lower frequency rate for the industry resulted entirely from a decrease in the frequency of temporary total injuries. The frequency of permanent partial injuries remained unchanged during the year, but a lower severity rate for this type of injury indicates that these permanent partial injuries which did occur were less serious than those in the previous year.

In 1946, small plants, on the average, had frequency rates more than double those of medium sized or large plants. The average

rate for small plants was 50.94 while plants of medium size had an average rate of 23.46 and large plants a rate of 21.08. Small plants, however, had an average severity rate lower than those of the other two sized groups, indicating that, in general, the injuries which did occur in small plants were less serious than those occurring in large plants or plants of medium size.

After declining somewhat from the high war-time rates, both injury indexes leveled off in 1946. The frequency rate index has shown slight decreases during the past three years and in 1946 was at a point about midway between the low of 1939 and the high of 1943. The severity rate index in 1946 was slightly higher than in the preceding year but lower than in all other previous years since 1938. In 1946, the frequency and severity rate indexes were 11 per cent and 18 per cent below the 1943 indexes, although they were 23 per cent and 31 per cent higher than the low rates which were obtained just prior to the war. The net reductions in both indexes since 1939 have been 48 per cent and 35 per cent, respectively, for frequency and severity compared with reductions of 23 per cent and 48 per cent for all industries combined.

In 1946 the average time charge for each disabling injury was 73 days; this includes actual days lost for temporary total disabilities as well as time charged for permanent partial injury and fatalities. The average of 73 days for the paper and pulp industry compares with an average of 90 days for all industries combined, an average of 23 days for the meat packing industry, and an average of 269 days for the cement industry.

The average number of days lost for each temporary total injury was 20; this figure is based on actual days lost and does not include any time charges. For all industries combined, the average was 22 days. Regarding permanent partial injuries, the average time charges per case for the paper and pulp



industry was 497 days—slightly higher than the average of 455 for all industries combined.

The following information was taken from a report of injuries in the Paper and Printing Industry prepared by the state of Pennsylvania, and covers 2,522 lost-time injuries occurring in that state during 1944. There were 9 fatal injuries reported and in five of these, as well as in 2,401 of the 2,522 non-fatal injuries some mechanical or material defect was indicated. Hazardous arrangement or procedure in or around the agency of the injury was a contributing cause in four of the fatal accidents and in 1,846 of the non-fatal accidents. In 95 per cent of the cases, unsafe layout of traffic or process operations was indicated, and in 6 per cent of the cases, the process itself was indicated to be unsafe.

Defective agencies were indicated in 816 cases. In 516 of these the defect was a slippery condition, and in 210 the agency was sharp edged. Rough condition of the agency contributed to 40 injuries, and in 30 the agencies were decayed, worn or cracked. In 33 injuries unsafe dress or apparel was a contributing

factor, failure to provide goggles and poorly designed goggles being mentioned in 30 cases.

A contributing factor in five of the fatal and 2,596 of the non-fatal accidents was an unsafe act on the part of the worker. Of this total, all five of the fatal and 1,131 of the non-fatal injuries resulted from over-loading, overcrowding, or otherwise poorly arranging materials. Using defective tools and using tools unsafely were mentioned as the unsafe acts in 622 cases. Of this total 222 were charged to unsafe use, or to use of tools for a purpose other than that for which they were intended. In 28 cases, the tools were defective.

Gripping objects insecurely, taking wrong hold of objects, and lifting with bent back or while in an awkward position caused injuries to 451 workers. Working on moving or dangerous machinery and equipment resulted in 61 injuries; in 29 of these, workers were cleaning, oiling or adjusting machinery in motion, and in nine cases, work was being done on equipment containing dangerous chemical substances.

#### TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: H. H. ADERHOLD, Safety Director, Marathon Corporation

#### Hazards Related to Paper Finishing Operations

By WILLIAM C. BERTHOLD

Assistant Finishing Department Superintendent, The Mead Corporation

In speaking of hazards related to paper finishing operations, we will divide the operations into five groups, discussing the hazards of each group separately. We will consider the finishing operations as that phase which has to do with the processing of paper from the time it leaves the paper machine until it is ready for shipment and divide the operation into five groups, namely: super-calendering, rewinding, rotary cutting, sorting, trimming and packing operations.

A survey of 130 lost-time and medical expense cases occurring in the finishing operations of our plant over a 30-year period showed that:

Thirty-seven cases, 28.5 per cent of the accidents, happened in calendering opera-

tions. Thirty-five cases, 26.9 per cent of the accidents, happened in rewinding operations. Twenty-four cases, 18.5 per cent of the accidents, happened in cutting operations. Thirty-four cases, 26.1 per cent of the accidents, happened in sorting, trimming and packing operations.

This indicates that the hazards involved were general and were not limited to any particular finishing group.

Of all the hazards encountered in calendering operations, perhaps the inrunning nip between the calender rolls is the most dangerous. The operator and helper both must thread paper into the nip on each roll run and while this is a common practice and an everyday job, it must be performed with

great care. One moment of inattention may mean the loss of a finger or hand.

A guard should be used to cover the nip while the calender is in operation, and can be made either stationary or removable. The removable guard is the most practical because it can be adjusted to fit the nip as the diameter of the composition rolls changes.

Where nip out or blow rolls are used they should be spaced properly so that the operator has sufficient room to work. A threading speed of 40 to 50 feet per minute is considered to be the most practical from a safety and operating standpoint because it gives the operator sufficient time to thread the calender properly.

Calendar platforms and steps—often the source of injuries through falls—should have proper guard rails attached and walk surfaces should be free of oil and grease. They should be made of good material and should be wide enough to permit free movement of the operator or helper.

Men working on super-calenders should not wear loose clothing, or go about the job with rags hanging loose from their pockets. Wearing jewelry on the job should be discouraged.

Shafts used in loading calender rolls should be made of light weight material, yet strong enough to support the weight of the roll without breaking or snapping off on the bearing end. A considerable number of injuries have been caused by shafts falling or dropping on employees' feet. The use of a shaft dolly while loading and unloading will minimize this condition. If a calender is loaded mechanically from a crane, the cables should be inspected frequently and changed when necessary to prevent breaking under load.

If roll wagons are used in moving stock to and from the calender, they should be properly constructed and proper type blocks should be used to minimize the hazard caused from falling rolls.

I should like to say, in concluding my remarks on calendering hazards, that sufficient working space, good housekeeping, proper instructions to employees and properly maintained calendering equipment will minimize the hazards connected with calendering operations.

The hazards encountered in rewinding operations are somewhat similar to those mentioned in the calendering operations. In the modern two-drum type rewinders, we

find an inrunning nip which can cause serious trouble. Many bad injuries have been caused by employees getting their hands and arms caught between the roll and the drum. With a hazard of this nature ever present it is not only necessary but essential that a proper type guard be provided and that it be kept in place when the winder is in operation.

The placing and tightening of cores on the rewinder shaft is to a certain extent hazardous but this condition can be eliminated by the use of proper type metal stands. When the loading of shaft and cores into the winder bearings is done by hand, lifting should be done by the operator and helper. A set of hooks attached to the winder can be used to facilitate handling the shaft into the bearings, thus relieving the operator and helper of an excessive amount of strenuous lifting.

Wearing loose clothing and jewelry should be discouraged among employees working on rewinders, and safety shoes should be a part of their wearing apparel.

When cranes are used to load and unload the rewinders, frequent inspections of the cables should be made to prevent breaking under load. If chain falls are used, frequent inspection should be made of that part of the chain which is in constant use.

Roll wagons used for moving stock to and from the rewinders should be kept in good condition and proper blocks should be used to prevent rolls from falling off the wagon while in transit.

The hazards involved in rotary cutting operations are for the most part similar to those encountered in the calendering and rewinding operations and are found mostly in loading and unloading the back-stands.

Here again it is necessary to keep crane cables and chain falls in proper condition so that continuous heavy loads can be handled without hazard.

Guarding of expansion pulleys and other moving parts is necessary to prevent operators from coming into contact with them in the normal course of their work.

Roll shafts should be kept in good condition to prevent breaking under load. Skids used in the cutting operations should be of the proper size and should be kept in good repair. Due to the nature of the work involved in cutting operations, all employees should be encouraged to wear safety shoes.



Here again jewelry and loose clothing should not be worn.

Sufficient working space should be provided in cutter operations wherever possible.

The hazards involved in the sorting operations are of a minor nature and can be kept under control by the use of proper handling equipment. Correct spacing of material in the working area, and the proper use of storage space will minimize the hazards. Paper cuts on the hands are the most frequent hazard and these need cause no concern if employees will get first-aid immediately.

The hazards in trimming and packing operations can be kept at a minimum by the use of proper handling equipment and by providing sufficient work space for employees.

The trimmer press undoubtedly is a hazardous piece of equipment, yet, with proper instructions to the operators, and with proper guarding of the rotating parts, the press can be operated safely.

Perhaps the hazard with which we are most concerned in packing operations involving roll, case, skid, carton, bundle, bales, and frames is the lack of sufficient space to handle peak loads. We cannot always anticipate

customer requirements and changes and as a result, we find roll packing operations overloaded at one period, and sheet operations overloaded at another period. It is almost impossible to strike a proper balance for any length of time and often it is necessary to shift employees from one operation to another in order to reduce the peak load in one particular place.

The shifting of employees from one job to another and from one department to another naturally constitutes a hazard. It is advisable for supervisors and foremen to retrain their employees when they move from one job to another about the dangers involved in their new work.

Considerable progress has been made in recent years in the paper industry in handling equipment. The use of power lift trucks, towing equipment, and power loading equipment has made the job easier; however, they often create new hazards. All employees operating power equipment should be instructed in the hazards involved and should be required to operate the equipment in such a manner as to protect themselves as well as others in the department.

## Selected Problems in Paper Products Manufacturing

(A Symposium)

Discussion Leader: H. H. ANDERSON, Personnel Supervisor, Marathon Corporation

### Bag Manufacturing Hazards

CLAYTON KEMP, Safety Engineer, Thilmany Pulp & Paper Company

### Waxing and Lamination Hazards

ROBERT D. GADGE, Superintendent, Wax and Parchment Production, Kalamazoo Vegetable Parchment Co.

### Asphalting Hazards

EMIL C. WOODMAN, Safety Engineer, The Ruberoid Company

### Carton Manufacturing Hazards

JOHN REIMER, Superintendent, Carton Manufacturing, Marathon Corporation

### Bag Manufacturing Hazards

MR. KEMP: In the manufacture of bags we do have ever present hazards that must be recognized to insure the safety of the worker. In this article I am going to describe safe practice at Thilmany.

First let us consider the principal hazards involved. Workers may be caught in external moving parts of machinery. Operators or adjusters are subject to the hazards of the internal moving parts of machinery and the chance of being struck by the striker bar when attempting to adjust or unchoke the machine when it is running. Others are subject to moving machine part hazards. There are hazards in the handling of material, rolls, bales, etc., and traffic hazards in the use of electric trucks, hand trucks, dollies, and skids. Oily or unkept floors subject the worker

to slipping and tripping hazards. Fire is a constant hazard and may break out around machinery, solvent areas and broke carriers.

Machine guarding is vitally important in the safety program. All machines must be carefully inspected and guarded. New machinery nearly always needs some guarding. All exposed gears, belts, pulleys, and other moving parts should be guarded. Heavy mesh guards should enclose the striker bars on the top arc of travel. Shafting is protected by casings entirely enclosing the shaft, or by a trough on the top, side or bottom as needed. The projecting ends of all shafts, bearings or hubs should be sleeved or guarded with a non-rotating cap. All open hand wheels should be disked. Extension oil applicators should be used where possible.

Personal protective equipment is a "must." Loose or improper clothing, flowing ties, rings, bracelets, wrist watches, and necklaces are not worn. Protective equipment must be worn when special hazards require, such as masks, hair covering, rubber gloves, safety shoes, goggles, etc. Delivery end of the machine should be of such a height as to prevent strain to take-off girls. Under-foot matting should be provided to prevent leg and back fatigue. Operators are provided with safety knives for cutting operations. Cuts should always be made away from the body. Locker room facilities must be provided for personal health and cleanliness.

In the housekeeping department racks are provided for core shafts, cores, bars, pipes, rails, and formers. Proper receptacles are provided for waste paper and bottles. Spillage of paste, oil and inks should be minimized through careful handling and all spills should be wiped up at once. All materials such as bales, rolls, etc. should be carefully stacked and blocked. Aides should be clearly marked and kept free of paper, trucks, and other material. Equipment should not be left standing in the aisles.

Operating rules provide that except where specifically provided for by his foreman, no employee is permitted to repair, oil, or adjust machinery or equipment while it is in motion. Safety rules given to all employees are as follows:

1. (a) Danger tags must be placed on all safety switches and starting buttons when the starting of such equipment might cause injury to employees or damage to goods or

equipment. Danger tags shall also be placed on all valves, levers, defective equipment, etc., when their operation or use may cause injury to employees or damage to goods or equipment.

(b) Danger tags must be signed and fastened securely by the party using them and must be removed only by him when the equipment is ready for use. No employee is permitted to attach a danger tag with the name of another employee on it. He must use his own tag, so it is readily known who to contact in case of necessity.

(c) Danger tags must be carried by all foremen, machine operators, and maintenance crews in their pockets, tool boxes, or other convenient places, but must not be indiscriminately left lying around when not in use.

(d) Padlocks have been supplied to foremen in departments and to maintenance men who regularly service and repair equipment. In all cases involving the shutting down of electrical equipment for repairs, adjustments, painting, etc., the safety switches must be locked in the open position by the employee responsible for the work in addition to placing his danger tag. If there are no other tags on the equipment the lock and tag must be removed when the work is completed and the equipment is O.K. to start.

2. Guards on machines should never be removed under any conditions, unless the machine is being repaired or not in operation. Guards taken off must be replaced before starting machines. Whenever changes on machines or equipment are necessary, which create dangerous conditions, either adequate temporary or permanent, guards must be provided before the equipment is operated.

Only operators, adjusters, or service men should move rolls or load the machine. Machine girls are not to do this work. Hoists and blocks are provided and should be used as necessary. Hands should be placed away from the pinch point when putting a shaft in the bearing. Shafts should be of sufficient length to prevent hands coming near the bearing. Block all rolls to prevent rolling.

Paste line valves should be cracked gradually on lines to prevent sudden out-gushing of paste on workers. Inspection of paste lines should be made to prevent rupture. Material handlers and truck operators should use cau-



tion in moving about the plant. Guard rails should be provided where workers are in the area adjacent to the storage area. Inspection, lubrication and maintenance of all trucks (power-hand) should be on a schedule. Operators of power driven trucks are personally responsible for operating efficiently and safely, but pedestrians should be alert to the traffic hazards present in areas where trucks are in use.

Under general safe practices where machines are in constant use, daily inspections are made by department men and monthly inspection is made by the safety committee. Regular fire inspection is made by the Plant Fire Chief. Daily inspection is made of all hoists, hoist cables and hooks, elevators and elevator gates, and rope slings. Adjustment and repair is covered under paragraph "G" on operating rules. General maintenance and floor conditions should be taken care of as they appear. Workers are cautioned not to sit on rolls, bales, skids, or bag boxes. All bridging used between cars and platforms or trucks and platforms must be securely fastened.

Safety spirit and cooperation help make the safety movement at Thimbury successful. We want our employees to enjoy their work. Safety is a vital part of it and is nothing more than the use of common sense and consideration of themselves and others.

#### Waxing and Lamination Hazards

MR. CAINE: One way of improving the accident experience in waxing departments would be to make it compulsory for each waxing supervisor to participate in a discussion, the preparation for which would require a study of the true facts.

We analyzed the accident history of the wax production department over a period of ten years—1937 through 1946. This department regularly employs approximately 180 men who work on a three-shift basis, 24 hours per day. Most of the equipment and materials handled are heavy. The production area is rather congested because of its expansion in recent years and the addition of overhead paper handling equipment.

We found that the type of accidents occurring in waxing operations parallel, to a large extent, those experienced in the plant as a whole; 93 per cent being in this category as against 7 per cent peculiar to waxing and laminating. We did find, however, that the

department's frequency rate was about 40 per cent higher on those accidents common to the entire plant. This appears to result from the unusual conditions involved in this process.

The total accidents occurring in our wax department during the 10-year period fall into nine general classifications:

|                            | Number | Per Cent |
|----------------------------|--------|----------|
| Struck by falling objects  | 59     | 24       |
| Caught between two objects | 51     | 20       |
| Struck against             | 48     | 17       |
| Struck by moving objects   | 10     | 4        |
| Slipped, causing strain    | 23     | 9        |
| Slipped and fell           | 17     | 7        |
| Slipped, dropped object    | 8      | 3        |
| Lifting, causing strain    | 23     | 9        |
| Miscellaneous              | 17     | 7        |
|                            | 250    | 100      |

You will note that 24 per cent of all accidents occurring in this department involved falling objects. It is particularly significant that 80 per cent of these resulted in injuries to the feet or toes. Although we have sold safety shoes to employees at cost for the last fifteen years, this spring we launched a campaign to encourage greater use of them. We conducted demonstrations of the protection afforded by the shoes, and ran pictures in our plant publication graphically showing how the shoes held up when Clark Tractors had been deliberately driven over the toes. In spite of the repeated "realistic propaganda," to date only 50 per cent of our employees wear safety shoes.

The next three groups in order of importance percentage-wise are "caught between two objects," "struck against," and "struck by swinging objects." They total 41 per cent and deal, in a very great majority of the cases, with the mis-handling of shafts and the improper use of several types of materials-handling equipment, such as: hoists, hangers on tracks, hand trucks, core racks, etc. A very small number of these injuries originate on exclusively waxing equipment. More than 60 per cent involve the fingers, hands and arms.

You will note from the types of accidents we appear to be quite simple: encourage employees to wear safety shoes and, after proper screening and selection of new employees, see that their indoctrination included careful explanation of the hazards involved, followed by proper instruction which will

enable them to develop safe work habits. An important part of this procedure, however, is periodic follow-up to see that the habits are forming.

I would like to combine the next four classifications because I feel they are closely related: "Slipped, causing strain; Slipped and fell; Slipped and dropped object; and Lifting, causing strain." These types constitute 48 per cent of our total injuries, and point up the importance of good housekeeping as regards wax and oil on the floor and equipment and, again, the absolute necessity of proper instruction in safe work methods in lifting and trucking.

This indicates, too, that precautionary maintenance and inspection of this equipment is essential. Periodic checking of all materials-handling tools and replacement of defective parts is a step in the right direction. We use a spot of paint on each part put back into use, the color of which indicates the date of inspection and that it was in satisfactory condition at that time.

From some of the statements I have made, you may get the impression that we endeavor to absolve ourselves from responsibility for accidents involving the mishandling or improper use of equipment. This is not true. On the contrary, our analysis revealed to us that 91 per cent of all accidents in the plant were of the human-failure type which could be the result of improper indoctrination, instruction and follow-up. This called for a revision in our safety philosophy. Heretofore, we had been led to believe that the good safety program was the one resulting in guards for every conceivable moving part. Now we are convinced that the best guard that can be installed is a "safety consciousness" in the minds of all employees.

#### Asphalt Hazards

MR. WOODMAN: Everyone in the roofing industry knows that asphalt, in its normal state, is perfectly harmless. The danger exists only because of the extremely high temperatures that we subject it to in meeting our production standards. Burns from hot asphalt are extremely painful and slow to heal. They always result in at least second degree burns and very often in third degree burns that cause much lost time.

Here is a typical burn case:

A forty year old employee, while working on a re-coating job suffered second and third

degree burns of the hands, arms, back, stomach, and head early today when a bucket of hot asphalt, which he was hoisting to the roof, spilled over him. While he was hoisting the bucket, a sudden gust of wind swung it against his head, knocking him down and dumping the contents of hot asphalt over him.

You may draw your own conclusions as to the cause and correction of this serious accident. It clearly indicates how a simple operation, when done the wrong way, can bring about terrible suffering and pain and, possibly death.

Years ago we used a paper cone, made out of dry felt, to carry hot asphalt to the point where it was needed. Very often the asphalt would leak through this paper cone resulting in burns to fingers and hands. We discarded the cone method and substituted the use of a long-handled steel ladle for this purpose and obtained very satisfactory results.

There was a time when we used hot asphalt for sealing canons. We applied it with a hand brush dipped into a pail of hot asphalt. This method was extremely hazardous and produced many serious burns. We changed to silicate paste and then later to a glue banding paper and eliminated the hazard entirely.

In filling drums with hot asphalt we had trouble in the re-coating process. Hot asphalt, after a twenty-four hour cooling period shrinks considerably; therefore, the drums had to be refilled. This meant that the operator was required to work from the top of the drums, a very hazardous operation. Planks were laid across the top of the drums and, once in a great while, the operator would make a mis-step off of the plank and into a partially cooled drum of asphalt, always hot enough to produce a third degree burn.

We provided a wider and better platform for this operation, but this did not eliminate the hazard.

Our method of filling these drums from the top was definitely a wrong procedure and we knew it. It had to be changed.

We solved this hazard by leaving a 30' aisleway between every fourth and fifth row of drums, allowing the operator ample room to re-coat the drums from the floor level.

Standard protective equipment for our employees who work around hot asphalt consists of spectacle-type goggles, full coverage wearing apparel including long sleeves, gloves



(not gauntlet type), good safety shoes, and in the barreling departments in addition to the above our men wear spats.

Through many years of experience I am deeply convinced that there is one outstanding mechanical hazard in the roofing industry that transcends all others. I am referring to unguarded, in-running nip rolls. These rolls may be pull rolls, squeeze rolls, calendar rolls, coating rolls, indenting rolls, needle rolls, or any other kind of rolls. If they are unguarded on the in-running nip side, they are a definite major hazard in your plant. Their locations on the machine do not lessen the danger whatsoever—they may be only two feet from the floor or 16 feet. Give these exposures time and, sooner or later, you will find them making cripples of your strong men. When that day comes, you will be simply persuaded for life that these nip hazards should be adequately guarded, and no one under the sun will ever be able to remove that conviction from you.

Here is a bitter experience that we faced back in 1934 and 1936, yet, is crystal clear in my mind today. We were working on a new product—which meant new machines, new equipment, new methods, and new hazards. On one machine the paper passed through a couple of indenting rolls which were located about 10 feet from the floor. Of course, the question of guarding came up and a special committee was selected to check the hazard.

Conclusions reached by the committee were as follows:

1. Because of the remote location, they considered guarding unnecessary.
2. The rolls were controlled by the operator who stood directly below them while the machine was running.
3. No man ever needed to go up to these rolls when the machine was in operation.

Nothing happened for two long years, then the unexpected happened. One of our experienced older men climbed up on the nip side of these rolls directly in front of the operator. The long spout of his oil can became caught in the nip, and he tried desperately to jerk it out with the net result that his hand and arm followed the can. Whenever I see that man with his empty sleeve, I can't help but say to myself, "There is a living example of one of our outstanding failures."

The industrial powered lift trucks that have

recently invaded our industry brought another hazard. Many are unaware of its presence. How many of your lift trucks are equipped with an overhead protective guard? The hazard of falling material is ever present whenever material is stacked higher than the level of our trucks. To me, every powered lift should be equipped with a sturdy, overhead protective guard on it. It should be standard equipment.

I think we can all agree that overheated stills or reheaters are fire hazards. When we see asphalt fumes turning to a dark yellow color, we know that we are dangerously close to a flash point which requires immediate action in cutting down the fire plus the opening of steam into the stills, or we can expect serious trouble.

We have found in addition to steam control lines in our stills or heaters that it is a good precautionary measure to have them in the furnace part of the still as well. Kettles have been known to spring leaks or in some cases are overloaded so that the asphalt has found its way down into the fire box. When that occurs you have a fire that really is a fire.

Asphalt stills can be equipped with automatic safety control units both for temperature and flame control purposes.

Around our saturator is another spot where fires have a habit of showing up. Cellulose in the dry felt is one of its causes. Automatic foamite control units in addition to steam controls, plus plenty of first-aid fire extinguishers, and personnel trained in their use, plus a good sprinkler system, will do much to control them.

#### Carton Manufacturing Hazards

MR. REIDMER: I am going to follow our production line in our carton department at Menasha and list the hazards that have caused us the most lost time accidents and tell what we have done about them.

First of all, the board used in making cartons is shipped to us both in cartoned lots and truckload shipments. A lot of this stock weighs approximately a ton and a half to two tons. Until recently, probably two or three years ago, we unloaded this with a hand lift-truck, pulling it over very slippery, wet, oily, and rough floors. This was very fatiguing work and led to back strain.

We now have power hand trucks which one man can handle. A power hand truck

will push the man along and right there created another hazard. Our men would get on these hand trucks and ride them, which is very dangerous. We had to issue instructions that men were not allowed to ride hand trucks.

Our next operation is that of printing. We have a printing press similar to those which print wax paper, newsprint and so forth. These have a series of gears on both sides of the press, from one end of the press to the other. We have put on a program of guarding all gears. If we get a suggestion from an employer or a supervisor about guarding a gear that they think we have missed, and we cannot make a metal guard immediately, we put a temporary wood guard on immediately. We do not let it ride. If a man is good enough to give us the suggestion, we think we should do something about it immediately.

All presses have a catwalk around them where the men stand altitude to inspect sheets, feed sheets into the press and do various other operations. These catwalks have a railing around them so the man cannot fall off of them.

In a press operation, it is necessary to put plates on the cylinder. This requires what we call latching the press around—that is moving the press a couple of inches at a time. We have found this to be a hazard because when a man has pushed this inch button, expecting the press to move a few inches, the press has often started up. You can all realize what a hazard that would be to a man operating in between the press if the press started up. We have eliminated this by getting the best electrical switch that we know of. We haven't had any trouble since.

Our next operation is that of cutting and creasing carton board. I think this machine is the most hazardous one in carton manufacturing. It has a large drum which turns to a permanent position, at thirty or forty revolutions a minute, with a large bed weighing several tons, moving back and forth underneath the cylinder. It is necessary to feed this machine by having a man sit at the side of the machine and feed sheets into the press. When he is feeding in this position, he has his feet directly over this die that moves back and forth. He is on a board about twelve inches wide to fifteen inches wide. Recently one of our men had his foot fall off this board and it got down in the

machine and he lost practically his whole leg. That is the first time we have known of an accident such as this. But, as we look at it now, we wonder why we passed up this hazard for thirty-five or forty years. It is so obvious a hazard now.

The machine on which this injury occurred is in a plant one hundred miles away from our plant at Menasha. We have guarded all our machines for this hazard now, but the fellows at Menasha honestly think we have done the wrong thing, because they don't see how it could happen to them. But, it can happen.

Along those lines, we have now taken another look at that machine and put more guards on it. We have found some hazards we didn't see before. We now have awakened to the fact that this machine is a very dangerous one.

Another serious operation in this machine is putting on what we call a "Mac" rail to cut the scores for the next job. To do this, a man must stand directly on the bed of the machine which moves back and forth, and we insist that this man lock the switch on this machine so it is going to be impossible to start.

Our next operation is tied in very closely to the cutting and creasing operation, and that is stripping cartons. This operation consists of stripping individual cartons out of a sheet, 15x160. At Menasha two men with hammers knock out the cartons. We have found that on numerous occasions, these men have struck their hammers together and chips have broken off and penetrated the men's arms. We haven't eliminated that hazard as yet. We are experimenting with different types of hammers, where one end of the hammer is soft enough so that if it is hit by another hammer, it will not chip off. We have tried that, and it looks as though it is going to help.

Our next operation is that of waxing cartons. We heat wax to 150-180 degrees. We do this by high pressure steam. All our rolls contain steam and they must be pressure tested to prevent a failure.

The hot wax is enclosed so that no one can stick his hand into it and it can't splash out.

The next step is that of gluing the cartons. A gluing machine, as safety hazards go, is almost free of hazards. True, it does have a lot of gears. We guard every gear completely



and both sides of the gears, so there is no chance of anyone getting hurt.

In our carton plant now, we keep the aisles clear. They are always ten and in some cases, twelve feet wide. We have the aisles marked.

In one of our departments, we have a housekeeping committee that meets with the supervisors once a month. They are a union committee. They bring in suggestions on safety and housekeeping. They discuss the various problems that they have encountered since the last meeting and it is the duty of the supervisor to keep records of those meetings and do whatever seems feasible. Every year, we have a new committee. It is appointed by the union and they try to get all their members interested.

We have a registered nurse on the day shift. We have first aid on all the other shifts so that anyone injured at any time, no matter whether it is a slash or paper cut, can be treated. We have found that the men go to the nurse no matter how small their cuts. These first aid men are trained by specialists and they are paid for all time spent in taking this training. The nurse on the day shift makes out a report of every accident and sends it to the supervisor the next day. This report gives him an indication of where the trouble is occurring.

MR. OWEN (Richardson Company): I would like to ask Mr. Reimer if he has had any trouble with pieces coming out of the dies when they are nicked and getting into the employees' eyes?

MR. REIMER: We haven't had that trouble.

CHAIRMAN ADERHOLD: Do you require goggles?

MR. OWEN: Yes.

CHAIRMAN ADERHOLD: Does that take care of it?

MR. OWEN: Yes.

MR. WAGNER (Chalkothke): I would like to address a question to Mr. Kemp about wearing safety shoes. Is that made compulsory throughout the plant or only in certain departments?

MR. KEMP: It is not compulsory from the standpoint of the job, but on a recent check, we find we have 80 per cent coverage and the good-will has been steadily growing. In later years, it has jumped about 30 per cent. In the last six months, it has made about a 25 per cent jump. Now, the so per

cent that are not covered are not required to wear safety shoes in the first place and we do not have to push a sales program. In our plant, it seems at the present time, at least, that the quality of the shoes with the new size steel cap under the toe, and the reasonable prices are selling them.

I find that the moccasin-toe oxford for our young fellows and the haced toe shoe that looks like a basketball shoe attract those who are reluctant to wear safety shoes. Go out and find out what they want. I went out and found out what their reason was for not wearing them. We didn't have what they wanted. We scouted around and got what they wanted. I can't think of a man in our shipping crew in either mill who would put anything on his foot, except the laced-toe shoe. And they never wore them before. That gang is doing a lot of athletic work—pushing and pulling on the job. This athletic-type shoe suggests they are athletic. It builds up their self-esteem.

Another thing: shoe companies are now making specific shoes for specific jobs. There is a shoe to satisfy a man who has to work under oily conditions. The shoe gives him the things he thinks he wants and needs. So far, I haven't had one complaint of a shoe hurting a man's foot. During the war there were a few complaints because they were not grade one shoes. The company made good and it didn't cost the men any money. We sell the shoes to them at absolute cost in those departments where we require them.

MISS FALLEN (Rhineclander Paper): I would like to ask Mr. Kemp a question. He spoke of the safety knife that they use in removing slabs. What kind of a knife is that?

MR. KEMP: The knife, first of all, fits on two fingers and a left-handed girl is not used on these particular machines. It is used for cutting the string on the bag wrap where necessary. It is curved so there is room for the string to be cut, to get between the fingers and the blade of the knife, but the finger of the girl comes in contact only with the blunt end of the knife and not the knife itself. It is not a true ring knife. We have altered it a bit to make it a little smaller.

MEMBER: She meant, I think, for cutting the slabs of paper.

MR. KEMP: The slab knife we used before seeing the one under discussion was one that you pull toward you. Speaking of cutting, we have made a cutting table on which we use

our safety knife and whenever we cut up a butt roll of paper now, it must be cut on the table. The table is hip high and takes the direction of cut away from the body, so if the knife goes beyond it, it goes past the body.

The blade is made of steel, one-half inch wide and approximately three inches long and  $\frac{1}{16}$  of an inch thick. There is a handle on the front of the knife and a handle on the back of it. Thus it is used as a draw knife. The safety factor that is in the knife itself is that the hand that is drawing the paper is protected by steel underneath the knuckles so that as you draw the knife, it cannot get away. The left hand is placed on it, bearing down on the handle and as you pull it away from you, you just can't get your hands in

there and cut yourself. We have never had anyone cut himself with it. But before we adopted the cutting tables, we had one fellow who cut himself in the groin. He was straddling the table.

MR. BIENVENU: What is the advantage of drawing it towards you?

MR. KEMP: There isn't any. We are experimenting. Unless you can find something to control the depth of cut and keep it continuous, we will have to pull. Nothing has been devised.

MR. BIENVENU: Can't you put a level guide on that?

MR. KEMP: It appears as though it will continuously dig and when you get into wax paper, it lifts itself right up. This one did a fair job on our wax.

### WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: R. W. LAUGHLIN, Supervisor, Loss Prevention Department, Liberty Mutual Insurance Company

### The Foreman's Responsibility for Safety in Woods Operations

By ALBEN KEENAN

Assistant Superintendent, Woods Operations, Hollingsworth and Whitney Company

It is well known to all of you that woods operations enjoy the dubious honor of being the second most hazardous occupation. Mining is the only occupation which has a lower standing in the National Safety list.

There are many reasons for the frequency and variety of woods accidents. Some of them are: The nature of the work itself—hard work and heavy labor using sharp pointed and sharp edged tools; varying weather conditions; wide and varied ground area covered by the average job; and floating labor supply with a consequent high labor turnover, making it difficult to train the men. Last, but not least, there is the fact that the development of safety consciousness and safety training programs for the woods have not received as much time and attention as they have in mills and factories. Many companies who scan their factory accident records closely accept woods accidents, with their resulting high costs, as something which are inevitable

and can't be helped.

Woods accidents cost a lot of money. Insurance rates on woods operations bring this point out very sharply. Not only do we have many accidents but we have many serious accidents, fatalities, broken bones and loss of limbs and eyes. Many employers have now come to the conclusion that something can be done about it and are proceeding to do it. They are installing definite, carefully worked out safety programs.

Woods safety programs, like all other successful programs, must have the active support of top management to be successful. This support should be carried down the line through the supervisory personnel, the foremen, directly to the workmen involved.

The foreman is by far the most important cog in the operation of any woods safety campaign. Conditions in the woods vary widely. One 10,000 cord job may cover an area of 1,000 acres or even more. Men are scattered



over different parts of this ground, and the foreman is the man who sees them all, if not every day, at least several times weekly. The camp may be isolated, visited by supervisors at infrequent intervals. Weather conditions change and hazards come and go with the changes. A snowfall may bring slippery ground conditions. In such cases, it is his responsibility to see that icy steps or walks in camp are sanded.

He has always been held responsible for the safety of the horses working in his camp and in most cases he looks after them and checks on their working conditions. If he has the same interest in keeping his men accident-free, he can be a powerful force for accident prevention.

Stream driving is a very good example of rapidly changing conditions in logging. A pile of wood which is safe to work on today may be undermined by the day's driving, with recurrent beds of water digging at the snow base on which it rests. If the pile falls into a heavy rush of water, a fatal accident may easily result. The foreman should check these hazards constantly and shift his crew accordingly.

The program pointed at the foreman should be started by a series of meetings on different operations at which these men are told the cost of accidents both in hospital bills and compensation costs. Their direct responsibility for accident prevention should be pointed out to them and methods which will lower the frequency rates should be explained to them. These meetings should be repeated from time to time after starting the safety campaign, and records of various camps discussed. Causes of individual accidents can be reviewed, and specific instances of poor safety practices should be pointed out.

Woods accidents in the Northeast follow a very definite pattern. During the cutting season, axe wounds make up a heavy percentage

of all accidents. Injuries caused by logs being switched to yards come next. These injuries are often serious, resulting in broken bones or severe bruises. Falling limbs and kick-back from trees during felling operations are also responsible for many serious accidents. During the snow hauling season, pulp hook wounds and back injuries take the lead.

A program which stresses one type of accident a month has worked out well in many cases. The month of September, for instance, may be designated as the month in which special attention will be given to the prevention of axe wounds. Posters stressing safe methods can be used and the foreman is instructed to be especially watchful for unsafe practices used by his cutters. During January, pulp hook wounds may receive the major share of attention.

One of the best methods of arousing and maintaining interest is competition between camps and operations. This has been used in plant safety for a long time, and it is just as effective in woods operations. Monthly frequency figures are prepared and distributed, both for individual camps and for operations as a whole. No one likes to stay constantly in the lower brackets in such a competition.

Entertainments, such as special movies, suppers, etc. can be given as a reward to the winning camp each month with some separate reward to the foreman for his part in a good job.

Without the active interest and cooperation of the foreman on the job, any attempt to improve safety performance has two strikes on it at the start. If he does not know or care how his camp stands, the use of posters, manuals, etc. can at best effect only a limited improvement. The most important part of the program is in his hands, and his performance, good or bad, will directly affect the result.

### Some Approaches to Accident Prevention in Woods Operations

By DR. ARNOLD E. HANSON

Director of Company Relations, Brown Company

Are we attacking the accident-prevention problem as energetically and fundamentally

in our woods operations as we are in our mill operations?

I determined to get an answer to that very question. I wanted to bring you some data and some illustrations of woods safety programs that matched those in the mill operations of many companies.

It didn't take long for me to learn that I wouldn't find many such illustrations. I did come upon some encouraging examples where combined training and accident-prevention drives in woods operations had in them many of the elements which are common to the well-rounded safety programs now fairly typical of mill operations. The most unique program I learned about was that conducted in a C.C.C. camp where 160 young men performed most of the jobs usually associated with a woods camp and operated 18 months without a lost-time accident. The record claimed is especially significant when one recalls that the operations included the felling of trees, the handling of explosives, axes, saws, and the use of mechanized equipment.

At any rate, in preparing this talk I turned my attention from gathering illustrations to exploring another question; namely, what are the fundamentals in an accident prevention program in woods operations? If we ran our safety programs in the woods like those in the mills what would we do?

The answer to this question isn't so difficult, is it? We know first of all that we would put an intensive effort upon investigation. We'd want to be sure we had all the facts surrounding a lost-time accident. We'd want correct facts. We'd want enough facts to know how to prevent a recurrence of that accident. And we wouldn't believe we really knew enough to make a sensible surmise until we had all the pertinent facts that come from an adequate investigation. We wouldn't trust our judgments until we were sure of those pertinent facts.

Again, once having the facts, we would make sure they are turned into our Safety Division for use. The mill safety director shouts to high heaven if he isn't immediately given all necessary facts regarding accidents in mill operations, and he ought to do so. I know that woods operations present a much more difficult problem here because of their comparative isolation and removal from the rest of the company's operations. Yet, there are too many trucks moving in and out of the operations regularly. Often there are the company's own telephone lines. Once we get those facts, we would analyze

them for cause and remedy. We'd analyze not only individual cases, but groups of cases.

In short, we'd investigate thoroughly and then use the results of the investigation effectively.

Secondly, we'd initiate remedial measures. Like a good golfer, we'd "follow through." It is a truism to say that we should profit by our mistakes . . . by our accidents. Now we don't need to be hit twice to initiate a remedial program. Once is too often in accidents.

Neither do we need to cast about for the point of emphasis in initiating a remedial program. The investigation and analysis tell their part of the story. The rest has to do with protective personal equipment, guards, improved maintenance, preventive training, inspection, proper use of tools and equipment, proper care of those tools, effective materials handling, improvements in methods, and improved working conditions.

There are many mill programs where a superb job is done in engaging and holding interest in accident prevention. They make a business of it. Interest is the life spark that makes the safety program work.

It's amusing, sometimes, how this awakening and maintaining of interest motivates an effort on our part—even when we know it is being used on us.

Interest is the motivating and directive force to effort. It works on us even when we know it is being done. We have plenty of help from the industrial psychologists on how interest is awakened and sustained, of how "the bonds can be placed in readiness and kept in readiness to act." The most common devices are contests, and recognition and rewards for successful achievement. Well-directed publicity has its place. Participation in safety meetings we have all need to advantage. Committee work is an interest builder, if there is a challenging program for the committee to work on. Visual aids have proved useful. Suggestion systems have been tried. Entertainment programs for camps with good safety records have proved effective. Training programs, especially for foremen, have been good interest builders. And you could mention many more.

Interest is the driving force, and we know quite a bit about how to arouse and maintain it.

Finally, a good safety program, whether in mills or in woods, has another factor ever-



present in it—instruction. We have a whole body of useful information available to us in the field of industrial training. We know how to analyze a job for its teaching elements, we know how to analyze that job for potential accident hazards, we know how to organize this material into "teachable units," and we know quite a bit about how to put the stuff over effectively. We don't need to "start from scratch" here. All we need to do is use what is ready at hand. Our mill operations have done a better job of this activity than our woods operations have, and yet the value of the instruction is as great in the one as in the other.

And there we have it. These are the elements that seem to be basic and fundamental in good safety programs in our mill operations. They are identical requirements for our

woods operations. Just four simple requirements.

Investigate  
Initiate  
Interest  
Instruct

The four "I's" of a sound safety program—and there you have it.

I suppose we know all this in the abstract. Yet I keep recalling to mind the statement that has been voiced here several times this afternoon; namely, that "we haven't gone at this job as fundamentally in the woods as we have in the mills." I wonder if we know it in the abstract but not in the concrete.

At any rate, we know what the fundamental factors of a sound program are. It takes only two eyes to see the problem. But it will take the four "I's" to whip it.

#### THURSDAY AFTERNOON-SESSION

October 9, 1947

Presiding: GEORGE W. HARPER, Safety Director, The Mead Corporation

#### Four Round Table Discussions

##### Introduction

Presiding—GEORGE W. HARPER, Safety Div., The Mead Corporation

To the best of our knowledge, this was the first time that the round table was used as a major program at the National Safety Congress. This was a new method of presenting safety information. In all, four conferences were held, each running concurrently. Each of the four major phases of the paper industry operations was treated independently. The first conference was on Woods and Logging Operations; the second conference on Woodyard and Pulp Mills; the third conference on Paper Machines and Finishing; and the fourth conference on Paper Converting and Paper Products.

The delegate seeking knowledge on a particular point attended the conference, sitting down at the table assigned to his subject, asked his question and took part in the discussion which followed. Each conference had a conference leader, who directed and con-

trolled the flow of discussion. In addition, each conference had an expert who offered his solution to the problem when asked, and summarized the information whenever a discussion became too lengthy.

One feature of these conferences was the fact that the items discussed were of a specific nature. General questions with regard to safety programs, personal protective equipment, compensation and medical care were, in general, not topics of these meetings. The engineering phase of pulp and paper safety formed the bulk of the questions asked and answered.

The give and take of safety information, the difference of opinions expressed, and the specific nature of the topics discussed all blended to make these safety conferences a most interesting and valuable contribution to the Pulp and Paper Section.

#### Conference No. 1. Woods and Logging Operations

Leader: R. W. LAUGHLIN, Resident Engineer, Liberty Mutual Insurance Company  
Expert: R. W. CROUCHER, Safety Officer, Minnesota & Ontario Paper Company  
Recorder: E. A. PAGE, Superintendent of Personnel, Kimberly-Clark Corporation

#### PRELIMINARY DISCUSSION

Mr. Dickinson of the National Bureau of Standards, Washington D. C., asked for suggestions and volunteers to help in revising the American Standards Association codes on Pulpwood Logging. The following names were suggested as men who might help with this undertaking: Mr. Don Adair, representing the West Coast; Gordon R. Connor, President of the Timber Producing Association; Don Eisenack of Duluth; and Mr. Foster, New England States. Mr. Dickinson offered to send anyone requesting it a copy of the old ASA Code if they would write him at the above address.

#### DISCUSSION

1. What safe practices are necessary concerning large piles of pulpwood?

Reference was made particularly to large piles of 8" wood, both peeled and unpeeled, piled about 35' high and a half mile long. It was pointed out that deterioration sets in in hardwood that is piled, and after about eighteen months it must be used. It was decided that two years' time is too long to let wood stay in the pile. Discussion brought out that on soft wood one year is perfectly safe, but after two years there was considerable worm damage in the bottom tiers.

2. What type of medical service is best for isolated logging operations?

In the Southwest, it is a customary solution to the problem to get in touch with a doctor as near as possible to the operation and make arrangements for him to attend injuries in the camp. In this locality, the operations have good roads and are well connected with telephones so this method adequately takes care of the problem.

In discussing another type of operation where you have a true lumber camp, and it is sometimes 25 or 30 miles to the nearest doctor, a radio hook-up between camps can be maintained so hourly contacts with base operations is possible. A contract doctor makes the rounds of the camps regularly.

In British Columbia, it was pointed out that some remote operations have train service but once a week, and the camps must necessarily depend on trained first-aid attendants who are of a very high type. Discussion brought out the fact that in isolated camps a two-way radio was almost a necessity.

An additional problem was pointed out

where the some of the crew's work is two or three hours from a base camp. In this type of operation, it was generally agreed that first-aid kits should be available to crews. It was pointed out that permanently appointed well-trained first-aid men are a must in any type of camp or crew operations.

One member pointed out that they have a kit which contains both first-aid and medical supplies. He indicated that medical supplies are requested through the doctors. In addition, he stated that in their larger camps they have a full-time registered nurse who is stationed in the headquarters camp with a small field hospital which will gradually be enlarged to six-bed size. The type of nurse suitable for this work must be capable and, of course, have the required training. In this particular situation, they try to hire the wife of a man who is working in the camp. A nurse in this type of operation must have considerable leeway and this can be obtained by having permanent standing orders issued by the physician in charge.

3. How can I sell our safety rule which prohibits the use of double-bitted axes?

The discussion leader stated that we have actually two questions involved in the above. In the first place, it was pointed out that in Michigan and Wisconsin the practice of using double-bitted axes was quite general and that a logger would not be able to do his work as well if a single-bitted axe were forced on him. On the other hand, in Maine a single-bitted axe was a good deal more common. It was pointed out that twenty years ago the double-bitted axe was quite common in New England. The single-bitted axe is in use where greener men are very often employed.

The second part of the question dealt with the enforcement of a published rule. It was generally conceded that where the rule was in force the company should see to it that only single bitted axes were available.

4. What is the proper way to carry an axe?

It was the consensus of opinion that where an axe is to be transported any distance, the cutting edge should be covered with a guard. For short distances, it should be carried with the head close to the head of the axe; single-bitted axes, the cutting edge should be down. A guard was described which is made from heavy rubber inner tubes and can be slipped over the head of the axe while carrying it. It was pointed out that whenever axes are



transported in crew cars a light rack should be provided for storage.

5. How do you prevent accidents with wood hooks?

The discussion leader pointed out that the pulp hook he referred to was similar to a cargo hook and that there were many types, including D-handles, loop handles, and long handles. The type of accident most common from wood hooks is that of thigh or leg puncture wounds. It was pointed out that in order to prevent slipping with wood hooks, they must be kept very sharp. The discussion brought out the fact that a star point could well be used on most types of wood, thus shearing the fibers and producing a better hold than the needle point hook which has a tendency to slip through the fibers.

With regard to handles, it was stated that they had tried many types of handles. One concern has eliminated the use of the D-handle and the loop handle and are using hooks with a wooden grip. Many firms are attempting to standardize, making all hooks alike and training men to properly use them. It was brought out that the picaroon type of wood hook is very much in favor where the log has to be pulled. However, it was pointed out that where you have to lift the end of the log and throw it onto the pile or truck. The discussion leader pointed out that he had recently made a study of wood hooks and had a leader showing different designs.

#### Conference No. 2: Wood Yards and Pulp Mills

Leader: C. L. R. DOUGHERTY, Asst. Mgr.-Ind. Relations, Union Bag and Paper Corporation, Savannah, Georgia

Expert: FRID T. MORRISH, Safety Officer, Ontario-Minnesota Paper Company, Fort Francis, Ontario, Canada

Recorder: E. V. JOHNSON, Safety Director, Kimberly-Clark Corporation, Neenah, Wisconsin

#### DISCUSSION

1. How do you prevent puncture wounds caused by hand hooks?

In the Minnesota-Ontario Paper Company, they have eliminated the use of hand hooks and are substituting picaroons. The Flinchbaugh Company is using a thin guard, as well as a heavy leather apron, which has eliminated this type of accident in the mill for the last eighteen months. Another concern is using a fiber shish guard with a special addition that runs down into the safety shoe and is put on by their own shoe outfit at the plant. This gentleman further stated that

He stated that he would be willing to supply this to anyone requesting it.

6. How can interest in safety be aroused and maintained among logging crews?

One member stated that they hold a general meeting of all men in the camp, asking them to elect a safety representative. Also each month a crew went without a lost-time accident a ten-dollar award was given. This was put into a "kitty," to be used by the men as they indicated. This led to older employees checking on new ones and correcting their unsafe acts. Another method was to appoint an accident investigating committee from among the employees who would determine responsibility and make recommendations to prevent recurrence. A point was made that it is necessary to indicate to the worker just what was done wrong in order to convince him that accidents can be prevented. A discussion as to the value of accident forms filled out by employees indicated that one could not depend too much upon their validity. It is up to management to insist that accident reports are made out. In summing it up, the leader indicated that employees' concerns are valuable and that systematic training was essential but that any system needed the backing of management to make it effective. Regardless of the part employees play, it is necessary for the supervisors to be trained in safety and it is up to them to stimulate interest and, at the same time, enforce the safety rules.

the picaroon which they use is about half the weight of the ordinary picaroon and has a one-inch blade instead of the usual 2 1/4" blade. He further stated that they were trying out a fiber strap on the left forearm.

2. Is anyone using a dull point on the end of the picaroon?

In the North, it is essential that a different type point be placed on the picaroon during the winter months; otherwise, efficiency is lost. One of the members mentioned that they were using the "boston hook" for unloading wood but it was not very satisfactory on frozen wood. With regard to points on picar-

oons, it is customary practice in Cloquet, Minnesota for each man to take his tool to the blacksmith who modifies it to suit his personal like and dislike. They then keep the picaroon as their own tool and will not permit any other to use it. He further stated that a daily inspection is made of picaroons and tools by the foreman on the job.

3. How do you use a pike pole safely?

A representative of the Minnesota-Ontario Paper Company stated that they use pike poles and side hooks. No man is expected to handle these tools until he has been instructed by an old hand and further checked up on to make certain that he knows what he is to do.

4. Do you use tetanus anti-toxin following a puncture wound injury?

A showing of hands was asked for on this question and the majority of companies follow this procedure. Care must be used to be certain that tetanus inoculation is not given when a man has had it recently. Always check the patient's history before giving tetanus anti-toxin.

5. Do you permit men to sharpen their own picaroons?

It was pointed out that when men are permitted to sharpen their own picaroons many of them are not familiar with the operation of grindstones and in the grinding process they may reduce the quality of the picaroons. It was generally agreed that the best thing to do is to have a trained man to take care of this sharpening work.

6. What operations in your plant require the use of a safety belt?

The leader explained that he was particularly interested in those who walk alongside of conveyors and use poles to release minor plug-ups. A member present from Kimberly-Clark Corporation stated that when men work alongside conveyors they are required to use safety belts. It was pointed out that in most of the companies where they have chippers, in addition to safety belts, the men are required to wear goggles. Kick-back guards are essential on chippers, as well as safety belts. These guards catch the flying chips and large pieces that might otherwise cause injury.

7. What precautions are used when changing knives?

At the Flinchbaugh Company, they always pull

the electric switches but do not lock them because mechanics and electricians work very closely together. Comment was made that men working on the chipper realize the great hazard of the operation and take the pains necessary to prevent an injury.

8. Do you do your piling of wood by hand or mechanically?

This problem was presented because the log piles and the method used very often create a hazard to the men involved. It was pointed out that in some cases the apparatus has a drag-line attached with an orange peel bucket which is used to knock down the overhanging wood. The overhanging in this type of piling is caused primarily from short lengths of pulp wood so the problem is one common to the Northern mills. It was noted that a description of this drag-line principle is forthcoming in a new Data Sheet.

9. What are the principal injuries in handling short logs?

In the Northern part of the country, two principal injuries are hernias resulting from lifting near the chipper or grinder, and skin troubles resulting from hands being in the water.

10. How much use is made of hard hats in pulp mill operations?

The leader pointed out that all maintenance men in his plant wear hard hats. It was found that this was not common practice in the plants represented at the conference.

11. What are some of the major hazards around the digesters?

The leader pointed out that it is good practice to have the "cook" assume full responsibilities for this operation and that the other men connected with it should report to him. Proper safety supervision is necessary so that operations follow in sequence. Strict adherence to all operating rules is essential.

12. What kind of elevators or lifts are used within pulp mill buildings?

Several mills use a Humphrey lift, which is an endless conveyor. The question was raised with regard to the complete safety of this operation when men are permitted to ride this conveyor between various floors in the building.

13. What type of respirators are used by companies in handling dusty pulp materials?

It was agreed that the men handling the materials do not find respirators comfortable





enough and it was an operation of the majority that equipment can be used by the men, even though they were equipped by

the company. Specific instances were cited of certain types of respirators which could be used under various conditions.

#### Conference on Paper Machines and Finishing

Leader: D. J. BRETT, Safety Engineer, National Container Corporation, Jacksonville, Florida  
 Expert: WILLIAM C. BERTHELETT, Paper, The Mead Corporation, Charlotte, Ohio  
 Recorder: H. A. GORDON, Maintenance & Safety Engineer, Strathmore Paper Company, West Springfield, Massachusetts

#### DISCUSSION

1. Is it necessary for machines even to run in the mill?

No. When high speed is used by running is of no consequence. This was the conclusion of men who represented companies with machines running 775 fpm, 990 fpm, 940" wide running 1000 fpm, as well as those operating at slow speeds.

2. What type of safety devices are used on Conmacr Winders?

One company has an angle iron guard 12" or 14" in front of the roll being wound. This iron can be raised or lowered.

It was thought that this question referred to guarding the entering nip of a winder roll. In an ordinary type of Conmacr or Langston winder that uses a rider roll, no reason could be seen for guarding it on the back side. But it is important to keep the nip guarded.

One mill has a rule that a roll being wound cannot be touched until it is 10" or more in diameter, and there is a guard in front of the nip. A guard 6" high which will prevent anyone from going into nip, and which has a spring arrangement so that it cannot drop down, has been devised.

An angle iron guard made out of light metal, with two rollers inserted on the back and riding against the roll being wound, will do. As the roll increases in diameter, the guard will be pushed back so that it is always against the roll. And the two rollers do not mark the paper being wound.

Another mill has the rollers running against the shaft so as not to wear the paper, and that works all right.

3. How do you prevent telescoping of rolls on the winder shaft?

Many mills use rope to feed the paper onto the shaft as a roll is being wound up, to prevent its telescoping. This has always been a very hazardous operation.

Winder rollers are used by many in place of rope. Sketches were shown of these.

Another mill has devised a scheme to prevent the loops of rope from forming on the shaft, which is where the principal danger lies.

4. Are direct drives being used on your Conmacr Winders?

A big improvement, eliminating the clutch, has been made by the Rolland Electric & Engineering Company. The Mead Corporation is using such direct drives.

5. (a) Are safety belts used when feeding hydropulpers?

No. In most all cases, the hydropulper is completely enclosed or is so high as to make it improbable that a man would fall into it.

(b) How do you lower your men into the hydropulper to clean it?

One company has a 30" x 30" wooden platform that is used in the hydropulper for the man to stand upon.

All companies agree that the switch must be locked before the man enters the hydropulper. One company leaves a man at the switch, and a millwright takes off the spout.

Another company, which feeds from two floors above, has a problem on how to get the man into the hydropulper. To use a ladder is almost impossible. They use a boat-swain's chair.

(c) How often do you clean your hydropulper?

Once a week, once every tour, and once every 24 hours were the answers.

6. What type of device do you use to prevent rolls from turning on the core?

An expanding shaft or core collars and screws.

7. What method do you use to thread the rewinder?

In some mills, three or four men are required to thread the rewinder on the start-up. If the fourth hand is not watching carefully, there is danger of catching the other

men's fingers. Now a single man is used, the paper being torn so that it will feed in a tail, thus removing the possibility of injuring the other men.

8. How do you prevent men working on power equipment?

(a) All require some protective device that the men himself controls.

(b) Some use tags, made of leather, steel, metal, or some other substance, with the man's name or number on them.

(c) Some mills use locks, to which the workman himself only has the keys, or with one key in the main office, but the lock must be removed ONLY by the worker himself.

(d) One mill uses an equipment tag in addition to the workman's tag. This equipment tag has the work to be done, and the machine cannot be moved up until the foreman checks to see that everything has been done. This is an added precaution, as it would bring to light any worker whose tag had been prematurely removed.

9. What is the penalty for locks or tags being taken off without proper authorization?

Discharge.

10. What is the custom about changing fuses or pulling them while working on electrical equipment?

All agreed that fuses should not be touched by anyone other than authorized electricians.

Some mills, as an added protection, remove the fuses on lines to compensators and switches controlling equipment upon which men are working. Other mills use Square D type safety switches ahead of the compensator and lock these out so that the motor may not be started.

11. How is liquid chlorine handled in your plant?

(a) Who shuts it off?

The chemist in some plants. Better inspection in others.

(b) One mill had a bad accident record when a freight car was bumped into the connected tank car. The remedy—they placed the tank car about 20' from the derrick, instead of four to six feet as formerly. Better yet, have a separate siding for the connected tank car and allow only the chemist to have a key to the lock on the switch—not the switching crew.

(c) If a connection becomes broken, water should be played upon the tank to freeze the opening, thus shutting off the flow of gas.

(d) One plant provides gas masks for every worker, with his name on the case. Another plant provides respirators, which will be good for about five minutes, for the machine and better even.

The National Safety Council has a pamphlet on chlorine. Everyone interested should obtain a copy.

12. How do you take care of slippery and oily floors?

Sanding paper is used by some mills manufacturing it. No adhesive is required. If the floor is wet or damp when the paper is applied, it sticks better.

"Safety Walk" manufactured by the Minnesota Mining & Manufacturing Company, is used by many plants with highly satisfactory results. Other concerns are now making this same material. It works fine, even in oily places. When applying this material around the calendar, don't forget to put it on both the feeding and delivery sides.

For patching concrete floors, only concrete was recommended. A sealer, applied over the patch, often helps it to wear longer.

13. How do you handle the new man on the paper machine who is actually afraid of it?

Transfer him to another department. Don't keep him on the machine—he will be a definite hazard there.

14. What do you do with the old employee who becomes afraid of the paper machine?

Transfer him to another department. Talk it over with the union representative first, if necessary. When transferred, he must take the rate of the job to which he is assigned. In some cases he loses his seniority rights.

15. How would you handle the over-ambitious fellow who is seemingly not afraid of the machine? He is the fellow who dares to do something that someone else would hesitate to do.

This is a supervisory problem. One fellow handled it by giving the man a mechanical problem connected with safety. After solving the problem, upon which he worked for several months, the man became a safer worker.

There are more injuries from unsafe practices than from unsafe conditions. The safety engineer's work can be made easier if he will put himself in the position where his management is asking the foremen or supervisors why there are injuries in their departments. Then the foremen or supervisors will come to the safety engineer seeking assistance.



16. How soon after an accident happens is it investigated?

The first investigation should be made within 24 hours. Do not move a thing that would prevent investigation of the real cause of the accident until this investigation has been completed. Get the witnesses to make statements in writing as soon as possible after the accident occurs. If there was oil on the floor and the injured slipped on it, don't let anyone wipe it up until the investigator has seen it. If the accident occurs when the safety man is off duty, the superintendent or his nearest assistant must make the investigation and report. The safety man then investigates the next morning.

17. How do you take metal and other foreign substances out of rubber press rolls on your machine while it is running?

Evidently other members don't have this condition. Only solution offered was to shut down the machine.

18. How would you eliminate the hazard in removal of calendar plugs?

You must shut down the calendar and back it up to remove the plug.

19. Is your paper winder (two drum up-

right reel) adequately guarded at point of contact?

Some members use air jets at this point. Others thought it depends upon the type of paper being made.

One member has an 8" pulley hanging on the end of a rod, which is balanced on the frame. The pulley runs between the reels and prevents the rolls from getting closer together than 8", breaking the paper at that point. This small pulley, which has a weight at the end, doesn't hit either the top or the bottom roll until the rolls get within 8" of one another. That is considered the danger point. Then the paper is broken and proper steps taken to remedy conditions without injuring someone.

20. How do you guard slitter knives?

Quite a few members have a little guard over the top slitter at the point of contact with the bottom slitter. One member has a device made of paper which throws the slitters out of the way until needed. He will send a sketch of this to the News, Letter Editor so that it may be adopted by others, as it appeared to be a safety device with merit.

#### Conference No. 4: Paper Converting and Paper Products

Leader: G. J. BIENVENU, General Superintendent, Gaylord Container Corporation.

Expert: H. H. ADERHOLD, Personnel Supervisor, Marathon Corporation.

Recorder: H. L. BAUGHMAN, Personnel Manager, Container Corporation of America (Cincinnati, Ohio).

#### DISCUSSION

1. How do you control the speed of electric trucks?

One member stated that operators in his plant are trained in the proper speed to use in various locations in the plant. One organization painted numbers on the floor, which informed the operator as to how much speed he should use. It was agreed by the group that a governor is not practical due to the extra amount of power needed in going up ramps, etc.

2. Do you permit people to ride the new small type of powered hand trucks?

It was the consensus of opinion that employees should not be permitted to ride hand trucks. Those using this type truck have found it necessary to lay off or discharge those employees who follow this practice.

3. How do you handle your paper scrap?

A showing of hands was asked for on this

question and the majority of companies baled it.

4. How have you licked the dermatitis problem on adhesives?

A representative from one company stated that during the first few months of employment, a hand lotion or cream is recommended for use by new employees. After the hands have become used to the adhesive, this is no longer necessary.

5. How do you guard a guillotine cutter?

One company is using a new guard recently placed on the market, whereby the switch operated by the left hand must be kept in operation on and off by fractions of a second. In this way, it cannot be tied and the machine operated by just the right hand. The switch must be pulled by the left hand during the cutting operation by the right, thereby keeping both hands occupied and out of the guillotine shear area. Another

company has a series of bars coming up in front of the cutting area prior to the actual cutting operation which makes it impossible to place your hands in the cutting area.

6. What is done to protect a second man in the operation of a guillotine cutter?

A representative from one company stated that when a second man is needed to get the flat stock from the pile onto the cutting table, he steps back to the pile before the cutting operation takes place.

7. Have you painted your machines bright colors?

The majority of companies represented have painted their machines bright colors and find that housekeeping is much better and the hazardous points of operation are more readily distinguished.

8. How do you protect your scrap baler crew?

It was agreed that as long as the crew wears the proper safety equipment, such as safety shoes, goggles, respirators, etc., and are properly trained on the job, they have all the necessary protection.

9. How have you licked the fume problem on a printer?

One member stated that his company uses hoods and an exhaust system. Another plant with a high ceiling produced satisfactory results with merely a frequent change of air.

10. When feeding board into corrugating rolls, how do you prevent finger injuries?

It was suggested that sticks such as those used in threading calendars, be tried in connection with this problem.

11. How do you overcome burns when waxing paper products?

One company has a reserve tank above waxing tank, which they fill, heat, then empty into the regular tank. Another company has a central reserve tank which is filled, heated, and emptied into the various waxing troughs. This always gives an empty tank in which to place cake wax. For those having no reserve tank, it is a matter of safety training for the employee in replenishing partially filled tanks.

12. How do you prevent eye injuries due to board, and also steel straps?

It was agreed that the wearing of safety goggles and proper training of employees in the use of their equipment and methods of doing their work would prevent these eye injuries.



# *Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME XVIII

PETROLEUM SECTION

NATIONAL SAFETY COUNCIL, INC.  
20 NO. WACKER DRIVE • CHICAGO 6, ILL.

## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

**THE NATIONAL SAFETY COUNCIL**  
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Petroleum Section

5

TUESDAY AFTERNOON SESSION  
 October 7, 1947

Presiding: J. HOWARD MEYERS, Director of Safety and Fire Prevention, The Atlantic Refining Co.

### The Safety Program, a Unique Tool of Management

By H. H. ANDERSON

Vice President and General Manager, Shell Pipe Line Corp.

The safety program merits a key place in the management plan because, adroitly handled, it is an exceptional tool for improvement of profits. It affords the manager a ready means amongst his workers to promote many conditions beneficial to the business. It is unique because the workers respond through awareness of reciprocal benefits.

Several such business conditions or factors can be improved through a well-planned and carefully-administered safety program. Effectiveness of supervision, employee relations, customer acceptance, public relations, productivity, service continuity, reduction of waste and reduction of absenteeism are open to improvement in our own companies.

Heinrich<sup>1</sup> has shown that an average lost-time accident, including expenses of all kinds, costs the company about \$975 plus the legal cost of any industrial deaths. Thus we may accept without discussion the value of a safety program for reducing accident costs to the company and anguish and wage losses to employees; but some industrialists who recognize these obvious benefits seem unaware of the profit to be derived from applying the program to other phases of the business.

A business large or small can succeed only if it serves its public, and the larger it is, the more it is dependent on its employees to carry out its objectives. To win their best effort the employees must be brought to recognize their mutuality of interest with their employer. Only then will they prefer to stick on the job; to work harmoniously, vigorously and carefully; and to carry the tongue of good report to customers and the public at large.

The conditions or factors mentioned are related. The others are responsive to the first, effective supervision, and its corollary, good employee relations. However, the improvement of each factor requires special effort if not a separate program in the management plan. Of course the safety program

<sup>1</sup>Heinrich, H. W.: "Industrial Accident Prevention"

cannot replace that other effort, but well-planned safety promotion will create a propitious atmosphere for that effort and supplement it to unique advantage for workers as well as management.

The experts say that good industrial relations require effective two-way channels of communication between workers and management. Such are imperative if a manager expects to sell the company and its policies to his workers, and if he is to be honestly appraised of—and in a position to respond to—their attitudes, problems and needs. To illustrate how safety promotion can create such two-way channels, I will describe the experience of our own company with 1,500 employees operating 4,500 miles of oil pipe lines.

The best channels are provided by our Safety Chapters. Twenty-nine of these have been organized by the safety engineers to include all rank-and-file workers and their direct supervisors. Formed by a conveniently-adjacent group of about 50 employees, each chapter elects officers who conduct formal quarterly meetings. These are held on employees' time, but company transportation may be used. More than 80 per cent of the workers attend them regularly, and full attendance at a good program is common. Division, Area and Head Office supervisors are always invited. Working funds are obtained when desired by dues or collections.

The meeting programs vary. One each year includes a dinner or picnic for the families, largely financed by the company. But all of them usually feature two or three items such as a short talk by a local citizen, a description or discussion of a company policy, the showing of a selected motion picture, or the presentation of service and safety awards, plus a brief talk on safety. The last is followed by a general and frank discussion of any unsafe local conditions. Minutes are written and mailed to all concerned.

Supervisors join in the safety discussions,



and the superintendents are expected by the management to soon correct any unsafe conditions. Other irritating working conditions have been brought out and discussed freely at the meetings. Corrective action has quickly followed. Now our union councils or "grievance committees" have little on their bi-monthly agendas but special seniority cases and general matters.

The experts say also that most employee unrest flows from a pyramiding of small grievances. The Safety Chapters literally "hire a hall" where every physical and supervisory condition can be aired and nipped in the bud. When workers and supervisors—at times with their families—meet freely off the job, a camaraderie and mutual respect develop that are priceless on the job. Company policy is best understood and appreciated when it can be explained to the workers informally. Opportunity for both is provided by the chapters.

Thus in the Safety Chapters we have an ideal atmosphere for promoting the common interests of employee and employer. Social bonds are fostered within the business. The employees can "blow off steam" about their working conditions without fear of reprisal and with hope of improvement if warranted. The management can sell company policy as well as the company to the employees, and convince them that they personally benefit by becoming ambassadors of good will in dealing with the customers and selling the company to the public.

Very effective channels for work improvement are our On-the-Job Safety Meetings. These are held by each foreman with his crew of workers the first few minutes on the job each Monday morning. He has at hand a mimeographed safety message prepared by the superintendent or the safety engineer that can be read aloud to the crew in two or three minutes. Each message aims to provoke several minutes of discussion by the crew members in its application to their current work problems.

A typical On-the-Job subject is—"The Right Way is the Safe Way." This tells the foreman should teach his crew members how to do the job correctly so they will not get hurt; also that if he does this in the first instance they will not have to learn dangerous and wasteful methods. Another example is—"You are Your Brother's Keeper." This stresses that each crew member (in-

cluding the foreman) should think of his fellow's safety as well as his own. The idea prevents accidents but better yet it promotes good man-to-man relations on the job, establishing the workers' respect for and confidence in each other as well as the foreman. In short, it fosters team spirit.

Other examples are—"The Value of an Explainsman" and "The Value of a Question." These point out that men will work more safely and wholeheartedly if the foreman explains the purpose of each job and why it should be done in a certain way. Too, these prompt the workers to ask about jobs they don't understand. Each of our maintenance and construction crews spends a few minutes at the start of each new job, regardless of the day or hour, discussing any hazards of the job, the locale or the work equipment, and special precautions to be taken. While safety is the theme, much waste of time and material is thereby avoided. Oil losses and pipe-line shut-downs are minimized.

These discussions keep the foreman on his toes. In fact they put him "on the spot" and provide a neat gauge of his effectiveness as a supervisor. Our foremen have measured up to this challenge because we have prepared them for it. They have attended conferences on company policy and the principles of supervision, and they have received special training in job relations, job instruction and job-motivation improvement. Yes, our foremen believe that the safety program directly benefits them, too, because they receive from management more help in job planning and better appreciation of their many responsibilities.

The value of the On-the-Job Safety Meeting for the promotion of service continuity, productivity, and waste reduction lies in the focus of the place and time for selling these directly applicable ideas. We started our meetings during the war-time scrape when our accidents were increasing. They brought an immediate reduction. Productivity in our business means more barrel-miles of oil transportation. Our employees have been able to boost our new sound line throughputs by attaining better and better service continuity. This factor is the pay-off for utility companies, common carriers and other firms producing service instead of goods.

Equipment Inspection Teams of our safety engineers with the division superintendents afford opportunities to improve morale. Per-

sonally they visit our stations, tank farms, field batteries and maintenance and construction jobs to inspect safety equipment and check for hazards. Their fresher perceptions often detect unsafe conditions unnoticed or tolerated by the local personnel. The safety men are able often to bolster any flagging morale of supervisors and workers on isolated jobs through friendly discussion.

Our First Aid Training Classes are especially fine media for making company boosters. Following the training technique prescribed by the U. S. Bureau of Mines, and taken voluntarily by employees on their own time, these are given occasionally over the entire system. Recently we opened the classes to interested members of employees' families at each station. With three days to work with each class, our genial instructors were able not only to give Schaefer's Method its due but also to build a lot of company spirit in the home.

Then there is the Automotive Safety Campaign. The public's opinion of a company is determined in no small degree by employee actions. With one fourth of our employees driving a company automobile or truck, the Automotive Safety Campaign is effective not only to cut down insurance and repair costs but also to promote safe and courteous driving on the highways. This is a substantial bid for public good will along our lines in seven states.

Our Personal Safety Contests provide the means for reducing absenteeism. These instill a competitive team spirit not only in preventing accidents but also in keeping the workers on the job. Whether or not a minor injury results in lost time usually depends on employee attitudes. One injured worker may elect to lay off a few days whereas another hurt even more seriously will continue at work through the competitive urge and the concern of his fellows as well as his own for their team safety record. Our company-wide record of but one lost-time injury out of every nine accident cases exemplifies the idea.

A manager or superintendent uses poor judgment who makes of his safety man a mere junior who must furtively look to safety men in other firms and to the National Safety Council for guidance and inspiration. Men who can be as valuable as these in promoting so many phases of the company work merit the status of senior assistants. As such they

should be encouraged to offer advice in the formulation of personnel policies and the planning of new jobs, as well as in the execution. Our own safety engineers and first-aid instructors have had practical pipe-line experience and have been selected for their judgment and personality. They are neither stool-pigeons nor trade-rats, but are well qualified to represent the Area or Head Office managements in the field, and to safeguard the personal welfare of the workers with whom they are always persona grata.

Probably some managers have overlooked a bet in the safety program because they still think of safety too much in terms of fire-extinguishers, machine guards for "hard-hats," non-skid swivel chairs for "bram-hats" and other gadgets to be improved by mechanical engineers. But even with such safeguards galore, most of us have found that safety is a mental attitude that can be best improved by human engineering. Thus safety promotion is largely a matter of training, and fits hand-in-glove with modern programs of employee training and good-will building.

Employee training, good-will building and safety promotion are logical parts of the industrial relations program. In fact, they should be predominant parts. Perhaps industrial relations managers should spend less effort arguing with union leaders and more effort keeping and improving the good will of the rank-and-file toward the company. After all, if a company really loses the good will of its workers it will fail. Then there won't be much left to argue about.

The safety program cannot replace special effort to improve these discussed business conditions or factors. But it certainly can create a propitious atmosphere for that effort. And it would be unfair to arrogate to the safety contacts all of the good that can be done with letters from the boss, the company magazine, posters, et cetera. They should be continued. But none of them provide the priceless personal contacts to get across so many vital messages, nor do they afford a medium for reciprocal expression by the workers.

Needless to say the unique value of these safety channels will be lost unless a company's personnel policies—its general wage structure, benefit plans, promotional opportunities and grievance procedures—are fair and are equitably administered at all levels.



of supervision. But in those companies where the workers are getting a square deal despite innuendo and misrepresentation to the con-

trary, the safety program affords exceptional opportunities to convince the workers of the facts.

### Training Methods in the Petroleum Industry

By STERLING W. MUDGE

Supervisor of Training, Socony-Vacuum Oil Company, Inc.

The word, "Training", as it is generally used today has taken on a broad meaning. Its use here will include the following:

1. The providing of useful information concerning the tools, products, equipment, facilities, processes, etc., which may be a part of each individual employee's work, so he may use them in a correct and safe manner.
2. The improvement of the ability or skill of each individual employee so his mental and physical actions are performed in an effective and safe manner.
3. The development of personal characteristics and habits which are necessary for effective and safe performance on the part of each individual employee.

If Training is to include all of the above elements, it will be readily recognized that it involves far more than reading a manual or attending a conference. This leads to a consideration of the types of training which might be provided such as "formal" and "informal" programs.

"Formal" training would be that which is organized as a series of lectures, discussions or some form of presentation to a group. This type of training is usually developed to meet the needs as they exist but it is not by any means the answer to complete and effective training even though it is a method of exposing employees to a source of useful information.

The reading of a book on "How to Swim" or watching a sound movie on the same subject would probably be helpful to one who is desirous of learning to be a swimmer. It would probably be helpful to listen to a good lecturer on that subject, but the actual learning of the skill of swimming requires on-the-job training and continued practice with coaching if confidence and good performance are to be attained.

"Informal" training, which is the contin-

ing on-the-job, day-to-day improvement in useful knowledge, and the development of correct skills and habits, produces the most effective and lasting results. This does not mean that the "informal" type of training is a hit or miss approach. It should be organized, planned and conducted according to a pattern and long range plan and not just left to chance.

"Who is responsible for effective training?"

"Management" is a word used to indicate the group composed of executives, managers, superintendents and sometimes the foremen. The word, "Management" is also used to indicate the art or skill of managing people. When used in this latter sense there are varying ideas as to just what this art or skill of managing people really is. A very simple but practical definition is: "Management" is the responsibility for accomplishing results through the efforts of PEOPLE.

Regardless of the nature of the industry or the departmental divisions of the industry, it is the PEOPLE who through their mental and physical efforts accomplish results. How many executives, managers and superintendents give very much thought during any day to the basic fact that it is the PEOPLE of their company and their departments and plants who are really determining the quantity and quality of the output, service or whatever it may be. Therefore, if the executives, managers and superintendents are dependent upon the efforts of the PEOPLE in their company and their departments for the desired end results, are they not responsible for the continued development and welfare of the employees by providing useful information, improving abilities and skills, and for the formation of good working habits and attitudes?

Supervisors and foremen are definitely a part of the management and they continue

a very important part because of their close relationship with the PEOPLE who actually produce the results. Are not supervisors and foremen in a most advantageous position to continuously encourage, coach and aid employees to become productive and safe workers? This is all so obvious that we often overlook this natural avenue of approach for the application of simple, practical on-the-job training.

Another obvious fact is also often overlooked to a large degree, i.e., that a business organization reflects the attitude of the management. Upon walking into a retail store you can usually determine the attitude of the management by the appearance of the store and the type of service rendered by the sales clerks. The effectiveness of the training activities in a business or industry depends directly upon the attitude of the management. If the executives, managers and superintendents are sincerely interested in training, encourage and actively participate in the development and conducting of training plans, real progress will be made in improved and safe performance on the part of the employees. The supervisors and foremen will in turn recognize their part in training, too, provided they are encouraged and coached.

There is a simple, logical approach to the planning of training. A manager or a super-

intendent, if he will hold a "management conference" with his supervisors and foremen can quite readily determine:

1. What information should be provided to improve the safe performance of the employees?
2. What abilities and skills should be improved to develop safe performance of employees?
3. What characteristics and attitudes should be developed to improve the safe performance of employees?

By an analysis of the actual current conditions and situations, the needs for training can be determined. The more carefully the needs are determined or anticipated, the more effectively the training can be planned and organized. The establishment of the training plans can follow the natural steps, such as:

1. What training will produce tangible, beneficial results?
2. Who should receive the training?
3. Can the training be organized as a continuing on-the-job, coaching process?
4. Can the supervisors and foremen be coached to carry on the effort in a practical day-to-day manner?

This simple method of analysis and planning can be applied to all industries and to all types of Training.

### WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: Dr. B. B. REEVE, Medical Director, Standard Oil Company (Ind.)

### World War Lessons Applied to Industrial Injuries

By T. J. KELLY, M.D.

Plant Physician, Shell Oil Company, Wood River Refinery

Safety measures are initiated with the idea of first preventing accidents, and second, when accidents occur, seeing that the injured person receives the attention that will enable him to return to work as soon as possible with minimum harm to himself.

In World War II the Army infused these principles in its Medical Corps with remarkable success. From the front line company aid went back to the specialist in our hospitals in the United States, the main objec-

tive was to institute procedures that would enable the soldier to again become a fighting component of the Army.

As in the Army, so also in industry a great number of injuries occur. In industry, because of the rigid rule of immediately reporting any injury, however slight, to the proper authority, the majority require only a single first-aid dressing. However, fractures, burns and wounds should receive prompt attention because the final outcome



depends a great deal on what is done at the time of the accident. Death can often be averted by knowing what to do and when to do it at the proper time.

Serious loss of blood may occur where arteries are severed and when no attempt is made to stop the bleeding. Faint rapid pulse, increased respiratory rate and cold clammy skin may be observed. The individual sometimes is unconscious. This is the type of case in which shock may occur.

The first to reach the scene of the accident should institute measures immediately to control bleeding and not wait for the nurse or doctor.

If hemorrhage is so severe that ordinary pressure cannot control it, usually a large vessel, most commonly an artery, has been severed. In the case of wounds of the extremities a tourniquet should be applied in the right place. The artery above the bleeding point must be compressed against a single solid structure. For example, a tourniquet should be placed around the upper arm, because it has but one bone, the humerus. It should not be placed around the forearm because it has two bones with a space between them into which the radial and ulnar arteries might slip when the pressure of the tourniquet is applied. So, also, a tourniquet should be applied around the thigh, which has but one bone, the femur, and not around the leg, which, like the forearm, has two bones with a space in between into which the arteries might slip.

At times safety personnel are required to accompany workers with such injuries when they are being transported to the doctor or the hospital. It should be remembered that shutting off the blood supply to some part for a long time by means of a tourniquet will cause the death of that part. The tourniquet must be loosened every 15 minutes or so. It was our unfortunate experience in the excitement of the invasion of Normandy that many an extremity was amputated because gangrene had set in due to the tourniquet being left on too long and unattended. The blood supply had been shut off for hours because the tourniquet had been forgotten. In many instances the bandages themselves had been applied so tight that they acted as a tourniquet. This was especially true in cases where the wounded had not been found for days or transportation delayed. The company aid men had done what they

could and then gone forward to take care of others. Infection had set in and with it, swelling of the extremity to such a degree the bandages became much tighter, the blood supply interfered with, and gangrene had ensued.

In wounds of other parts of the body, especially the head, chest and abdomen there is very little the safety personnel can do except place a dressing and arrange for immediate transportation to the nearest hospital. There facilities and medical attendants are adequate for further treatment.

Statistics of this past war reveal that of all casualties in all the theaters approximately 80 per cent sustained wounds in the extremities. Of that 30 per cent the majority, in addition to having wounds of the soft parts, had fractures of the underlying bones.

These fractures might have been only chip fractures in which the bullet or shell fragment chipped off a piece of bone as it passed on its course, or more serious ones in which there was a marked displacement of the broken fragments. Chip fractures were found only when the individual reached an evacuation hospital where the X-ray revealed them. The ones that showed displacement when found by the medical aid man were immediately splinted at the scene of discovery before any attempt at moving the wounded man was made. Any solid object that happened to be around was used, usually the soldier's rifle. For the lack of a solid object, the man's own body was used.

In case of fractures of the upper extremity, the arm and forearm were tied firmly to the side of the body by belts, triangular bandages, and such. In fractures of the lower extremity, both legs were tied together by the same means. The man was then carried by litter to an aid station where the temporary splint was replaced by a more adequate one.

Proper measures were carried out to combat shock, and he was then transported by ambulance to a field or evacuation hospital where a heavy plaster cast was applied before transportation to the rear.

This same principle of prompt splinting at the scene of the accident can be applied in our industries. There is no excuse for moving an individual without some form of temporary splint being applied first. This procedure not only prevents shock and decreases pain, but it also prevents any further damage to the tissues of the fractured extremity.

When a bone is broken, the jagged fragments tend to cut the tissues around them, and the more movement there is, the more the surrounding structures are lacerated. Sometimes nerves and blood vessels are severed, thus adding complications to what was at first a simple fracture. Another point, too, which is very important is that the length of the individual's convalescence is increased, and often a crippled extremity or an amputation is the result.

Suspected fractures of the back, especially, should have immediate splinting before transportation. The reason is that quite frequently movement between the fragments severs the cord, and a case of complete paralysis below the level of the fracture is the result.

When fractures of the skull occur, prompt evacuation to the nearest hospital is essential. There is very little that plant personnel can do.

Minor fractures, like those of the hands and feet, are usually not disabling, and the employee is able to resume his work.

In the petroleum industry burns may be caused by heat or flame, or chemicals, such as acids and caustics. The damage done to the body by each type depends upon the degree or extent of the burn itself. Thus, we divide burns into first, second, and third degree burns, regardless of the cause.

A first degree burn confines itself to the surface or superficial layer of the skin and manifests itself as a redness of the skin or a blister formation. A second degree burn involves the whole thickness of the skin, while a third degree burn involves not only the

skin but the deeper structures such as fat, muscle, bone, blood vessels and nerves.

In industry the problem of chemical burns is handled by prompt first aid. The profuse use of water in the form of showers usually lessens the degree of the burn, and then the chemical involved is neutralized.

As in the case of wounds with considerable hemorrhage and of fractures, so also in the case of burns, first aid must be given as soon as possible. The wound must be dressed with an oily substance, morphine given for pain, and immediate transportation provided to a place where more definite treatment may be employed.

Most industrial plants have emergency hospitals available, with competent nursing staffs on duty twenty-four hours of the day and have well-trained medical men to take charge and give the necessary orders. However, too much time sometimes elapses before the medical man can be reached or arrives on the scene. During that time critical changes can often take place in the injured man's condition.

While waiting, the nurse or safety man can follow certain principles: prevent further loss of blood from bleeding areas by means of proper pressure or a tourniquet; ease pain by injection of morphine; prevent shock by heat and stimulants; apply splints in cases of fractures and the proper dressing in cases of burns.

All these measures tend not only to save life but to shorten convalescence. By following this procedure, safety department personnel can feel that they are helping to keep a good safety record.

## Health and Accident Problems in the Modern Refinery

By DR. WAYNE BOLYARD  
Asst. Medical Dir., Standard Oil Co. (Ind.)

The growth of humanitarian ideals and workers' compensation laws have served to focus increasing attention upon accident prevention. Our modern thoughts along these lines are not altogether original. The concepts have taken a long time to bear fruit. Over two thousand years ago, an Italian physician by name Raimundus, observed that industrial conditions should be studied so that

the worker might have a fairer chance to earn a living without harm to himself. This physician published a book on occupational diseases—the first history of industrial medicine and hygiene. The book described various diseases which were peculiar to certain tradesmen. The hazards of inhaling dust were recognized and masks were advised. Reference is made to such topics as cleanliness,





clean clothes, poor ventilation, unsuitable temperatures, rest intervals and postural changes.

It was not until organized safety work was instituted that the recognized hazards of occupations began to be brought under control. Previously, mechanical safeguards such as proper scaffolding and handrails were little used and gas masks and goggles were rarities.

It was fairly obvious from the first that in setting up organized programs the man doing the job knew where unsafe working conditions existed if he could be brought to think about them. The average worker felt that safety work was additional work and an additional burden upon him, and that it was entirely foreign to his daily round of duties.

To the majority of workers safety meant the installation of mechanical safeguarding.

Organized safety work by providing of mechanical safeguards, safety protective equipment and the preparation of safe work procedures, paid dividends since accidents per million hours worked dropped markedly within a few years. It was early apparent that if accident frequencies were going to be reduced further, then educational activities were needed. Educational activities have been incorporated in organized safety. Some of these in use are Foremen's Training Conferences, Sponsor Training Conferences, Sponsorship Plan, Exhibition of Safety Films, Job Demonstration, Publication of Safety Newspapers, Safety Committees, Safety Inspection Committees, Questionnaires and Safety Manuals. The accident frequency has responded favorably to these activities.

Modern safety engineering goes far beyond the application of the guards on a compressor, safety hoops on ladders, safety showers and fire blankets. Up to date programs provide for the engineering of safety into the purchase of equipment, in the erection of buildings and the construction of refinery units. It is involved in the extra heavy tubes of preheaters that reduce the possibility of failure and fire, in considering stresses and strains on cables, chains, rope, winches and other equipment that would cause much trouble if safety was not a factor in their design. Safety engineering problems vary from the proper length of handles on wheelbarrows so designed to take most of the load off the worker's arms and back, to delicate warning instruments on big units running thousands of barrels of crude each day.

Safety in modern refining plans against mechanical mishaps against which the worker has been reasonably prepared. It also seeks to guard him against the contacts and inhalation of toxic materials, the effects of which he may or may not be so well aware.

The petroleum industry has made many relatively rapid changes in its history. These have occurred in the production of crude oil, through refining and the marketing of the finished products. Organized safety must not only keep step, but anticipate and be ready for future changes. In earlier years more emphasis was naturally placed on mechanical features; however, the rapid progress made in chemical research and petroleum technology has gradually added more chemical hazards, either as ingredients concentrated in various processes or in finished products.

Toxic materials may cause injury to the worker by dermatitis and chemical burns. Acute and chronic toxicities can follow absorption, inhalation, or ingestion.

To eliminate and control these hazards the best possible process design must be employed and the personnel should be given adequate safety and protective equipment and training.

The introduction of new chemicals and the preparation of new products introduce new safety problems in refining, distribution and marketing. It is becoming of increasing importance to know not only the chemical and physical properties of compounds and products, but their toxicological properties as well in order to properly safeguard personnel and consumer. Some of this latter information is already known to a greater or lesser degree through experience and publication. Any potentially hazardous substance can be made to serve a useful purpose when the proper rules are known.

A number of the toxicological hazards of the petroleum industry are also found in other industries. Chemicals in use in other industries may assume importance in refining. For example, phenol has wide uses and applications and its properties are fairly well known; however, in its use in petroleum refining this information must not only be kept in mind but also possible variations peculiar to petroleum refining.

In the refinery, phenol is used as a selective solvent for the refining of lubricating oils. During the war phenol was used for the extractive distillation of toluene. Phenol at high temperatures will burn and explosive

mixtures with air can be formed. Phenol will produce serious skin burns and it can be absorbed into the body before there is a sensation of burning. Initially, it exerts an analgesic effect which probably accounts for numbness before a burning sensation develops. It can also enter the body by inhalation. Phenol is soluble in water and alcohol. It is important that phenol be quickly removed from the skin using either alcohol or water. Phenol in the eyes should be washed out by protracted flushing with water. These measures should be followed by medical attention. Clothing on which phenol has been spilled should be laundered before being worn again. Proper protective equipment such as special rubber clothing, acid hoods, rubber gloves and boots, and rubber goggles should be employed, and if phenol is present as a gas, masks should be worn. Phenol acts both locally and systemically. Absorption is rapid and systemic poisoning may follow skin contact which may not produce a serious local reaction. Extensive exposure may lead to respiratory paralysis and death in a fairly short time.

Another example of a toxic material which is used in petroleum processes, is hydrogen fluoride. A knowledge of its properties and action is important in its proper management. Fluorides can produce acute and chronic poisoning.

Anhydrous hydrogen fluoride and water solutions of hydrogen fluoride produce severe burns of the skin as well as severe irritation of the mucous membranes. Acute pulmonary damage can result, but is ordinarily not likely because of the extremely irritating nature of the compound unless the individual cannot get away from a heavily contaminated atmosphere. As to skin burns, the severity depends upon the length of time of contact and the strength of the acid.

Hydrofluoric acid not only attacks the surface of the skin but produces progressive destruction of the deeper tissues, unless prompt measures are taken. One should not wait for pain to appear before taking action because of the penetrating destructive nature of this substance. Contaminated clothing should be removed and the skin should be washed in freely running water for a considerable length of time. Contact with this material requires prompt medical attention. Due to its penetrating quality, the burned area may require hypodermic injections of calcium gluconate

well under the skin in order to neutralize the acid.

The mechanism of chronic fluoride poisoning appears to be due to a disturbance of calcium metabolism and inhibition of enzymatic processes. Continued ingestion and inhalation may produce an accumulation within the body, capable of producing chronic poisoning. Up to a certain point the intake of fluoride is equal to the urinary output, but if absorption is increased accumulation can result. Under certain circumstances changes may take place in the bones and enamel of the teeth, due to fluoride.

Authorities advise that workers handling this material should be protected with long rubber gloves, rubberized aprons and rubber footwear. Plastic face shields and plastic goggles are advisable due to the etching effect of hydrogen fluoride on glass.

In the safety control of workers exposed to hydrogen fluoride it would seem desirable to check the urinary output for fluorides and x-ray certain parts of the skeletal system for evidence of fluorosis at six months intervals.

A complete safety program in modern refining must deal not only with mechanical hazards but with toxic hazards as well. Chemicals used and products made must be subjected to scrutiny in order that the best protection can be afforded. It is far simpler to control and study single chemical entities than the complex mixtures found in the products of petroleum refining. These products may contain varying percentages of many representatives of the different series of hydrocarbons and their derivatives. It is not an easy task to separate these mixtures nor is it particularly desirable economically, nevertheless, attention should be directed to potential toxicological hazards that may exist.

In petroleum refining, many substances are encountered which bear upon the health and accident problems of personnel. A great many are volatile, and some occur as fine dusts.

Some chemical agents may be absorbed through the skin without harming it, while others affect the skin directly and some may produce irreversible changes. It is a difficult idea for the average individual to appreciate that the skin is not an absolute barrier to toxic substances entering the body.

It is somewhat easier for the individual to recognize the possibility of harm arising from inhaled materials. For example, sulfur dioxide causes inflammation of the respiratory tract,



provoking coughing and sneezing. The individual will not stay long in a heavily contaminated atmosphere unless trapped. Other inhalants may act as asphyxiants, and the victim may not be aware of their presence. Some may mechanically exclude oxygen from the lungs. Others may interfere with oxygenation as carbon monoxide and hydrogen sulfide. Volatile unsubstituted aliphatic hydrocarbons usually produce no lasting changes. These exert an anesthetic type of effect on the nervous system. On the other hand aromatic hydrocarbons may do irreparable harm to the blood forming organs. Lack of information is a handicap in the complete classification from a toxicological viewpoint of the host of petroleum compounds and their derivatives.

Of the hundreds of compounds to be found in the various petroleum mixtures, our toxicological data are variable in extent. As new techniques make new products and by-products, it does not seem that we can always wait for experience and publications to keep us informed, but a program should be adopted from a toxicological viewpoint of examining new materials which may be produced, or older materials on which further information is desired. Investigations can be arranged to be done by various university groups or by individual companies. If it is desired to study a particular material, certain essential information should be obtained on acute and chronic toxicities, pharmacodynamic activity, skin and mucous membrane reactions. These are usually obtained by experimentation on several kinds of animals. Further detail and scope of work would depend on prior knowledge, processing environ-

ment, and the uses and nature of products and by-products.

It must be kept in mind that the individuals of a given species of animals vary in their response to a given toxic substance and that the effects obtained on mice may differ greatly from rats, guinea pigs, rabbits or other animals. Considerable care must be used in applying the results of animal testing to man.

The term toxicity is ordinarily used to describe effects ranging from the most mild to the most severe episodes. People in every day life are exposed to toxic substances, but not very many exhibit noticeable toxic responses. It is fairly obvious there must be a number of factors involved in producing toxic reactions such as individual susceptibility, time of exposure and concentration of the substance.

In conclusion the health and accident problems in the modern refinery requires a close correlation between the safety and the medical department. The focusing of attention on possible toxicological hazards may necessitate research and investigation in fields ordinarily not crossed in refinery laboratories in order to better safeguard personnel. To make further forward steps in safety work in the refinery necessitates a knowledge of toxicological hazards that exist and anticipation of new hazards that may arise with their proper safeguards. Safety administration must look to their medical departments for necessary study and research. Medical departments should accept this assignment and give guidance to the safety department in these matters.

#### THURSDAY AFTERNOON SESSION

October 9, 1947

Presiding: W. O. Wilson, Manager of Safety, Standard Oil Company (Ind.)

#### Customer Relations in Accident Prevention

By ERIC V. WEBER

President, Ohio Petroleum Marketers Association, Incorporated

Industry spends millions of dollars a year attracting the customer to the product. Once that relationship becomes firmly cemented, it is difficult to disunite. Death, accident, seri-

ous injury, or heavy financial loss to the customer can do it, and in doing it and will continue to do so. The extent to which these dislocations occur will depend, in our industry, on how good a job we do in teaching our customers how to use petroleum products.

Many customers do not know how to use petroleum products properly. It is not only our duty, but the soundest type of business practice to employ every means at our command to overcome that hazard to the business ledger, in addition to our duty to guard against destruction of life and property.

In this country today there is a burgeoning market—the farm market—where, for the first time in the history of the industry, large quantities of petroleum products are being turned over to private citizens for unsupervised storage.

The city dweller, if he stores anything at all around his home or place of business, has a buried reservoir of fuel oil in a tank supervised by law and within easy reach of a fire department, hospital, first-aid squads and the like. Yet, petroleum accidents occur in cities.

How much more liable to accidents, then, is the farm, where these facilities are farther distant, and where increasing quantities of gasoline are being stored, often under improper conditions? It is our prime duty to educate the farm families of the nation on the safe usage of petroleum products.

The farm is mentioned specifically, not only because it is the most important problem confronting us, but also because further remarks are to be considered in the light of this growing farm business.

Customer protection usually means the protection of a family. The very young and the very old in any family are particularly susceptible to accidents. Children, especially younger children, are filled with curiosity about everything. They try to eat or drink everything they can cram down their throats. The drinking of petroleum products by children has resulted in many illnesses and a number of deaths.

An incomplete survey of the 10-year period ending December 31, 1946 included reports on more than 900 cases of kerosene poisoning in the United States. This means that there must be one or more cases of kerosene poisoning every week.

As most of these cases involves children less than 24 months old, the only means of

prevention is to keep kerosene out of the reach of small children. A review of the individual cases clearly shows the circumstances under which small quantities of kerosene have been left within reach of unsupervised children. The only way oil-company agents may help to reduce such accidents is to explain repeatedly to customers the serious effects which may ensue if children should drink kerosene.

Children are not the only members of families who suffer injury and death from the improper use of petroleum products.

One of the most flagrant misuses of a motor fuel is to use gasoline as a cleaning fluid. The general availability and low cost of gasoline creates an irresistible temptation for many people to use it for cleaning purposes. This temptation results in many deaths and innumerable painful burns.

The National Fire Protection Association estimates for the 15-year period (1930-1946) at least 2,670 fatalities have resulted from the use of gasoline for cleaning purposes. If this is a fair estimate it must be assumed that on an average at least 3 people die each week because they use gasoline for cleaning. It is significant to note that the figures reported by the Association in July 1947 for the 15 preceding years show a smaller loss of life by fire at oil refineries and bulk oil distributing plants than from the use of gasoline and similar liquids for cleaning purposes.

The most serious loss of life by fire resulting from a misuse of petroleum products, according to the National Fire Protection Association, arises from the use of kerosene, range oil, and fuel oil to kindle fires. The NFPA estimates deaths at the rate of one every day resulting from that quick but dangerous practice of pouring a little kerosene on a "dead" or dormant fire. Those who misuse kerosene in this manner may do so in ignorance of the volatility of such a fuel at higher temperatures. This should not be true, however, of those who use gasoline to kindle a fire and yet the NFPA figures would indicate about two deaths by fire each week from such a misuse of gasoline.

In commenting on a record of about 2,000 deaths by burning gasoline and kerosene, Robert S. Moulton, Chairman, National Fire Protection Association Committee on Fire Record, reports in part: "In practically every instance it can be shown that the deaths have



been directly or indirectly due to lack of ordinary care in the use of flammable liquids. Gasoline and similar fluids used for home dry cleaning purposes in violation of every sort of published warning, the use of gasoline or kerosene to kindle fires in kitchen stoves, and lack of proper care and maintenance in filling oil stoves and lamps are responsible by far for the greater proportion of these fatalities. It is interesting to note that oil-fired furnaces are listed as responsible for only 24 of the 2,466 deaths. This may be explained by the fact that oil furnaces commonly used are of a standard, well-safeguarded type installed by men specializing in this type of work, whereas gasoline and oil stoves, often of improper design, are purchased and installed by the householder with no expert supervision."

Many deaths have been prevented by publicizing the danger arising from misuse of petroleum products. Such publicity must be a continuing activity especially directed through school teachers to reach children in rural districts where kerosene and gasoline increasingly are stored in bulk in such a manner as to be easily accessible to every member of the family.

The accessibility and low cost of the bulk storage of gasoline and kerosene makes it difficult to provide cleaning solvents and kindling material which could be marketed for safe use on farms. Some feel that the substitution of safety solvents and safety kindling material are a necessary element in preventing flammable liquid fires. Many safety solvents are being marketed, and their sale should be accelerated as a realistic method of providing safe dry cleaning in the home.

It has been suggested that the marketing of safety kindlers of absorbent material to be saturated with kerosene—even corn cobs if dipped in kerosene—would contribute substantially to a reduction in deaths by fire.

Closely related to the safe use of products is their safe storage particularly in bulk on farms. This subject recently has been given a great deal of consideration by the Flammable Liquids Committee of the National Fire Protection Association. The Association has adopted and published a standard for Farm Storage of Flammable Liquids, which,

if widely circulated by oil companies and if used generally by farmers, would contribute substantially to fire prevention on the farm. Oil companies should give serious thought to the dissemination of this material.

As an industry we should work in closest and heartiest co-operation with public officials who have safety responsibilities to discharge toward the end of reducing the toll of deaths and accidents from improper handling and use of petroleum products. These public officials will welcome your active help in this respect because a large percentage of them are not fully equipped with technical knowledge having to do with the products of oil.

In the development of co-operative relations between the industry and public officials, the importance of the office of State Fire Marshal should not be overlooked. The relationship of cordiality should be established, as well as a high degree of confidence, so that the Fire Marshals and representatives of the industry can work together trustfully and constructively in the formulation of safety practices. A relationship of this character is likely to contribute much to the adoption of sound regulatory policies.

A great deal of public education can be conducted through service stations. A well-kept station, where there is plain evidence of good safety practices, is certain to impress customers, and in such a way that their observations will become good safety lessons. One of the growing evils around service stations is seen in smoking on the premises. This hazard comes from both the customers and the employees. It is not an uncommon sight to see customers smoking in their cars while gasoline is being pumped into their tanks. You need not be reminded of the danger which attends. Much of this peril can be eliminated through a kind and diplomatic caution from the man at the pump. Some station operators refuse to make a fill if the customer is smoking near the island.

Surely the ingenuity and initiative of petroleum marketers can develop ways and means of curtailing the misuse of petroleum products. Everyone of us in the oil business should do our bit in telling our customers how our products may be stored, handled, and used safely, economically and effectively.

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# Transactions

## 35TH NATIONAL SAFETY CONGRESS



VOLUME XIX

POWER PRESS SECTION



NATIONAL SAFETY COUNCIL, INC.  
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## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

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Power Press Section

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### TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: E. C. WOODWARD, Safety Director, A. O. Smith Corporation

### Memorial to Ben Grainger

By GEORGE H. BERRY

Safety Engineer, Western Electric Co., Inc.

Ben Grainger is gone. Come these many months. We who but a short while ago, were rejoicing at his assignment as staff representative for the Power Press Section as well as other sections, still can scarcely believe that he is gone. It seems but yesterday that he stood at the door, counting the attendance at our sessions with a view toward obtaining a larger room for us at this present Congress. It does not seem possible that we shall never again see his genial sunny smile—that we can never again pick up the telephone or write to Ben asking for advice—nor lean upon him for guidance in the formulation of programs or for some idea from his vast storehouse of experience.

There was nothing selfish about Ben. He had no flare for self publicity. He was modest to a fault. He asked nothing more for himself than he'd like to give to others. He talked in a language we all could understand and we liked him right from the start.

Ben Grainger was born April 4th, 1886, in St. Louis, Missouri and died February 18th, 1947.

His service to safety was of a kind and quality duplicated by few men. It runs through a period of 34 years—almost exactly parallel to the history of the National Safety Council itself!

In addition to his sectional activities, Ben was a staunch supporter of the American Society of Safety Engineers. His fellowship and wealth of experience in human relationships and safety work will be missed by countless friends in industrial safety fields.

Ben Grainger's first industrial job was that of a plant engineer with the Stromberg Carlson Motor Devices Company of Chicago in 1913.

In 1925 he took charge of safety work for the Bendix Aviation Corporation of South Bend, Indiana for whom he established an enviable program of accident prevention.

In addition to his safety work at Bendix, he also served for four years as chairman of South Bend's Safety Council's Industrial Division.

In the early days of the last World War he went with the Newport Shipbuilding Company at Newport, Fla.

Later he became safety director for the Ingalls Shipbuilding Corporation at Pascagoula, Miss.

Having filled various offices in the Power Press and Automotive and Machine Shop Sections down through the years, he was a "natural" for staff representative of these sections when he joined the National Safety Council's staff in 1943.

A practical man rather than a theoretician he was more interested in the means and devices for preventing accidents than delving into the theories of programming alone.

As a master of personal relationships, (which he preferred to call "getting along with the boys") he was highly successful as a shop safety man as well as a staff representative. His colleagues at National Headquarters tell me they found him to be a "caustic critic of 'fool' ideas and an inexhaustible source of workable ones."

In human relationship Ben Grainger has set an example which will be difficult for many of us who remain here to follow.

As Admiral Gregory so aptly said at the grave of General Harbord in Arlington Cemetery on the 11th of last August:

"Half of our troubles we make ourselves by rebelling against our misfortune. As soon as we can accept them, can say and believe they are for the best, their sting is gone. Trusting in God, we shall not fancy we should be happy were we only somewhere else, had we only that something else which seems to us wanting in our lives. We shall feel that God put us exactly where we are, sent or withheld whatever was right; and



our part is only to do the best we can with the 'talents' He has lent us, be they ten, five or only one.

"The one who walks straight forward on the path of life, with no backward glances at yesterday's stumbles and wanderings—at peace with himself, at peace with God, willing to live, not afraid to die—knows a happiness beyond the disturbing power of all the

outward accidents and changes of life."

In thinking of Ben Grainger I am reminded of the following prayer adopted by a relatively new fast growing movement throughout this nation:

"God grant me the serenity to accept things I cannot change, courage to change things I can, and wisdom to know the difference."

### Taking the Punch out of Punch Press Accidents

(A Symposium)

Discussion Leader — Paul Windsor, Safety and Medical Director, R. G. LeTourneau, Inc.

#### Through Investigation

Presiding: GEORGE W. GREENWOOD, Safety Director, Western Electric Co., Inc.

It is our understanding that according to the Bureau of Labor Statistics, United States Department of Labor, approximately 24,000 power press disabling injuries occur annually.

Obviously, our research project is not yet fully developed. As yet it has not had the opportunity to prove its worth, but it is significant that it is beginning in a time when industrial activity is at the highest peak in history, and our annual report is presented at a time when the safety profession is called upon to contribute to a better understanding of our mutual accident problems.

The contributions of your firms in sending in case histories of disabling power press accidents and allied pressroom accidents have been significant in making these sessions at the Congress well worth any safety man's attendance.

The report compiled from your case histories has been sent to every member of the section.

On the "A" side of this report are tabulated those injuries that relate specifically to the operation of power presses themselves. On the reverse side we have an accident setup whereby disabling injuries other than those on the presses may be reported. It is our hope you will take these reports back with you and fill them out covering some disabling injuries that you have had in the past in this category and send them in to Mr. Art Kelly, Staff Representative of the National Safety Council for the Power Press Section.

Give us your cooperation, and I am sure

that next year at this time we will be able to give you twice as much information as we are able to today.

The coming year also should see our section strengthened by the addition of new members. One would be unthinking to state that the task facing us in developing a constructive power press program is a simple one and easy of execution. It is a project that demands the best that the safety profession can offer. It calls for cooperative effort on the part of everyone. This national analysis is but a step in the process of providing the united effort and essential program of activities so vital in the prevention of power press accidents.

It is the hope of the Power Press Section that it may be able to work in close cooperation with Automotive and Machine Shop Section in achieving this goal. But, in the final analysis, we are dependent upon the individual safety men and safety engineers whose contributions will be in the industrial plants throughout America and through whose efforts foremen and employees will develop the "know how" to prevent power press accidents.

This paper describes briefly the accident facts which have been revealed through an analysis of data covering hundreds of power press accidents. The analysis presented covers approximately 500 punch press accidents alone. It attempts to illustrate the possibilities of such a case analysis method of using cause groupings. Just to the extent to which it succeeds in reflecting specific cause groupings, this step should represent a step in the

direction of isolating accident facts on a scientific basis.

I should like to review with you the way this particular analysis was set up. We went out into many industrial plants throughout the country and discussed such an analysis with foremen, with engineers, with management, with maintenance people, and with inspection people.

This is the breakdown of your cases. The first three pages are devoted to those unsafe mechanical and/or physical conditions of power presses causing disabling injuries.

At the suggestion of the engineers and the maintenance people and press manufacturers we broke it down in the following subhead categories: Tool Guarding; Machine Guarding; Machine Guard Adjustment; Tool Design; Machine Design; Stock Feeding; Stock Feed Roll; Hand Tools; Lubricants; Body Position.

Some of you are going to ask why we put in the category of body position. If you notice that, under that subheading of body position we have stated "Operator still seated at press during adjustment by other employee."

There were three cases sent into us in which I definitely recall there were finger amputations because the operator was still seated at the press when the maintenance man started to work on the press, and he stepped on the foot pedal and his fellow employee sustained finger amputations. One of the suggestions we can give you is to make it a cardinal rule that whenever a maintenance man starts to work on a power press, the press operator should not sit or stand near the foot pedal. Be sure that he is away from his press.

In the last three pages we talk about unsafe acts, the mistakes of our employees or the unsafe behavior which contributes to disabling press injuries. Discussing supervision from a training point of view, we developed the following subheadings.

Feeding With Hand Tool—If you notice, under that heading the outstanding fault was failure to use tweezers or pliers to feed or remove stock. During the course of the year we received a letter from a firm which said, "We want to report a power press accident in which we are very happy that the woman operator was not injured. We are sending in for your collection a pair of tweezers that the girl was using at the time the press was operating." There was a report

on the press, and this is what happened to the aluminum pliers, so you can see what might have happened if the young lady had not been using the pliers at the time the press repeated.

Quite a few amputations were caused by lack of coordination between two persons working on a press which resulted in injury to one of them. Adjustments are a particularly acute problem in small plants where the power press operators have to make them themselves.

The above accident facts, as brought out in the listed causes of punch press accidents, attract our attention before areas of activity. These are first operations, subsequent operations, setup operations, and maintenance operations. In our study we include only those material-handling accidents which were involved in actually feeding the stock into power presses.

I should like to mention another thing that impressed us. A fatality was reported on a press brake in one company where they were barring over the press brake. There was a steel bar in the crank shaft. One employee was standing near the foot treadle; the other employee was behind the brake. The employee in front of the brake accidentally stepped on the treadle. The flywheel started to revolve. The power had been turned on by someone and this bar struck this man in the head killing him.

We felt pretty bad about that because a number of firms such as our own have developed a crank shaft press bar which is spring actuated and when anybody releases it, it throws the bar clear of the crank shaft. If that particular industrial firm had known there was such a bar available or could be made, perhaps that man would be living today.

It is sometimes difficult to visualize some aspects of punch press operations which accompany accidents. Furnished with analysis such as the above, it will no longer be necessary to speculate. The preventive action needed will be present in every particular. After such accident facts have been made clear by review and study, the real need to correct our accident situations may become apparent.

Meanwhile, we can and we must initiate action to eliminate accident causes as revealed in this analysis. Until we can see our way more clearly, it will be necessary to think in terms of a wide range of possibil-



ties.

Four methods of control suggest themselves: engineering, inspection and scheduled maintenance, training and management interest.

Since the following speakers will discuss these methods of control, I shall restrict my remarks to the major areas which a constructive power press program will include. These are: research, such as this project today; interpretation, in terms of treating this study as we have, going out into industry itself to see what our foremen wanted to know, what they needed to know; application and evaluation.

**Research**—The purpose of research is to give our program direction. Two areas of research are fundamental; namely, the needed engineering, inspection, maintenance and supervision essential to eliminate unsafe mechanical and/or physical conditions. Secondly, the needed supervision and training essential to eliminate the unsafe acts of employees.

I should like to make this mention of training. I would like to refer to it as our Chairman, Clark Woodward has often referred to it. It's a thing that everybody talks about but very little is done about it. It has been my experience in going throughout these United States that the majority of our training is not done in the training schools of big plants.

Most training is actually done on the job, and it's going to become an essential part of our program to furnish you people with the "know how" to include it in training your foremen so that they can teach the employees.

**Interpretation**—There is a great need for specific interpretation of the research. The professional safety man and other industrial personnel alike are far from conversant with the best and latest developments in tool and machine guarding. For that reason, this year we have added to the Industrial Executive Committee of this section a representative from the tool manufacturers' industry and one from the press manufacturers' industry, with a view of finding out how many safeguards can be built into tools and machinery before they reach our shops.

We think that it's imperative that every one of us make a major contribution to the tool manufacturers and the machine manu-

facturers, so that they can give us safer machines in the future. The average safety man is so far from being informed that there is little or no recognition of the advances made in knowledge of human behavior which may be applicable to power press accident problems.

**Application**—By application we mean the methods by which our combined knowledge may be put to work to achieve our common objective—the elimination of power press accidents. Application may lead in the following directions:

(a) To establish specific objectives or goals in each plant.

(b) To examine present practices in light of these objectives.

(c) To make specific recommendations for changes in present practices.

(d) To develop technical materials on preventing power press accidents. We hope in view of the accident information sent in to revise our *Safe Practice Pamphlet* and bring our safety instruction training cards, our data sheets, our films, our posters and everything that has anything to do with power press accident prevention and engineering up to date.

(e) To develop studies of such data that are practical and useful. This, of course, calls for the development of recorded information which is informative but not time consuming. That's an important thing in industry today. We have to put our safety on an economical basis.

**Evaluation**—Evaluation will be the method for determining whether or not our program has produced results. We have a tangible measure of evaluation in the reduction we make in the number of power press accidents. Of first importance is the area of fact finding studies which will give us the cause and effect relationship of power press accidents. The analyzer furnished this audience should make safety people concerned about where they are going in their work. It should give us all a desire to examine our methods and submit some of our theories to a more rigorous examination. Although safety councils and safety people have their part to play, in the final analysis power press accident prevention, if we find it at all, will be in the thousands of industrial shops where the unknown foreman or supervisor builds the defenses against accidents in the minds of his fellow employees.

### Taking the Punch Out of Punch Presses—Through Guarding

By HARRY L. COIN

Safety Director, Fisher Body Div., General Motors Corporation

In the early days of accident prevention many of us thought that accidents would cease if all dies were enclosed with a guard. Others thought the hand button controls were an ideal safety device. There were others who thought the sweep type guard would do an acceptable job. Many other types of safety devices and gadgets were introduced with the one thought in mind—"Taking the Punch Out of Punch Presses".

When all of this equipment was introduced into industry the accident rate went down somewhat, but accidents continued. Some operators and foremen complained that guards or safety devices of any kind slowed down production. Many times the value of safety equipment on presses of any type was questioned. However, safety equipment for presses gained headway steadily. Finally, after considerable analysis of the value of safety equipment on presses from plants all over the country, I believe we can arrive at the following conclusions:

1. That proper guards which keep the hands out of the danger zone have prevented many accidents.
2. Safety devices alone, without proper instruction, are inadequate to prevent accidents.
3. The installation of the proper type guard on presses is assurance to the employees that the employer has done as much as possible to make the plant safe in its working areas.
4. The proper application of guards strengthens the foreman's position in the prevention of accidents and creates an air of sincerity on his part to those working under his direction.
5. On numerous occasions safeguarding equipment has been economically sound in helping to prevent equipment failure.
6. The high degree of morale created in industry by the use of safety devices and guards is one of their greatest redeeming features.
7. In my opinion, there never was or never will be a safety device that hindered production.

Back in the early twenties the need for more efficiency in the production of automobile body parts required tremendous increases in the weight and capacity of large presses. At the time these presses were manufactured it was considered quite an engineering feat to build them so that they could stamp out large panels with one stroke. Very little attention was given to the designing of safety into the mechanism. Since that time, however, practically all large presses come to us from the manufacturers completely equipped with safety devices which make them comparatively safe to operate.

I believe that we all recognize that the most effective method of taking the "Punch Out of Punch Presses" is to enclose the die in such a way that operators' hands will be kept out of the danger zone yet allow work to be fed or held through openings in the enclosure. The guard then acts as an effective barrier to insure that the operator can not place his hands in the danger zone.

The enclosure guard not only protects the careless and inexperienced employee, but also the experienced employee from freak accidents that cause serious and permanent injury, heavy compensation costs and higher insurance rates.

The simplest dies to guard are those used in blanking and strip feeding where the operator holds and feeds the stock through the die. You have probably heard it said that it was not necessary to guard this type of operation as the operator was not supposed to go under the ram. But it still is possible that he may and as long as a hazard exists on an operation of this type it must be guarded if we are to prevent accidents.

In addition to the many hazards resulting from normal operation of the press such as tripping the press at the wrong time or reaching in to fix something that is wrong, there are many hazards involved in working close to a dangerous, unsuspected, rapidly moving piece of machinery, such as the punch and die of a punch press, just as there is in working around unguarded gears, chains, belt



drives. If anything should happen, a serious accident could result, whereas if the danger zone were guarded no damage would occur.

It is impossible for a person to give his undivided attention to one subject eight hours without some mental or physical distractions. If an employee happens to be upset by worry, tired or sleepy which can and does happen to all of us on an "off" day, the chance of his attention being distracted is even greater, particularly in the case of new and inexperienced operators.

This is the time that a complete guarding program will pay dividends.

In checking causes of accidents we know that several severe accidents have been caused by unpredictable reasons such as noise, con-

vention, dirty work, a heart attack, a part dropped on an unguarded foot treadle, or the press may repeat, the ram fall or something else happen which is not anticipated by the operator. All of these contingencies are avoided when you enclose the danger zone with an adequate guard.

It is no secret that plants which have instituted a well formulated and complete guarding program have reduced accidents and raised their efficiency.

We want dare let our guarding program lag. It is a continuous and ever-changing job of designing, redesigning, updating and putting in new that guards are in place and properly used along with a complete and thorough job of educating our employees.

#### Taking the Punch Out of Power Press Accidents—Through Maintenance

By ROBERT A. REYDEN

Chief of Machine Maintenance, Western Electric Co., Inc.

Since you are all interested in the punch press end of manufacturing, you may want to take a brief look at the general scope of our activities in this direction. There are approximately 375 presses of a considerable variety between small bench presses and those rated at a thousand-ton capacity. They are used on a wide variety of work requiring a high degree of interchangeability.

The operations include practically all of those known to the press work field and require tools from simple drilling, turning, drawing, and extruding dies to complicated combination tools with seven or eight steps on part, carried along in the scrap skeleton until their final operations are completed, after which they are separated or clipped off. These tools are fed with automatic roll feeds; others are magazine fed or have slide devices for secondary operations. Dial feeds, hoppers, and conveyor feeds are also used. The type of organization known as the product type shop requires that these presses and tools be scattered throughout the plant instead of being concentrated in one location as is usually the case.

The maintenance of this equipment among all the rest of the machinery required for manufacturing is done by general machinists, electricians, and other tradesmen and groups of specialists and is carried on by a centralized maintenance organization.

Some of the mechanics are assigned to various field locations where there is enough concentration of machinery to warrant their continuous vigilance and activity. If their

work load becomes too heavy, they are given assistance by other mechanics from the centralized maintenance location. Because of the large numbers of certain machines requiring concentrated attention, some of the presses and have been specialized in various kinds of work such as the reshaping of some machines, milling machines, grinders, or punch presses.

Being chosen as a maintenance man, I have been asked to touch on some specific ones of accidents reported nationally. These accidents resulted in amputations which seem to be caused by defective machines and can be charged against maintenance or tool setups. This current analysis indicates that at least eight amputations were caused by faulty punch press brakes. No doubt there are many more amputations that remain unreported. Let us analyze in some detail what the possibilities are of such an important part of a machine going wrong. While the brake is important, its maintenance is comparatively simple when understood.

First of all the purpose of the brake is to keep the punch press ram at the top of the stroke and prevent it from falling while the clutch mechanism is disengaged. It is "accidental ram fall" that generally causes damage or accidents while the punch press tool is being set up or being removed.

The brake consists of the frame, the lining, mounting screw and adjusting bolts, and locking nut. The brake's lining surface is faced with a high-grade lining which has good frictional qualities. We use long life

or specially prepared lining material. In some cases the lining is held in the brake frame by means of soft copper or brass rivets. Another way is to have it embedded carefully and fully into machined depressions or pockets of the frame. Care must be taken to insure that the lining is uniform and is of the correct thickness in order to get as much surface as possible in contact with the brake drum. Another important point in getting full bearing surfaces is in the mounting of the brake itself to the machine. It must be bolted so that the lining sets squarely with the shaft. If it isn't, only alternate edge bearing will be had.

We are concerned about bearing surface so as to be assured of the greatest amount of friction possible between the crank shaft and the lining in order to provide rather sensitive adjustment. If we have the bearing surface concentrated on one line, it is possible that the brake frame will crack because of the necessary pressure applied to the adjusting nuts. It is almost equally undesirable to have the bearing surface concentrated at the circumference of the brake lining.

Summer adjusting pressure used to compensate for wear of this kind will tend to heat and glaze the lining, destroying almost all of its effectiveness, and may cause the casting to crack. When the adjusting screws are tightened evenly, the crank shaft will stop in eccentric position at the extreme top of its revolution, thus the ram being attached to the crank shaft will also be stopped at its uppermost position. Apparently on the type of machine referred to in the accident reports the loose adjustment of the brake makes it possible for the shaft to revolve some far and allows the ram and tool, because of their weight, to fall to their extreme low position. This may occur even though the power is off. A tool setter changing dies at such times would be subject to amputation or other serious injury.

The placing of oil or grease on the brake will of course reduce the effectiveness of it; yet it is often done after a brake has been adjusted to tightly. Rather than do a little more readjusting, someone short-cuts the job by squirting oil on the lining. Then the maintenance man must do a job of degreasing and readjusting.

While the maintenance man makes frequent checks on the performance of the machines in his territory, there are several tell-tale signs which warn the operator of ap-

proaching danger. One sign is a persistent clicking of the clutch mechanism. By observing the centering holes on the end of the crank shaft to see whether or not the holes are lined up parallel with the vertical axis of the machine or by observing the ram for a seemingly lazy stopping action at the end of the operating stroke the operator can note the condition of the brake. A rebounding ram may also be caused by a loose brake. A brake requiring too frequent adjustments should be suspected of needing a maintenance man's attention. Regardless of what has been observed during the operation of the press, the set-up man should check the press action before he removes a tool from the press and also before he starts a setup. Wooden blocks are sometimes provided to guard against ram fall but I'm not so certain that such blocks are always a total safeguard. Perhaps I'm prejudiced by having observed a sad experience in that connection. Someone failed to remove one of the blocks before turning the power on, a broken slide was the result. Fortunately no one was hurt but a serious production delay was encountered.

The next chargeable series of amputations on the national list of faulty machines is the clutch mechanism which transmits the driving power of the press fly wheel to the crank shaft performing much the same function as an automobile clutch which finally connects the engine to the gearing of the car's wheels. There are numerous types and designs of clutches in the positive and friction classifications.

Most clutches still in use are of the positive drive variety which are generally equipped with safety devices that prevent the press from repeating more than one stroke even though the operator keeps the foot pedal in the operating position. The press may be operated again only by allowing the foot pedal to return to its normal non-operating position. Some of these clutches require good spring actions for safe operation and require close maintenance attention; springs that show signs of becoming fatigued should be promptly replaced and care should be taken that they are of the correct size and hardness. Since most of these springs are in hidden blind position some emphasis as to their location should be made else they they might be passed up.

Worn trip levers and latch pins cause are other sources of trouble requiring close attention.





Tell the signs of poor clamp conditions are indicated by unusual clutch noises and sluggishness of action. Each type of clutch needs careful analysis and study to determine its proper behavior and limitations. These analyses should be placed on paper in simple shop language, well illustrated, and made available to the responsible maintenance men, operators, and set-up men.

The subject of tool clamping while comparatively simple seems to be a bugaboo and this national report has eight suggestions listed. Clamping conditions start at the bed of the press and depend somewhat upon its condition. It must be square with the punch holder opening in the slide or ram and its surface should be free of bumps or deep depressions. If these conditions are not satisfactory, it may be necessary to have a maintenance man scrape the bed for conformance. It is equally important that the upper parts of the press are in good order too, so that upper tool members have good bearing and clamping surfaces. Next, the holder plate condition must be examined for parallelism and surface irregularities. They may also require resurfacing. The screw holes must have good threads. We protect these screw holes when not in use with aluminum caps made for the purpose. Loose particles of dirt, chips, or perforator slugs should be thoroughly removed from the bed of the press and plate before being bolted together. One of the most common errors in bolting is the selection of bolts that are too long. A condition such as this is met where the nut is pulled up tight against the threads but not against the holder.

The bottom of the die holder of course must be free of all obstructions to good bearing. Then the selection of clamps for the tool and their positioning must be done to favor the tool and press. I have in my hand one of the clamps that is now our standard equipment and has replaced all others. It is made of some steel pack hardened and is designed to provide a large bearing surface for clamping the machined ledge of the holder, and is thick enough to minimize springing action. In most cases, the use of four clamps is advisable. Of course, on extremely large tools, this number would be increased. They should clamp on the die holder ledge in a position giving the most bearing surface possible. Our clamps are made to provide this condition. (Exhibits on board showing various positions of clamps

and clamps in front view against radius.) The clamping should of course be done uniformly with regard to tightening the clamping screws.

Filing up of loose, thin parts to thin up a clamp is unsafe as the pile might collapse and leave the tool unclamped and out of control. The punch holder should be examined to see that it has no burrs or raised portions on any of its bearing surfaces to detract from its clamping efficiency. The clamping block of the press and punch holder opening should similarly be scrutinized. Under no circumstances should an abrasive be used on the punch holder to help keep it locked in place. It results in an expensive machining job on the ram if the practice takes hold. It's much easier to see the ram ends when additional clamping is required. All clamping should be frequently checked for tightness and on high speed presses the checking should be done more frequently.

In order to put across some of the methods for keeping punch presses and press tool safer and maintenance men, a number of ideas have been used. Most of these are simple and can be used in small plants or large ones depending for success only upon the degree to which they are carried out and followed up. For example, our tool making department resorts to the practice of calling in operating department supervisors, set-up men, and press operators when an unusual or complicated tool is being completed before its final assembly. A toolroom supervisor carefully explains the action expected of the various tool parts such as spring pads, scrippers, clamping punches, pilots, and any other parts that might be even slightly difficult to analyze when the tool is all together and its important features hidden from view. When the completed tool appears on the operating floor, it isn't a total stranger and no one needs to be in a fog about its behavior.

The machine maintenance department being responsible for running in new machines carries out the same idea when new machines are brought to a department. In setting up one of our satellite plants where most of the people hired were taken from turning districts totally unacquainted with punch presses, the simple expedient of labeling the important parts of the press was resorted to. This was coupled up with small informal meetings around a punch press where each part of the press and its equipment was explained in simple terms and

demonstrated.

Points of the press needing the highest focus of attention were painted up with orange-colored paint such as brake and clutch adjustments and guards. Gradually the language of the press group developed to the point where communication was effective and where operators and set-up men could receive instructions and transmit difficulties effectively. The accident record for this group was exceedingly low and its output and work interest was high. Of further significance—no accidents were held during the first months of operation when supervisory attention was highly concentrated on the punch press portion of the job.

Other more elaborate means include a thirty-hour classroom and laboratory course where set-up men, operators, safety men, and supervisors receive fundamental instructions and reviews on punch press set-up, operation, and tool care in considerable detail. Actual

equipment is available for analysis and discussion and the course winds up with participants making typical set-ups and punch press adjustments under the eyes of an instructor and fellow workers. The course is not only given to newcomers but also to old timers as a refresher. A three-year course for maintenance machinists is also used to keep the maintenance crews supplied with highly skilled men.

The thing I am really trying to emphasize is that taking the punch out of punch press accidents requires all the forces that ingenuity can provide, not only of the maintenance men alone but that of the set-up men, the operator, the safety man, and all ranks of supervision as well. And please give your maintenance men a chance to do a good complete job instead of a patch here and a patch there. Back schedules can be made up—fingers can't.

#### Discussion

MEMBER: 217 accidents here have been classified under unsafe conditions. Do I understand then there have been 436 accidents considered or are some classed in both categories?

MR. GREENWOOD: I would say that there are very few duplications. For instance, if a company sent a report in on a fellow who had two or three fingers amputated, and it was a first operation or a second operation on a type of press, they would name the type of press that specifically could be guarded, in the report.

If there were no guards, we would put it under unsafe mechanical or physical condition because when you have an unguarded press with no hand tools of any type for the employee, we think it's expecting a lot for the employee not to have accidents.

When a person is operating a press all day long and turning out thousands of parts, the operation becomes so automatic that it becomes a reflex action and oftentimes a person will step on the treadle, not intentionally, but just through reflex action. The majority of those are put in unsafe mechanical and physical class.

MEMBER (Wisconsin): If there any guards available this will prevent an employee from sticking his head in a punch press and stepping on the treadle.

MR. COIN: Yes, by putting the foot treadle far away from the press. We anchor the treadle in our plants 42 inches from the press. Make him leave that treadle and take that step to the bed of his press. That's the only answer I have to that one.

MR. GREENWOOD: You have got to guard it by location. We use side guards on some presses. This may be too large a press to use side guards. He went head-on in, in this case. The only thing you can do is to get him away from it.

Still again, you have that instinctive action. I notice in a number of the reports sent in that an unusual condition was existing at the time the accident occurred—something unusual like a piece of stock stuck, or it wasn't started properly and the employee made some false move and was caught. I think the answer is guarding it by location.

MR. ART GRAHAM: Going further with that, I think it would be well for Mr. Coin to tell how they guard the pedal, preventing material from falling on the pedal and tripping the press at the wrong time. Will you explain that please?

MR. COIN: We use a hood-type metal guard over the pedal. It's necessary for the operator to place his foot inside of the guard to trip his press, so that that will prevent anything falling on it and tripping it.



MEMBER [International Harvester Company, Maintenance Department]: I would like to know if it's possible to get a periodic check in connecting rods on presses.

MR. HEYDEN: As I understand the question, it's a matter of having periodic inspection often enough to guard against ram drop. In our plant, of course, we have machinists who have the job of checking every press every day.

MR. FRANK W. FISKE [Brewer Fitchett Corporation, Cortland, New York]: I have never yet found how to guard a press brake.

MR. HEYDEN: We do guard the clutch and brake with a metal guard that is fastened to the frame of the press. It's about 18 gauge metal and is guarded that way.

What type press are you talking about? Is it a steel weld made press?

MR. FISKE: It bends the metal, and most guards put on those presses are in the way.

MR. HEYDEN: You get that argument in regard to all guards anyhow, but we do use them on the clutch and brake.

MR. GREENWOOD: Have you tried a two hand control on it? Take the hand off the button and he has to inch it down to shape it.

MR. FISKE: He does that with the foot treadle.

MR. GREENWOOD: If the operator takes his foot off, the press would stop right at that point. In other words, it will come down within an inch or so of your stock before the press makes its final downward movement to shape the part. You will have to set her like that, or you will run into trouble. There are a lot of two hand controls. On a lot of reports, they have tied one back and inched it down with one hand. You can fix two hand controls so you can't do that. There is the electric eye that has been tried, but you always have the possibility of a failure. It has happened in one plant that I know of. We haven't had too much experience with the electric eye.

MR. PAUL PORTUS [Mutual Insurance Company]: I want to report an accident that involved the breaking of two half-inch bolts. I don't know whether they broke at the same time or not, but at any rate, they allowed the ram to come down. It apparently went down backwards and took off a couple of fingers in the process.

What maintenance can you give to be sure that bolts don't break?

MR. HEYDEN: The question, I believe,

concerns the bolts on the brake frame bending. In general, those bolts will break if the brake lining is worn too thin or if there is only a one line bearing or if the brake lining has become glazed. Those are about the main contributing factors, and, of course, the more often they are checked or the more often the brake bands are changed, the fewer bolts will break.

It's due to excessive tightening which is a result of not having enough braking surface to do the job that's required of it.

CHAIRMAN WINDSOR: Does that answer your question?

MR. PORTUS: In this case it tightened against the spring. It couldn't have been tight enough to actually break the bolts.

MR. HEYDEN: Well then, the other thing may have been in mounting the frame of the brake out of square on the press frame; that is, if you have that whole thing twisted, I suppose you might get some undue strain on the bolt.

MR. PORTUS: I was wondering, would you say they should be changed every year or so?

MR. HEYDEN: Oh, well, that depends upon how much use the press is subjected to. Some you wouldn't have to change for ten years. I don't know of any way of checking those things frequently enough. If you want to take a cut and look out every so often and give it a magnet flux inspection, that would determine whether or not there were any cracks in it. Of course, if you want to pull it through much more strain than it would ever get in an operation, that would be another method. Ordinarily, I suppose these bolts are just made of ordinary 10, 30 steel. You might try some higher tensile strength alloy.

MR. PORTUS: Would you recommend that?

MR. HEYDEN: I would recommend it if you are having trouble.

MR. GREENWOOD: It is hoped after we get more information, that the engineering committee of the section will be able to set up some suggested recommendations along that line. I think that you realize that a lot of these things have to be arbitrary.

Our hope is that within the next three or four years we can develop out of the section a manual of operations by which you people can be guided, not mandatory, but a list of suggested recommendations.

MEMBER: Could we have a little more

discussion of defective repeating presses by reason of defective clutches?

MR. GREENWOOD: The report brought out that if there was enough play with defective clutches it was possible to detect slipping.

There is one other thing that came out in these investigations, and that is that certain types of presses need certain types of lubricants. There was one case in which the lubricant was so heavy that it caused the press to bind so that the operator shut off the power, but then the ram came down on its own. After the Synthel case over dead center the press dropped just enough to trap this woman's hand and amputated two fingers.

Accidents such as this one call for more periodic inspection of clutches and a further study of lubricants.

MR. HEYDEN: I think that the very fact

that clutches do so often fail is an argument in favor of Harry Cain's suggestion that we use foods as much as possible and color the guards. I believe that if we are going to do a smart safety job, we ought also to do a smart production job, and devise foods and guards that enclose the danger area.

If they are designed properly, they will increase production and make us friends of the production minded people, as we should be. I don't mean we should get rid of the maintenance crew by any means, but keep them busy in watching brake linings and so on. If the press does repeat, the operator will have been saved.

I think it can be done. It is being done, and I think that the very fact that we know that clutches can do that and brakes can fail is all the more argument for good tests and enclosures.

#### THURSDAY AFTERNOON SESSION

October 9, 1947

Presiding: GEORGE W. GREENWOOD, Safety Director, Western Electric Co., Inc.

#### The Medical Man's Challenge to Accident Prevention Program

By E. J. SCHOWALTER, M.D.

Asst. Supl. Medical Div., Western Electric Co., Inc.

The Bureau of Labor Statistics annually records approximately 22,000 lost time power press accidents. An appeal has been made by our committee to members of the Power Press Section for analyses of their power press accidents. We received reports on 229 accidents involving 248 injuries.

These accidents included 61 amputations, 61 serious lacerations, 33 fractures, 10 infections, 8 hernias, and numerous other types of serious injury. If we can consider these injuries typical, we can assume that in the year 1946 there were approximately 6,000 amputations, 6,000 serious lacerations, 3,000 fractures, 1,000 infections, 800 hernias, etc., which were a direct result of power press accidents. The last annual compilation by Industrial Commission of Ohio reported 1,377 lost time—including 3 fatalities, 515 permanent partial disabilities, and 607 over seven days lost time. Using this distribution of accidents as a yardstick, there occurs annually throughout the country 54 fatalities, over

6,000 permanent partials and over 10,000 lost time cases of seven days or greater duration.

If any incentive were necessary to stimulate our best efforts to prevent power press accidents, that incentive could be provided by these figures.

All of us are keenly aware of the physical suffering and mental anguish attendant upon these serious lost time injuries. Each of you appreciates the financial loss to the employer entailed in such injuries. You know this loss includes compensation and medical costs, costs of delayed or lost production, and perhaps the cost of replacing tools or machines. Safety is your business and you know these things, so we need not spend time further discussing them.

With your kind indulgence I would like to relate some of the thoughts a medical man has when he thinks of accident prevention in a great industrial plant.

He thinks of the employment department. Are adequate pre-employment examinations



a part of the hiring routine? Surely this is significant in any accident prevention program. It assures an initial general level of health and physical ability necessary in a safe worker.

He thinks of the placement department. Is common sense used in placing employees? Or are small, slight men placed on heavy jobs? Are large, clumsy men assigned to work requiring speed and agility? If the job requires special physical skills, is the worker given special pre-placement examination to determine the presence or absence of these skills? For example—if the job requires good depth perception (which, incidentally, some second operations on power presses might well require) was he tested for depth perception? A lack of this depth perception, if needed, might result in a serious accident. The medical man of today has facilities for measuring some of these skills. Examples are the ortho-rater, the sight-screener, the audiometer, etc. Is the worker emotionally stable? Obviously the emotionally unpredictable individual is not to be trusted with dangerous, expensive equipment. Techniques are being developed whereby personalities, which vary considerably from the normal or average, can be detected. The Minnesota Multiphasic Personality Inventory is one of the currently available devices that can be employed in this field. Perhaps some day tests will be developed to detect workers who are prone to commit the various unsafe acts responsible for so many of our accidents. If such discriminating tests were used, it would not be for the purpose of eliminating from industry all of those who fall, but rather of giving them special instruction and training, or placement where their traits would not interfere with efficient and safe production.

The medical man would think of the placement of the handicapped worker. The dearth of man-power during and after the recent war brought new emphasis to the value of the handicapped worker. Can workers with physical handicaps be considered safe workers? Of course they can. Large companies such as the Ford Motor Car Company, the Caterpillar Tractor Company, the Western Electric Company and many others have for years been profitably and safely placing handicapped employees. Clark Bridges' volume entitled *Job Placement of the Handicapped Worker* is an excellent reference on this subject for the safety man as well as the medical and placement man.

The medical man would think of the training program. In addition to being taught the mechanical "know-how" of the job, is the worker trained in safe practices to be followed for his general work location and the operation of his particular job? Is he taught proper work habits and postures so that he will avoid unnecessary fatigue and bodily stresses and strains? Is he taught why safety devices are used? We all know that if a person knows the reason for using safety equipment he is more prone to use it than if he is merely told to comply with certain rules.

The medical man would think of the industrial hygiene department. Is proper safety equipment specified? Are goggles, safety shoes, gloves and other personal protective equipment most engineered for each particular type of job?

The medical man would think of the employee's supervisor. Has he been sufficiently indoctrinated in the cause of safety? Has he been taught that no job is so urgent that safety must be sacrificed for speed of production? Does he impress piece rate employees that their rates are set with allowances made for safety devices? Does he cause neglect or delay in the reporting of accidents by penalizing employees for accidents? When assigning a new man to a job does he allow for a "breaking in" period during which too much is not expected from unaccustomed muscles? Does he rotate employees to the best of his ability on jobs which require constant physical strain and on jobs where are semi-destructively monotonous? Does he periodically check his workers and the machines to insure constant and proper use of safety equipment and devices? Does he follow through on safety training and at times remind employee why safety devices are used?

The medical man would think of the counseling department. Has the plant some systematic means of improving the attitude of the worker? Rothlisberger and Dickson have shown that improvement in the attitude of a worker results in an improvement in the quantity and quality of his production. There are sufficient accidents on record which can be blamed on emotionally upset workers to make us suspect that a well-run counseling service, using either the directive or non-directive method, will in some measure prevent accidents. Some employees are prone to respond to group pressures of ridicule regarding safety equipment and practices.

Counseling can help control this reaction.

The medical man would think of the publicity department. Is there such an indiscriminate flood of safety publicity that nobody pays any attention to it? Or is it carefully selected or tailor made for local conditions. Is there a careful check of non-safety publicity for safety value? Are the safety men given all of the credit for a good safety record, or does the safe employee participate in the glory and publicity of a job well done?

The medical man would of course think of the medical department. Pre-employment examinations and pre-placement examinations have already been discussed. Cooperation between all of the previously mentioned departments and the medical organization is conducive to the prevention of accidents. But there is another means by which medical personnel can aid in preventing accidents, and that is by making the industrial hospital a place of service to the worker. If an employee is kindly and courteously treated in the hospital, if in time of pain and suffering a good "personnel" job is done, we can be assured that he will report his injuries promptly and will readily seek professional care. Many disabling complications of injuries are a direct result of failure to receive prompt professional medical attention.

The medical man would most certainly think of the safety department. An interesting thought might be: Could a safety man be responsible for causing an accident? Well if not an accident, he could cause a disease. How is this disease contracted? The usual onset, surprisingly enough, occurs when a safety man has just hung up an outstanding safety record. The actual infection begins when he boasts to management or his fellow safety workers about his achievement. Now we all know that according to the law of averages, if for no other reason, very unusual safety records are eventually terminated. If at this time some poor unassuming employee suffers, let us say, a back strain which is sufficiently severe to render the employee unfit for work, this disease begins to fester. This hypothetical safety man may then exert pressure on this employee to continue

at work and thus avoid that horror of horrors, a lost time accident. Now conceivably the man with the back strain might have been fairly close to an emotional break-down prior to his accident. If this were the case, the stay-at-work pressure applied by the safety man might be the proverbial "straw that broke the camel's back" and thus become the immediate cause of a serious, emotional reaction in the worker. Psychiatrists would diagnose the end result as "post-traumatic neurosis," but actually the patient would be a victim of "lost time-itis"! The medical man might wonder further about the safety department. Is it peopled with problem cases or is it staff composed of high type individuals with engineering or mechanical background, or with statistical ability or valuable "on the job" experience? Are the safety investigators satisfied with an investigation that determines that an accident was due to failure to use tweezers or failure to shut off power while making adjustments, or some other similar unsafe act, or do they try to determine why no tweezers were used, or why the power was not shut off? Do they attempt to determine the basic, fundamental reason for the accident or merely the incident or occasion associated with the accident? Is the safety department just a flag-waving, contest-running, publicity loving organization or is it a scientific fact-finding department? Does the safety organization just gather information or does it gather good information, and having gathered it, proceed to analyze it and put the results to practical use? Does it aid in the safety training of workers and supervisors? Does it provide the "know-how" in accident prevention? Does it merely tell management what management would like to hear, or does it inform management promptly and honestly of the actual safety condition of the plant?

These are some of the thoughts a medical man might have if he thought about an accident prevention program. You will have noticed that most of these thoughts were expressed in question form. I will not attempt to tell you which answers would indicate a good accident prevention program. Safety is your business and you know these things.



### Putting our Knowledge to Work (A Symposium)

Discussion Leader—HERSCHEL L. SMITH, Safety Engineer, General Electric Co.

#### Participants:

A. R. GRAHAM, Safety Eng., Bituminous Casualty Co.

W. L. HANAU, Asst. Supt., Engineering Dept., Fidelity & Casualty Co. of N. Y.

R. E. JOHNSON, Safety Eng., Cronquist, Inc.

MR. HANAU: What can be done to cut down these 24,000 cases that Dr. Schowalter has referred to when we get back to the job? What we must do to accept the medical challenge, must be considered.

Now, in order that we may proceed in an orderly and efficient fashion, the pattern we will follow is this: I will describe the accident as reported to the Power Press Section. My partners, Art Graham and Russ Johnson will develop the mechanical and personal factors involved and suggest controls. The audience then will be asked to participate in the analysis of the case. Mr. Smith who is presiding will then summarize the conclusions.

The first case concerns the operation of a single crank, open blank and inclinable punch press which was in the inclined position at the time of the injury. The operation is described as the piercing of two small holes at each end of 1,200 pieces, three inches long and two inches wide. The operator was instructed to pick up the piece with his right hand, shift it so that he was grasping it at the center and locate it in the die, remove his hand, and depress the treadle. After running some 400 pieces, the operator's left hand was pierced and crushed by the left set of punches. The punches were of sufficient length to provide one and a half inch clearance between the die and the punch holder. The press was in good condition. No safety device was provided, dependence being placed on the dexterity and alertness of the male operator who was 32 years old, physically fit and left-handed. Are there any questions regarding this case?

MEMBER: How was the material ejected?

MR. HANAU: That wasn't stated. It did state though that the man was placing the material in the press when he was caught.

MR. GRAHAM: You remember that Mr. Hanes told you that this man was feeding

1,200 pieces, eight inches long into this inclinable punch press. Looking at it from the standpoint of the plant that's in a position to make their own dies and guards, we would like to suggest that a chute feed be provided with a complete die enclosure. This die enclosure should not have a pinch point between the lower part of the ram and the top of the guard.

If the man has difficulty looking through the enclosure the guard can be made of plexiglass or fibroston safety glass, and I understand that very soon there will be a glass on the market which will be difficult to smear.

Now, let's look at the plant that has in dies made outside the plant by a die shop. What kind of a guard would we adopt in that case?

We offer several suggestions, one is the pull-out type of guard.

This type of guard must be properly maintained in order to operate efficiently. If you don't maintain these guards and die enclosures, they will cause trouble sooner or later.

Let's make the die enclosures or the mechanical guard in such a way as to take the man out of the danger zone.

MR. HANAU: Russ, will you please cover the training aspects of this thing now?

MR. R. E. JOHNSON: There is a lot to be said about training. It's pretty hard to do it in the small shop, where there are only five to fifty presses. It's a little difficult to give one man the job of trainer or instructor. However, in some of the larger shops, similar to our own, we start our training from the time the employee is interviewed. After the physical examination to determine the proper placement of that employee, he or she is sent into the safety department to receive a little talk on safety on punch presses.

First of all, we choose an employee for the job. His size, height, weight and so on, are given consideration.

We don't pick a short, squat man to operate a job where a long reach is necessary. We try to choose that employee that would be comfortable in working at that particular job.

After the safety talk he is sent down into the department. There the supervisor talks to the individual and then turns him over to the die setter who is responsible for training him in the safe practices of punch press operation.

The new employees are told that they must not wear any rings on their fingers or any jewelry on their hands—no long sleeves, no riding of the punch press pedal. They receive instructions as to how the various guards work.

They are told that a die enclosure guard is the same as a railroad crossing gate arm. When that arm comes down, it means stop. You must stay behind the gate, even though you can easily climb over, crawl under or walk around it. They are told this perhaps a dozen times in the course of the very first day of work.

We also explain muscular coordination and fatigue; explaining that their right leg, their back, and their arms and shoulders will get tired. If they get too tired, they are told to come up and tell the supervisor. I know I wouldn't be able to mix concrete all day long my first day without having a pretty sore back. But if somebody was lenient with me, probably the next day or the day after that I could become a full-time cement mixer.

We also tell the employee about protective equipment, gloves and hand creams. We also talk about developing good habits.

On this job or this die that Walter brought up, Art Graham mentioned a feed. If I were a boss in this particular plant and we were running a short run of 1,200 pieces, I don't think the customer would pay for a chute feed. I do agree with him on the pull-back guard, and I do agree with him on the enclosure guard, but I have another type of guard that we must use in our plant that probably isn't used all over.

We construct our die in the same fashion apparently as this one, but we have closed the die down by bringing shoulder-head screws into this die shoe. This makes for only a quarter of an inch opening between the stripper or the punch and the die block.

We set that die, and bolt it to the bolster plate only leaving the top free. There may be four inches between the top of the die shoe and the ram, which we enclose at that point.

This die is built the same except that we add two springs, two shoulder-head screws

and an enclosure guard around the top of the ram so when the punch press comes down it bumps that piercing the four holes. The operator holds it with his left hand, picking up the other piece and can go right along.

We still don't allow that man to ride the pedal, however. He still must take his foot off the pedal on each operation.

MR. CERNEY (General Electric Company): If I were setting a job up in which the man fed the press with his left hand, took parts with his left hand, and put them in the right hand, I would insert a bolt or something so he couldn't cross with his left hand to hit anywhere near that guard.

MR. HANAU: That's a good point. In other words, you feel we could provide some enclosure around there to keep the man out. Does anybody disagree with that?

MR. JOHNSON: You mean you would put a bolt on the die shoe or bolster plate?

MR. CERNEY: On the bolster plate to prevent him from getting his left hand into the die.

MR. JOHNSON: Why couldn't he go around it?

MR. CERNEY: If the bolt was put in such a position, he would still hit that before he would hit the die.

MR. JOHNSON: Wouldn't it be about as simple to take a piece of corrugated or pierced or perforated metal and bend up just a half a box?

MR. CERNEY: Right.

MR. JOHNSON: And put a little slot in the center to slip it through and cover that die. Would it take any more time or effort to do this than to put the bolt in there and try to explain to the fellow he should try to keep his hand out. In other words, why not try to cover up that die so he doesn't have to worry about his hand getting around the bolt or die.

MR. CERNEY: His left hand, not his right hand, was caught in the machine. It was his left hand that was coming around that guard, around that die.

MR. JOHNSON: His left hand was pierced and crushed by the left set of punches apparently on the removal of the piece. He might have been riding the pedal. He probably lost his timing, and I think that it's very simple to get a piece of perforated screening, even if it's chicken wire, and put it in front of the press so the operator can only get in so far.

MEMBER: That will slow feeding up con-



siderably.

MR. JOHNSON: Well, I am not in a shop like Western Electric. I am in a shop that's a jobbing shop. Our runs are from 50 pieces up to 5,000. That's usually a high run, 5,000, and every die that goes in the press has an enclosure guard where it's possible and it doesn't cost us a lot of money. We can put one on there in an hour and it doesn't slow the operation.

MR. SMITH: Now, what we are discussing here is whether or not we can depend on the operators' dexterity and not have any kind of a safety device. I am going to put this thing to a vote.

How many believe in this case it's perfectly all right to depend on training and the operator's dexterity and alertness?

Let's see the hands of those that believe that? (Three)

How many think you should put some kind of a safety gadget there. (Majority)

I am going to ask Mr. Hanau to take the next accident.

MR. HANAU: This case concerns the operation of a No. 1½ double-action press. A combination blanking and forming operation was being done and coil stock was fed from the back. There was a cage or barrier across the front of the die. Hand tools were not used. In starting a new coil of stock it was necessary for the operator to reach under the guard to grasp the coil with his hand. When he did this, he tripped the press, resulting in the amputation of the index and middle fingers of his right hand.

Now, before we start discussing this, are there any questions as to what happened in this case?

MR. CERNEY: What kind of a guard was it?

MR. HANAU: A barrier guard with an automatic feed.

MR. GRAHAM: It seems to us that the guard was inadequate because the man was able to reach under the front barrier when he was arranging the stock, so that it would feed through the press. I was in a plant not so long ago where something similar to that was handled very nicely. The press was guarded with a die enclosure on all four sides.

It was fed from the back and when it ran out of stock the next roll would be welded to the one that was finished making it unnecessary for the operator to go in to feed the press.

Somebody mentioned the use of pliers. Pliers are fine, but I feel that we should not use pliers alone, except in extreme cases. There should be adequate protection either around the die in the form of a die enclosure or some measure for taking the operator out of that danger zone, because there have been too many accidents that have occurred in just that way.

MR. JOHNSON: Inasmuch as we don't have very many jobs in which we use coil stock with an automatic feed, and due to the difficulty of trying to figure out exactly what the situation was at the plant, it's really hard to decide what the training should be here other than discouraging pedal riding.

MR. CAPMIEK (Western Electric Company): The first speaker objected to using pliers. I can't see any objection if he uses aluminum pliers. They are inexpensive for one thing, and if this operator had been supplied with a pair of hand pliers, he would possibly have saved his fingers. We instruct our employees never to put their fingers under a punch or die.

MR. GRAHAM: I don't object to the use of pliers. I say, use them, but I do feel that we should not rely upon pliers alone. We should have something else like our die enclosure to protect us also, because I have found too many accidents occur with the use of pliers alone and without some form of die enclosure or some means of taking a man out of that danger zone.

MR. CAPMIEK: When you have roll stock and you get that automatic feed started at one time, the roller on the other side will keep rolling that part through. Since there is no more manual labor connected with it, I can't see the objection to using the pliers.

MR. SMITH: Can someone tell us about guarding the dies where an automatic feed is employed?

MR. SHEAR (American All Safe Company): There are three devices made by three different companies that are essentially barrier guards and when the barrier is lifted so that work is done underneath the barrier, the power of the press is removed.

I won't name the companies. I think it may be a straight mechanical guard, very low priced. One is an electrical device, a little bit more expensive, and another one is an air operated device at about \$300 and I don't see any other answer.

Where a man has to start the feed, the use of pliers would not work in nine cases out of ten.

out of ten, on starting a roll feed, because it's too fine an adjustment.

MR. BURNELL: I think I have seen presses make the sweep guard. We had forty presses, and it was our practice when we fed a new strip of stock, that the roll feed could be cranked by hand to carry that stock into the die. The press would stop and the roll feed could be cranked by hand to start a new strip. It was cranked by hand until it was carried in to a stop on the die. Then the power was started.

MR. HANAU: I think we have emphasized the fact that we are not doing everything we can with the equipment we have in the plants to keep these accidents from happening.

This is case No. 4 which involved a trimming operation on a No. 6 press. The press was equipped with a two-handed pull-back safety device, and a nonrepeat attachment. The operator sustained amputation of the tip of the index finger when cables failed to pull the hands clear.

Investigation developed that cable had stretched so that pull away was incapable of clearing fingers.

I think that we would like to know something about how this press might have been operated safely with the present device on it, and also if you have any suggestion as to what might have been done to operate that press safely without the two-handed pull-back safety device.

MR. GRAHAM: This was a pull-out type of guard, which leads me to feel the guard was not properly adjusted in the first place.

It says that investigation developed that the cable had stretched, so that the pull-away was incapable of clearing the index fingers.

Many people take the position that the cables on a pull-out type of guard don't stretch. The action there is like the wear of an elevator cable. After considerable wear it tightens and becomes smaller. Some people claim that that is a stretch, but what probably happened in this case is that they measured the operator for the distance in an incorrect way. Some authorities say that things should be set up so the punch is one-half inch from the die and the man should be out at least two or three inches. The more, the better, I think, because there is a certainty there about taking the man out of the danger zone.

Many times workers will buck the guard

with the result that they will strain the rods leading from the multiplier back to the pulley. This could very easily throw the system out three or four inches.

It mentions a nonrepeat attachment which I have never seen. They call them nonrepeat attachments, but what's going to happen if your clutch pin breaks? It's going to repeat, isn't it?

About the guarding of this particular operation which involves a No. 6 press. It doesn't give much information here as to the amount of work that's being done, but again, I would suggest that if it's not too large a job, we provide a semi-automatic feed with a full die enclosure.

I feel that whenever we can rely upon automatic feeds with die enclosures, we are just that much ahead. Of course, we can't always do that because there are so many plants that are not in a position to build those automatic feeds, and where they are not, we have got to do the next best thing, rely upon mechanical guards of some nature.

MR. JOHNSON: I doubt very much whether a three-sixteenths inch diameter cable stretched enough to cause any man to have an accident.

We have about 70 pull-back type guards in our plant. We have made it imperative to the die setter that every time he puts a worker on a punch press with a pull-back guard on it, he has to lower that press either by hand or by the motor, and then shut off the motor, so that the die remains one-inch open. The cables and the wristlets after they are adjusted properly should be six inches away from the die shoe.

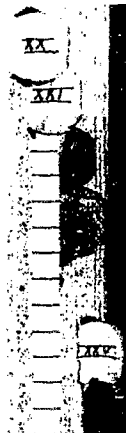
We make them pull that press down by hand so that the operator will stretch and feel he has got a guard.

If a standard gauge is not used to measure and assemble leather wristlets, they may not be the same length. You can be off as much as an inch and a half, but you may not notice it.

There is a trimming operation that is used on certain jobs. In removing this from the press we have to consider the hazard of getting pinched, if there is a repeat.

We should also know whether the employee stands or sits.

We have instructed our die setters to instruct the employee—to demonstrate to that employee, and to follow up, to make sure that he understands what you want him to do.



MR. UNDERWOOD: We have many pull-back guards in the plant, and if the guard is set according to instructions, they will never have an accident.

I haven't seen a cable ever stretch. Our guards are double-checked after the setup man sets them up as a safety precaution, and if they are properly set, no one will ever get caught.

MEMBER: We are trying to change the conditions. The investigation reveals the cable did stretch. Isn't that correct?

Isn't that what it says?

MR. GRAHAM: That's right. It did say that. I think I made the point, that the man, who made that report, said he had the understanding that it stretched. However, all the men that I have come in contact with in different plants, claim that cables don't stretch, that there is a tightening of the cable which makes it smaller.

MR. HANAU: Frankly I would like to say, that I have yet to see the cable that stretched so fast you couldn't catch the stretch between operations, and it's my understanding these pull-back guards should be adjusted for each operator. If you get that much stretch in between operations, I am willing to take that case if you will take all the rest of them.

But this emphasizes to me that no guard is better than its maintenance.

And you can't put these two-handed devices on any press and just forget about them. You can't walk by them when you are inspecting the plant and take for granted that because it's a two-handed device, that it is properly set and is going to pull that man's hands out.

So I would like to emphasize again, it is important that the job be set up safely regardless of what safety device you use.

Our next case involves a No. 8 press which was being operated when this injury described as a lacerated thumb was sustained. The press was equipped with a two-handed tripping device. The operator was removing stock from the press by placing his hand on top of the part, which was an auto wheel, instead of in the drop center of the rim as he had been instructed to do so. Due to the solenoid failing, the press repeated and the operator sustained the injury as described.

MR. GRAHAM: Now, the cause of the accident was the failure of the solenoid causing the press to repeat. I remember a

case like that very distinctly occurring on a press which was operated by four girls. Some of the screws in the solenoid came out and caused a short circuit.

MR. JOHNSON: We have a very large type of press. It's approximately two stories in height, which we have four girls operating—two on the front and two on the back. The stock is passed from die to die, and we have electrical buttons that are mounted overhead.

All eight hands must make contact with these buttons in order to put the solenoid into action. The press goes into action, and the girls have to hold their hands on the buttons until the die has completed its downward stroke, and is on the upward stroke.

As you know, a solenoid on a large press takes quite a heavy beating and in this case the flat head of the rivet holding the parts together slipped in between causing the press to repeat approximately half way down again before it stopped.

Fortunately, there wasn't an accident. However, to make sure that we wouldn't have an accident on an operation of this kind, we installed a pull-back type of guard. They pull just tight enough so the girl can still hold on to these buttons when she brings the hands down, and then she is on the outside of the press.

We have the safety buttons plus the pull-back type of guard which we put in there to try to eliminate an accident.

MR. HANAU: I must take issue here with these fellows. They still want to rebuild the machine.

The problem isn't one of changing the machine over. We are trying to prevent accidents today and tomorrow while we are in the plant making inspections. It seems to me we have lost sight of removing the stock from the press by placing the hand on the auto wheel instead of the drop center of the rim as he had been instructed to do.

It seems to me when this job was set up they took into consideration the solenoid might fail and, therefore, the man was instructed to grab the wheel in the drop center of the rim so if it did repeat or the press did operate, his hands would be in the clear.

I want to get some expression as to what could have been done at the time of inspection to prevent this accident from happening.

MEMBER: I would say that there isn't any substitute for a supervisor walking down the aisle and looking at the operators operating the machines with the idea of safety in mind, and if this operator pulled off the piece from the top the time in which he was hurt, chances are he has been pulling that piece off for maybe a hundred times before that. If the supervisor sees that and allows him to continue, he can expect an accident. He should take prompt action whenever he sees an unsafe act and he will have a lot less accidents in the long run.

MR. HANAU: In other words, the foreman or the safety engineer had a lot of opportunities to see that fellow put his hands on the wheel before he took them off. We can be more observing to make sure that these safety devices, though they may be limited, are being used to their utmost in giving us all of the protection that is possible.

MR. HANAU: I go along with you all the way in dealing with people. First of all, you have two chances for human failure—one with the workers and the other with the foremen. I think all of us workmen have seen either one of them or both fail, too. In the use of the punch press where that condition becomes prominent, the reduction of human failure becomes our problem. Let us go to the next case which occurred on a 5-ton press set up to form a small button-like part. It was equipped with a swing guard and an air-ejecting device. A piece stuck in the die. The operator reached around the guard and attempted to loosen it with his fingers, and tripped the press resulting in smashed fingers of the right hand. The fact that this man came in on it with the right hand and received the smashed fingers indicates that the guard was not adjusted properly.

In other words, the arc was not wide enough to take the man out or he couldn't have come in. Of course, if we had more information on this, we might be able to interpret that a little differently. How was the guard set? Was it set too high or was it set so there was no protection at all? Was it possible to go around the guard from either side? Was there a flag there? Was it set according to the flag? I would say better adjustment and watching on the part of the supervisor and probably the use of a flag might help in this situation.

If you are going to see a sweep guard I

would suggest a double acting device properly set. This would give you a wide enough sweep so the man couldn't go around. We have used them in some cases in some plants with a fair degree of safety, and I think that this might have overcome the condition.

If we knew more about it, why we possibly could interpret it a little better.

MR. SAFFEN [Fort Wayne, Indiana]: We speak quite a bit about training and instructions. In cases where a man ten years on the job is involved in an accident, is he to be instructed? How often should a man on a job ten years be instructed?

MR. SMITH: As a supervisor, I think a man should be instructed every time he is placed on a job. I think you will find a lot of these accidents do not involve any "month-old" man, but they happen to good press operators who think they can violate the rules.

MR. MOORE [Remington Rand Company]: It isn't the beginners as a rule that take the chances. It's the oldtimers. "Familiarity breeds contempt." They get so used to it they think a punch press thinks as well as they do.

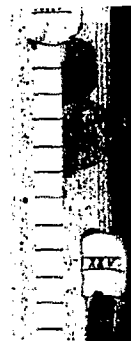
MR. HANAU: I think we are all interested in training, but my personal opinion is that we are putting lots of emphasis on the training of the employee, but how about the training of the supervisor or the die setter or the man who might be responsible for the proper setting up of that machine?

MR. ED PRANG: I think these men should be trained not less than once a year, and perhaps more often than that.

MR. HANAU: In other words, you feel that the man ought to be reoriented on how to maintain the equipment by somebody who is competent to show him how to do it, at least once a year. I think that fact is being overlooked tremendously in all plants.

MEMBER: I firmly believe that we should take each and every person when they start out on a job and show them a moving picture of accidents that actually happened throughout these plants. Show these youngsters that accidents actually happen on these machines, just telling them without showing them accidents is not convincing.

MR. HANAU: In other words, you feel we could make more use of visual aids. I think that all of us are agreed on that point. However, we are dealing with small plants as well as large plants, and very frequently in the small plants, these facilities



such as you describe aren't available.

I will agree that a lot of that instruction could be given probably by some agency outside the plant.

MR. COIN: Our corporation gives me ten minutes a week at the lunch period—at the end of the lunch period—for training. Each foreman talks to his group and you would be surprised what public speakers you can make out of foremen. Each Tuesday at lunch period when they come back, we take ten minutes for meeting every week.

CHAIRMAN GREENWOOD: In closing this meeting formally, I would like to summarize a few things. It seems to me that the discussion today indicates that there is a greater need for dissemination of "know how".

We all agree that instruction should be all inclusive, not only for the employee, but

for the foreman, the engineer, the inspection and maintenance and setup man as well.

I believe the real "know how" of most of our punch press problems is in the minds of foremen, and as your present chairman of this section, I would like to enlist your cooperation in having you send in any information regarding power press operation, the type of training you give, the type of guards you use, how you meet your various problems, your supervisory techniques.

We think if you men will write into the Council and tell how you do this or that, how often you think it can be done or should be done, that your committee can arrive at a consensus. Then, perhaps at this time next year we may be able to give out a list of suggested recommendations which are an outgrowth of the thinking of all industrial foremen and safety people.

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# Transactions

## 35TH NATIONAL SAFETY CONGRESS



VOLUME XX

PUBLIC UTILITIES SECTION

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## Foreword

**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

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J. E. YATES, Safety Supervisor, Pacific Power & Light Co., Portland, Oregon (Mountain States and Pacific Area)

**Staff Representative**—EDWARD M. JASPER, National Safety Council, Inc., Chicago, Ill.

## TUESDAY AFTERNOON SESSION October 7, 1948

Presiding: J. O. LESLIE, Director of Safety, Gilbert Associates, Inc.

### An Ex-President Reviews a Twenty Year Safety Program

By W. E. MITCHELL

Ex-President, Georgia Power Company

A recent issue of the Saturday Evening Post carried the following headline—"I'd like to KILL." Of course it had reference to the terrific toll of lives lost in highway accidents. Whenever we have a 3-day week-end holiday we are warned that 300 or 400 people will be killed, and they are. The number of accidents in and around the home are appalling.

But this great convention indicates the deep interest of every line of business here represented in doing a better job of accident prevention. With that thought in mind it seemed to me that it might be helpful if I were to look back over the electric light and power business, with which I have been connected for nearly 45 years, and see if we have made real progress there. These things that have been tried and proved helpful in one industry should be helpful in others. Of course, there are some hazards that, like the danger from coming in contact with live wires carrying high voltage, are much more prevalent in the electric utility business.

There is one thing that I know as well as anyone here—a thing that we all ought to know. It is the recognition that we can't let up; that, on the contrary, we must work harder than ever to make safety pay bigger dividends than it ever has paid before in terms of human life and happiness, of industrial productivity and economic well-being. Here, as perhaps nowhere else, eternal vigilance is the price of continued success.

Why have a safety program? What makes a successful one? How do you measure its accomplishments? Much has been written and spoken on this subject. I can't tell you anything new, but old lessons, like sound old proverbs, will bear repeating. Men at work are still much like overgrown children, prone to forget and prone to slip backward.

Why have a safety program—because it pays big dividends in cash, and in a clearer conscience. Accidents cost money and are an economic waste, aside from causing needless

human suffering. The training of men in safe practices and the avoidance of accidents fully justifies having a safety program.

What will make a successful one—that is harder to say but certainly it will take careful planning, thorough training, and sustained follow-up as part of the duties of all regular employees.

How shall we measure its accomplishments—that is not difficult. A steadily decreasing number of accidents per 100 man-hours worked and a continued reduction in fatal and permanently disabling accidents are positive proof that your program is working.

How to develop a successful plan—well, I'd say that the first and most important factor is that top management be completely and enthusiastically sold on the importance of safety.

Management must take the leading part in a program of accident prevention that amounts to anything. Management has to initiate it, see that it permeates the whole organization, give it emotional appeal, and keep it alive and going after the first interest has died down. You can employ safety directors to advise with the management, and with the men about good techniques. Safety directors can help to carry out the policies of the management, but they can't do the job alone, without the assistance of management.

The wages paid must be fair and adequate and there must be reasonable permanency in the job, if we expect the workman to become interested in accident prevention.

It is the duty and obligation of a company to take the leadership in activities of this kind from which the employees benefit. The president or general manager cannot delegate the organization of the safety program to some minor subordinate. This is not the way management gets results in production, or in purchasing, or in selling. Management must realize that the functioning of the

safety program is just as important to efficiency in the plant as any other major activity. Accidents are pure waste of men, materials and money! The primary objectives of the safety program are to eliminate these needless wastes, and, therefore, safety is an important part of management's business.

The three E's—Engineering, Education, Enforcement—are the basis of all sound traffic plans. I think they apply equally to sane, sound, successful safety work.

Engineering—it is management's first and primary responsibility to make the conditions of the work place physically safe. The best possible tools must be provided for each type of work. They must be frequently inspected and checked to be sure that they are kept in first-class working condition. Only when it has done this can management ask the workers to take an active part, and the most necessary part, in any safety program. Every new job must be engineered from the standpoint of the safety of the workmen who will carry it out. When management does its full part it is easy to get the other employees down the line to understand the importance of safety and to accept and follow the second E—Education.

We are learning that Education is a never-ended job. Man learns quickly and forgets quickly, until education and practice have formed safe working habits. They form habits of the right kind, and, therefore, they build character and make better men.

Enforcement means sound, firm discipline. It means careful, unbiased investigation by competent committees of every accident, publication of the findings, the preventive measures against a recurrence, and the proper disciplinary measures if the accident was the result of carelessness or negligence.

Any safety program must be soundly organized with a competent safety director and safety engineer. There must be some definite goals set. While records may be a nuisance they are necessary to record success and failure. But the safety director and engineer must spend most of their time in direct contact with the supervisory staff and foreman where the work is being done. They must make known to the men how keen the management's interest is in the accident prevention work. Employees are very sensitive to what they think is the attitude of the president's office. If safety is considered of great importance there this attitude will certainly

be reflected right down the line to every employee. Of course management must have capable men for carrying out the accident prevention details, but if the job is to be well-done it must meet with committees, must know personally what the main objectives are, and must actually lead all employees in the campaign against accidents.

Accident prevention is good business. Safe methods of work save money for the company. It is good enough business for the management to give it full and serious attention. You all know that accidents cost money without my telling you. When an accident occurs, work is disrupted, possibly equipment is damaged; if a new man has to fill a vacancy caused by an injury there is a slowing up and loss of efficiency until the new man learns his job. There is always the possibility that the new man will make a serious mistake on unfamiliar work. When the injured man returns to the job, after recovering from his accident, he is still far from his peak of efficiency as a worker and does not reach that peak again for a long time. These are what we might call indirect expenses, but they are just as real as direct expenses.

Looking at it cold-bloodedly, simply from a profit and loss standpoint, management owes just as great an obligation to the stockholders to initiate, direct and subsidize safety work as to direct the production processes. Safety is just as much the responsibility of good management as good operating practices or good sales methods—and I may say it pays just as good dividends. We go to great lengths to conserve our companies' physical assets; why not more attention to conserving its greatest asset—its employees?

You are probably thinking right now. "Well, that sounds all right but it's too general. Have you any proof that a safety program will conserve manpower, will reduce labor turnover, will improve efficiency?"

The Georgia Power Company now employs nearly 6,000 people, serving some 50,000 square miles of territory, and 390,000 customers. It has had an active and steadily improving safety organization for 30 years now, and its record supplies ample and affirmative proof.

Definite plans with a safety director were actively inaugurated just about 30 years ago. Many changes have been made since and the

number and severity of lost-time accidents have been greatly decreased.

The safety council, selected from department heads and cooperating with the safety director and engineer, has been an important factor in achieving results.

The thorough investigation of every serious accident by an independent committee and the publication of its findings has likewise been a most important factor. Then the continued education in safe practices and the annual safety contest between the six divisions of the company have helped make every single employee aware of the importance of this work. A trophy presented at a dinner to which every employee in the winning division worked has developed a splendid friendly rivalry and a great reduction in accidents.

As Al Smith used to say "Let's look at the record." In 1921 Georgia Power Company had 14.31 lost-time injuries per 100 employees; 6 of them fatal. In 1927 it was 5.43 L.T.I. per 100 employees. In 1936 it was .77 L.T.I. per 100 employees, with 3 of them fatal.

The Augusta Division, with 414 employees working 3,569,000 man-hours, completed the year 1945 to 1946 inclusive without a single disabling injury.

The Macon Division, with 558 employees working 1,507,000 man-hours, completed the year 1945 to 1946 without a disabling injury.

In 1945 and 1946 the company completed the year without a single fatal accident. (The phone call at 11:30 A.M. January 1, 1946.)

These results are concrete proof that intelligent continued effort will get results.

We have learned much in 30 years. Some of the factors which contributed are as follows:

Safety begins with a thorough pre-employment medical examination of all new employees. It is aided by an annual examination of all employees over 40 years of age.

Group safety meetings are held regularly for discussion of job hazards, accident causes, etc., and individual employees down the line frequently head these meetings or lead the discussion, rather than the foreman or superintendent.

Then two or three operating practice meetings are held during the year in each division, attended by supervisors and foremen to discuss operating and accident prevention problems, and have proven very helpful.

The majority of the operating employees

and many of the office personnel have completed the Standard Red Cross First Aid Courses.

Practical first aid measures are reviewed frequently at the various safety meetings.

I have already mentioned the importance of independent, thorough investigation of every lost-time accident. The thorough discussion by local groups of these reports and the conclusions and recommendations brought out have led to desirable changes in line construction specifications, and methods of handling job, all with the object of making the work safer.

Greater use of rubber goods for covering up hot lines is a typical example. In 1939, following a series of contact fatal accidents, we adopted the practice of covering all immediately adjacent wires, neutrals and grounded apparatus that the workman might accidentally come in contact with. This has resulted in the saving of at least seven lives during the past seven years.

Pole top transposition was adopted in 1939 and has saved the lives of three of our linemen following contact with energized lines.

A Divisional contest was established in 1941, and based on the frequency and severity of disabling injuries. Since 1942 no division has won the contest without a perfect record. Augusta Division has had a perfect record for the past four years, and also this year to date. During the six years of the contest (1941-1946) the divisions had a total of 78 disabling injuries (6 fatal) as compared with 157 (17 fatal) during the previous six years.

For years emphasis has been placed upon the proper training and instruction of employees.

During the past two years more than 900 employees have been given the formal basic lineman training.

Practically all of our supervisory personnel have completed the ten-hour Job Relations Training program.

Another contributing factor in the results obtained is the Group Accident and Health Disability Insurance which was inaugurated in 1927. It covered at that time only hourly paid employees for sickness and non-occupational accidents, with a 3-day waiting period, and benefits were limited to three months disability.

During the first five years, participation dropped very low and costs shot sky-high. We

revised the plan in 1938, to cover from the eighth day up to six months and included occupational accidents at one-half the amount of non-occupational accidents and extended the coverage to all employees with a graded schedule of benefits averaging about sixty per cent of earnings, on an experience basis. The participation rapidly came up to 85 per cent of the employees.

By 1935 we were able to waive the monthly deductions of premiums for several months from dividends received. Participation increased by 1937 to about ninety-eight per cent of the employees and premium waivers became more frequent. In 1939 we extended to the employee, without a change in premium, hospital coverage, and in 1940 we extended surgery coverage. These two extensions paid for themselves by corrective surgery and correct treatment, in reducing time lost from disability. In 1942 the disability benefit period was extended from six months to twelve months, and surgery allowance was increased from \$50.00 to \$75.00 with no change in premium.

The record shows that the company is increasing the benefits paid for occupational accidents and increasing hospital allowance

without any increase in premium. Group hospitalization insurance was made available June 1, 1944, to family dependents of employees. This is provided by a separate premium. The company's death rate the past eight years has been reduced to 7.7 from the previous eight years of 11.2 per year per 1,000 employees, or 31 per cent. The premium rate is the same today as fifteen years ago and below the National Standard.

Still another helpful factor are the eight Credit Unions in which 3,338 of the company employees are shareholders with a total investment of \$96,590 as of June 30, 1947. 1,898 employees have loans totalling \$300,098 from these Unions. The ability to get a loan in time of need at a reasonable rate of interest is of great value to an employee, and the relief from mental anxiety may prevent a bad accident.

Yes, preventing accidents and saving lives involves eternal vigilance, long proaic training and attention to a multitude of details, but looking back over 30 years of it with Georgia Power Company I can truthfully say that it not only brings a lot of satisfaction, but that it pays real dividends.

### Psychological and Human Relations' Aspects of Accident Prevention

By WALTER A. CUTLER, Ph.D.  
Center for Safety Education, New York University

Structurally, accident prevention in the public utility industry, is quite simple. Although it is a demonstrably vital and valuable activity, there is little excuse for needlessly complicating it. The essentials are these, insofar as human actions are concerned:

There are jobs to be done, live men, electricians, substation employees, etc.

When jobs are done right there are no accidents.

When jobs are not done right there are accidents.

The mission of accident prevention, therefore, is to find the reasons why jobs are not done right, remove or modify the causes, and thus cause the jobs to be done right, which also means safely.

It's as simple as that! Accident prevention,

in this view, is as intimate a part of production as any other element in production, for all that it seeks is to get jobs, all jobs, done the way the jobs should be done. As human actions are statistically the greater part of the accident problems, we are giving more and more attention to the study and control of human behavior. The results of human behavior compose the field of human relations.

Major reasons for unsafe actions are these:

(We are purposely omitting the factors found in an unsafe working environment, so as to concentrate on the human aspects.)

Unfitness (for any reason) for the work to be done.

Poor supervision.

Faulty attitudes of workers.

Special susceptibility, over and above the

average, to accidents. (This factor is most frequently termed accident proneness.)

*Unfitness for work*—If a man is unfit for his work, he is likely to lack confidence which may lead to both accidents and discontent. His "human relations" will be bad, and, what is worse, he may infect others.

Some reasons for this unfitness for work are poor personnel procedure and poor training. Poor personnel procedures include poor pre-placement physical and mental examinations; inadequate survey of a man's training and experience; inadequate provision for necessary training and proper assignment. An inadequately trained man is a potential "accident."

Poor supervision will frequently weaken the productive efforts of even the best man, and this, too, comes under the heading of poor human relations.

Foremen will bear the close and continued scrutiny of management, particularly, in their relations with their men. This is especially true in public utilities where there are so many "project" types of work, small groups working away from a center. Management should not take the position that a supervisor is beyond reproach simply because he is a supervisor and that in any friction between supervisors and workers there is a moral obligation on management's part to declare the supervisor always right. Good human relations call for the supervisor to have both authority and a readiness to accept the responsibilities that go with authority. Management will be well advised to exert every effort to strengthen the supervisor. These responsibilities of the supervisor include:

Knowing what he is doing and what his men are doing. That is, he must know his job.

Teaching his workers correctly. This includes the ability to begin teaching where the man "is," rather than where the supervisor "is."

Maintaining good morale in his department, which will come from his knowledge of the job, his impartiality, his patience, and good humor, and from an honest respect for the workers associated with him.

Inspecting constantly for unsafe conditions and unsafe actions.

Correcting unsafe acts in a constructive manner so that criticism will not develop.

Investigating accidents thoroughly so that

the real cause will be discovered, and then taking action to correct the situation.

Learning about his workers, their characteristics, the conditions under which they work best, and maintaining such relations with them as will breed mutual confidence and respect.

To do these things, and they should be considered a normal part of good supervision, the supervisor must be learning constantly about his responsibilities and opportunities for accident prevention as his part of the firm's total human relations program. A supervisor who has an adequate conception of his responsibility for sound accident prevention procedures will more likely than not be a supervisor who realizes that the best production comes about when every man feels that this is a good place to work.

*Faulty attitudes of workers*—The causes of faulty attitudes among workers, such as attitudes as hostile against good human relations must be sought both within the individual and outside the individual. When considering faulty attitudes, such as "stick out" above the attitudes of the greater number of workers, attention should be given always to possible sources of irritation in managerial policies, supervisory actions, or real or fancied irritations in the work environment. If there are such sources of irritation, and if they are found to be "real" sources, then study should be given to the modification or modification of such causes. Once such sources are removed, there is a good hope that the faulty attitudes will disappear. Two often, we expect the worker to make all the adjustments. It is often advisable for management including supervisory to make such adjustments too.

There are certain psychophysical bases for our attitudes. Our attitudes are generously compounded of what we know, feel, aspire to, love, hate, etc. Our general attitudes and our specific attitudes have naturally, their basis both in our general experience and in special experiences. A man who for a combination of reasons has failed to get ahead, may have the general attitude that the world is against him. Within this general framework, he may have specific attitudes of aversion or admiration which are based on experience with particular individuals.

Also there are physical bases for mental attitudes. A boy with poor eyes or poor hearing, or poor physique, sits in a schoolroom,

Because of his deficiency he learns slowly and soon the class leaves him behind. As the gulf widens he may take refuge in being a bully or in troublemaking or solitariness to compensate in his eyes and the eyes of others, for his deficiencies. That same boy, years later, may be employed by a utility company. He still has the special attitudes which he developed as defenses, but now they are grown up and frequently are worse. He admits to his conscious mind only such evidence as supports his attitudes, so that his bad attitudes are strengthened and harder to change.

It is sufficient to remind ourselves that for every attitude there is a reason. Sometimes the reason, or better the cause, is on the surface, sometimes much deeper. If the attitude is to be changed, the cause must be found and treated.

Some of these attitudes are as follows:

**Irresponsibility**—This is the immature person who has never learned or wanted to learn to accept authority.

**Unteachableness**—This person cannot be taught either because he knows it all or because for some other reason he has developed an unusual resistance to knowledge. To tell such a person about a potential accident situation is to get a laugh. He also may be a half-learner. He hears only half of an instruction, then turns his mind off.

**Combattiveness, Belligerence**—This person is just "against." He is against fellow workers, the supervision, the management. His automatic reaction to any proposition is to find, unerringly, some element with which he can find fault.

**Clownishness**—The clown is potentially the most dangerous person around the place. "Anything for a laugh" is his motto.

**Solitariness, or Unfriendliness**—This person is for some obscure reason, aloof. He may be deliberately unfriendly, or involuntarily so because of lack of developed capacities for friendship. In any case he may be an unsafe worker, depending on the extent to which his attitude affects his behavior and on the extent to which his attitude may affect his working as a member of a team.

**Resistance to Supervision**—This person is, like the belligerent person, against all supervision. But this attitude does not require belligerence. In fact, the most potentially dangerous expression of the resistance may

be in a "quiet man," one who long ago made up his mind just what he was going to accept from the supervisor. Without making an issue of it, he is going his own way.

The above are some of the "bad" attitudes which may be found among workers. They are important, both in themselves and in their possible effect on other workers. It is not suggested that the modern business undertaking should constitute itself as a psychological or psychiatric clinic. It is suggested, no, it is recommended that any intelligently managed concern should include enough knowledge of human behavior and its complexities to accomplish that most desired of objectives a harmonious family of workers, free from major causes of friction, and free from accidents.

Let us return, in this connection, to the foreman; for he is a key figure in this matter of attitudes, as he is a key figure in productions and in accident prevention. He should take the lead in helping to change poor attitudes, but he should not work as if as if he were perfect. Similarly we should not be unrealistic and expect him to be a psychiatrist or a psychologist. Management should be careful to see, in elevating men to supervisory positions, that these men either have the qualifications for real leadership, or have the potentialities for developing leadership. The foreman, in turn, may treat a bad attitude just as he would treat an accident. What is the cause? What seems to be the reason for the cause? How can the cause be removed? Am I (the foreman) at fault? There is no loss in admitting mistakes. There is continuous loss, friction and trouble in perpetuating them.

**Accident-Prone**ness—In achieving this desirable objective, special attention should be paid to that group of workers, loosely termed "accident-prone." While there may be differences in technical definitions of accident-prone, we will repeat as our own general definition, "that susceptibility to accidents which is substantially over and above the accident experience of persons doing the same type of work." It is apparent that such persons need special attention in their own, as well as the company's interest. Dismissing such a person, even when it is administratively possible, is not only a confession of defeat by the company, but it is also a poor example of the best human relations. In such

cases, the most thorough personal examination possible is advised. There must be basic reasons for continued susceptibility to accidents and often such reasons are discoverable and lend themselves to treatment. Search must be made among the following elements:

The psychological and mental makeup.

The past history—family and environmental.

Attitudes, implied or expressed, toward family, the management, working associates, supervisors, and others.

Observed behavior patterns.

Certainly, there is as much warrant for salvaging a worker, as there is for salvaging a piece of material. Careful work done to reconstitute a worker as a safe operator will have as beneficial effect on good human relations as innumerable posters, sermons, or rule books. We must begin with the postulate that any person is "safely" employable, if we are willing to work with him to discover and remove any factors which may cause him to work unsafely. This is not the time to discuss extensively various techniques which may be used, but it is the time to reaffirm our belief that verified cases of accident-prone men should be viewed just as we would view an illness or an injury. Human relations demand human conservation.

It is the axiom of psychology as well as a fact of experience, that the best way to cure a bad habit is to persuade the person to adopt a better habit. This axiom applies as well to groups as to individuals, and to large-scale operations as well as to individual effort. In considering the human relations aspects of accident prevention, therefore, we are led inevitably to the belief that success in accident prevention will be an invariable concomitant to successful human relations within a given plant or industry.

The converse of this fact is a point made earlier in this paper that a sincere and thorough going accident prevention program may be a means of achieving a good program of human relations. These two activities, human relations and accident prevention are reciprocal and interdependent. The reason is simple, basic and convincing. Each is based on the American concept that a man has worth, significance, and that on any work which he undertakes, he is an individual whose welfare and viewpoints are matters of primary concern. Both of these mutually related activities are expressions of fundamental good

will. As such the more successfully such good will is translated into active and concrete practice the more faulty attitudes and other factors which interfere with successful human relations will tend to disappear.

In furthering a program of human relations as related to accident prevention, management should ask itself the following questions:

Is the attitude of management towards safety (which is understood as an indispensable adjunct to production) wholehearted and sincere in expressing this attitude—is as much weight given to the welfare of the workers as to the possible monetary savings?

Is provision made for maximum safety in all operations, including mechanical means, physical conditions, and work practices?

Are the supervisors real leaders, intelligent in their own duties, impartial, thorough, and do they do their utmost in recognizing their responsibilities and opportunities for preventing accidents, including a knowledge of the workers associated with them? This knowledge should include knowing each man as an individual, his temperament, his home conditions, and knowing the conditions under which he works best, and what conditions affect him adversely. Are the workers treated generally as men, rather than functions or "numbers"?

Are the majority of workers, safe workers, and, if so, is the considerable influence of this group used intelligently to bring others into line?

In short, is it a good place to work? After all, accidents, as bad and as costly as they are, are but one form of human waste. There are other losses which are considerable but which may not be as easily computed as accident losses. All of these losses, accidents and others, flow from the steady drains on our economy caused by poor human relations. Is it too much to believe and to hope for, that more attention to the human side of production will effect incalculable human and material savings? Is it too much to say that in this troubled world at this time, every effort to strengthen the real bulwark of our world, our men and women, will be our only guarantee against chaos. Is it too much to hope that in this effort for better human relations and fewer and fewer accidents, the public utility companies of the nation should take an earnest and a conspicuous part?

### Fitting the Employee into the Right Job by the Use of Placement Tests.

By MORRIS S. VITELES

Director of Personnel Research and Training, Philadelphia Electric Co.

A number of years ago there appeared in England a book entitled "How to Run a Broom Factory" which good naturedly poked fun at recent developments in the application of scientific methods in business and industry. The use of psychological tests was naturally not overlooked by the author and there are a few pages devoted to a discussion of the use of such methods in the selection of workers. After pointing out that the modern firm should have a "first-class psychologist to look after the selection of work people" the author goes on to say:

"Clearly, if you want a man to stand and look at a machine, and you take on a man who is

(a) Blind or  
(b) Incapable of looking at a machine then the machine won't be looked at, which will Decrease Efficiency. If, however, you use Scientific Methods, your psychologist will select a man who

(a) Isn't blind and  
(b) Loves standing and looking at machines.

"The machine will thus be looked at and this will Increase Efficiency. The technique of scientific selection he goes on to say, is something like this:

"(a) You take your applicant and place before him an Unfamiliar Piece of Prose. If he can read it he isn't blind. If he can't read it he is either blind or can't read, in either of which cases he is Unusable.

"(b) If he gets through this test satisfactorily, you take him along, place him in front of a machine and tell him to look at it. If, when you come back an hour later, he is still looking at it, he is Suitable. If, on the other hand, he has stopped looking at it, note what he has begun to do. The following list shows how this may help you to fit him into an appropriate job.

|                   |                               |
|-------------------|-------------------------------|
| "If he is:        | Then he is more suitable for: |
| Asleep            | Night watchman                |
| Gone              | Traveler                      |
| Reading the paper | Director                      |
| Writing a letter  | Clerical Post                 |

"The main idea is to place people in positions where they may use their natural Bent. If people have no natural Bent, but just stay straight all the time, they are suitable as Cashiers."

I recall that my first reaction upon reading the material cited was one of resentment at what appeared to be an attack upon the dignity of psychology and of the professional psychologist. However, I was also quick to recognize that, in fact, this bit of satire gives a fairly close approximation of what the practical man frequently thinks of the psychologist and of the way in which he goes about fitting the right employee to the right job by the use of psychological methods.

Beneath all this gibing by the author of "How to Run a Broom Factory" lies a keen appreciation of the essential skepticism concerning the use of psychological methods which, in the past, has seriously hampered the wider application of psychological selection methods based upon a sound and adequate program of research. Moreover, in spite of the many papers read at many meetings on psychological procedures for selecting personnel—and sometimes, I suspect, because of these papers—there is still considerable misunderstanding about the role of tests in the selection and classification of employees. For this reason, it seems appropriate to take a few minutes for a brief survey of basic principles applying to the use of psychological tests in fitting the worker to the job.

One basic principle is that *tests do not take the place of the interview or supplant other methods ordinarily used in the employment of personnel.*

It is not possible, now, and I question whether it will soon—if ever—be possible to use tests *alone* for selection purposes. There are aspects of personality which cannot at present be measured adequately by tests and, under any circumstances, the employing officer should satisfy himself that the applicant for employment or transfer is the kind of person with whom he can satisfactorily get along. In passing, it should also be noted that both the application blank and the interview

are themselves subject to improvement by the application of scientific methods and that much can be done to make selection more effective by research on these employment methods. However, all of this merely supports the point of view that tests supplement and do not take the place of methods which are customarily used in the assessment of applicants for job vacancies.

Another basic principle in the use of psychological tests for placement is that such tests are *not 100 per cent dependable.*

Tests cannot be described as 100 per cent dependable, or as having anything close to this degree of dependability, if by dependability is meant that the use of tests will result in the placement of only employees who will meet the job performance standards, in the rejection of all who will fail to meet such standards, and in the rejection of none who can be expected to meet them.

Unfortunately, the professional psychologist has sometimes spoken with such enthusiasm about his tests as to give this mistaken impression that they are infallible instruments. Moreover, the average employer who has heard a speech about tests frequently ends by expecting too much of them. The fact is that, in the use of tests and allied psychological techniques, we are dealing simply with "probabilities" and not with certainty. However, on the basis of adequate statistical treatment, it is possible to make accurate predictions as to the characteristics of a group hired through the application of improved psychological methods—predictions as to the proportion of those employed who will qualify for the job and be retained, and the proportion who will prove unsatisfactory, and be eliminated.

While tests do not supplant other methods used in fitting workers to jobs and tests are not 100 per cent dependable it is also an established fact that where psychologists have been given the opportunity to conduct thorough and continuous research, better and more dependable results have usually been achieved in the selection and placement of employees than can be obtained through the use of only traditional methods. There is considerable evidence that, where a testing program is set up on the basis of adequate research, considerable improvement can ordinarily be anticipated in the way of increasing the proportion of qualified men selected; shortening the training time; decreasing the

number of errors and accidents; reducing labor turnover, and accomplishing similar worthwhile objectives.

A typical illustration is found in a marked decrease in the percentage of unsatisfactory apprentices as the result of the use of well-standardized tests by the Scoville Manufacturing Company. The Scoville Testing Program was started late in 1923. Following an extended period of research, tests were introduced in 1926 in hiring metal trade apprentices. The percentage of unsatisfactory apprentices, which had hovered around 40 per cent for the previous five years, dropped to 17 per cent. In 1930 after a similar study of additional tests, two more were added to the battery, and the percentage of unsatisfactory apprentices dropped.

The foreman who rated the apprentices on their progress and skill in mechanical work never knew the test scores. Not only was there a sharp decrease in the number of unsatisfactory apprentices with each change, but the unsatisfactory workers were laid off earlier, instead of being carried along to fail ultimately, when the foremen realized they could be replaced by better boys.

In the ten years subsequent to 1930 new and higher requirements for potential development of trainees beyond the original goals were set, the number of apprentices trained currently increased, etc. Nevertheless, the percentage of failure, as of 1941, was still about 8 per cent. This fact is attributed to an enriched interviewing technique which, incidentally, shows the advantages available from the study and improvement of interviewing methods themselves.

Another illustration of the usefulness and the extent of dependability of tests is found in the use of *Motor Ability Tests* in the selection of street car operators. Using a score of 90 or above on this test, it was found necessary to hire only 105 men to obtain 100 qualified operators (candidates who were able to complete a rigid training course satisfactorily). Using a score below 90, it was necessary to hire 206 men to obtain 100 qualified operators. With a score of 80 to 89, 141 men are needed to obtain 100 qualified operators.

Now in considering these data, it is to be noted that even with the highest scores there were still five men who failed to make good on the job. In the illustration cited, the dependability of selecting qualified employees

increases as higher scores are used in selection, but in no case was 100 per cent dependability achieved. As a matter of fact, I would be very suspicious of any report which stated that such a degree of dependability had been reached. Nevertheless, such figures indicate both the improvement which can be effected when tests are used to supplement ordinary employment data and the way in which known probabilities for selecting qualified personnel with scores at different levels can be used to advantage in selecting the highest possible proportion of qualified workers from the available labor supply.

The experience of the Army Air Forces in the selection of pilots furnished another illustration of the degree of dependability of tests in selection and placement. As is well known, the cost of training an Army pilot—and also a civilian airline pilot—amounts to a considerable sum. For this, and other reasons, an extensive program of testing was used in the selection of Army Air Forces and is now under consideration in connection with the selection of civilian air pilots. As a final test of validity of this selection program, 1145 men were assigned to pilot pre-flight schools regardless of the scores made on the tests already in use for the selection of Army pilots. Of these, only 23 per cent were successful in completing the pilot training course and in becoming rated pilots—a percentage far below that attained when only men with passing scores on the pilot tests were assigned to training.

In the Army Air Forces selection program the numbers 1 to 9—called *stanines* (standard nine)—were used in predicting the probabilities of success or failure during training as an aircraft pilot. Eight and 9's represent very high scores, whereas 1's and 2's represent low scores on the tests used for classification purposes. Approximately 85 per cent of the men with scores of 8, 8's and 9's succeeded in completing flight training, whereas only 30 per cent of the 4's and 5's and 8's; only a very small percentage of the 1's, 2's and 3's were successful in completing flight training.

The tests proved to be more dependable than other methods of selection in terms of reducing the per cent of men eliminated during flight training. However, the tests were far from 100 per cent dependable. Moreover, using tests and raising the entrance standards reduces the number of men who have to be trained to meet a given quota,

lowers the training costs, and supplies a greater percentage of dependable men but, at the same time, a greater supply of candidates is needed to produce these results.

In general, a review of successful testing programs both in industry and in the military services demonstrates clearly that consistent results in the way of improved performances can be procured only when both the business man and the psychologist are willing to make an adequate investment of money, time, and funds for the exact scientific determination of the value of the proposed method. The psychologist has no mysterious power to penetrate the secrets of the individual's occupational abilities through the use of magic formulas which make it unnecessary to expend time, effort, and money in order to get results. On the other hand, as has been indicated earlier, where psychologists have been given an opportunity to conduct thorough and continuous research, substantial gains have been obtained in the way of improving employee performance through better selection and placement.

There are available many striking illustrations of results which may be achieved by scientific application involving the use of psychological tests in the selection of competent personnel. However, instead of attempting to present a series of additional testimonials on the value of such methods it seems well to use the time which is available to consider a few of the more significant recent trends and new developments in fitting workers to jobs. These reflect, in part, the outcome of research and practice in the use of tests by the military services during World War II. One such important development, illustrated in both military and civilian applications of psychology, is the use of test batteries for the different classification of applicants for employment.

The usual practice in industry, with some exceptions, has been to use a separate test battery for each job and to limit testing programs to a relatively small number of jobs in which hiring and adjustment problems are particularly pressing. Developments in the formulation of "job families" and the experi-

"It should be noted that as test standards are raised, the proportion of workers potentially qualified to meet a fixed level of productivity who are rejected for employment also tends to increase. This is one of the costs paid for decreasing the number who must be employed to obtain a given quota of employees fully qualified to meet the performance standards of the job."

ence of the Army Air Forces and other organizations point to the possibility of using a single battery to determine for which of a number of jobs a man is suited.<sup>2</sup> This, of course, makes practical a large scale, all-inclusive testing program which can be conducted within reasonable limitations of time, space, personnel and administrative costs.

In the Army Air Forces selection and classification program to which reference has already been made "assembly line" methods were employed in running hundreds of thousands of cadets through a series of tests and applying the results with outstanding success in determining whether a given man could most competently serve as a pilot, bombardier or navigator. Underlying this program was the knowledge, obtained through careful job analysis, that the different aircrew positions require different capacities and skills as well as training. As the AAF investigator points out, a man who is careful, accurate, and mathematically inclined might make an excellent navigator but fail to make the grade as a pilot. Similarly a candidate who never got along well with his math instructor might fail miserably in navigator or bombardier training but would make an ace pilot if properly assigned.<sup>3</sup>

The Aircrew Classification Battery was designed to help in such classification. This included paper and pencil tests that could be administered to several hundred men at one time and apparatus tests requiring individual attention for each candidate, standardized conditions, and very carefully trained testers. Each candidate was given all the tests, and separate aptitude scores, called *stanines*, ranging from 9 (high) to 1 (low), were computed to predict each candidate's chances of success as a pilot, navigator or bombardier, respectively.

If a candidate had a *pilot stanine* of 9, the chances were only 4 in 100 that he would fail in primary pilot training. The candidate with a *pilot stanine* of 1 had the odds against him with 77 chances in 100 for failing early in pilot training. The higher the *stanine*, the more assured was the investment made by the Army Air Forces in training the cadet. A candidate with a high navigator *stanine* had a much better chance of completing advanced navigator training than one colleague with a low navigator *stanine*. A similar relation is true for bombardier.

A candidate with a low *pilot stanine* might

have a high navigator *stanine* or a high score (*stanine*) when the battery was scored to reveal his chances of becoming a successful bombardier. Due to local quota conditions, there were instances in which men recommended by the Psychological Research Unit for bombardier or navigator training were assigned to pilot training. Their elimination rate was almost twice as high as for the men assigned according to recommendation.

As indicated earlier, the Aircrew Classification Battery was used primarily to select candidates who would have the best chances of succeeding as pilots, bombardiers or navigators, respectively. Data are available which show that men with high *stanines* also did better in combat.

In passing, it should be pointed out that there is also evidence, that men with high *pilot stanine* scores were least likely to have accidents attributable to "pilot errors." This is an illustration of the possible usefulness of psychological tests in the reduction of accidents, to which I shall refer again later in this address.

In the Army Air Forces classification program, the number of occupations—differentiated by a single battery of tests has been limited to three. Simultaneous testing for only three jobs would greatly facilitate the industrial testing program, but there is no reason why, with the use of proper validating techniques, the number cannot be extended to include ten, twelve, or even more jobs. It can be readily seen that such a program will reduce the cost of testing and make possible the large-scale operation, covering the entire plant, which has just been described as feasible and practical for industry.

The USES has already gone far in research in this area by developing a new USES General Aptitude Test Battery, a combination of tests which measures a number of important aptitudes and supplies information regarding the individual's chances for success in learning to do a great number of jobs.

The Battery is being standardized on samples of workers employed in various occupations. Norms have already been developed for 50 fields of work representing approximately 2000 occupations. These norms are expressed as Occupational Aptitude Patterns and consist of minimum aptitude scores required for occupations, characterized by similar aptitudes and grouped according to the

Part IV classification code structure of the Dictionary of Occupational Titles.

While the USES General Aptitude Test Battery has received only limited use thus far in local employment offices throughout the country, there are indications that the battery is filling a very real need. Using tests related only to individual job, as was the practice in USES offices as well as in industry, "it was not possible to test an individual for more than forty or fifty occupations even if two or three entire days were spent in testing. The General Aptitude Test Battery, however, makes it possible to obtain information about an individual's aptitude for several thousand occupations in a little more than two hours of testing."

In telling of this development I do not want to leave the impression that the USES General Aptitude Test Battery is without limitations, that it meets the needs of all plants and that it is ready and available for use upon request. Nevertheless, the construction of this battery represents progress in the development of techniques for differential classification which can contribute to use and effectiveness of tests in fitting workers to jobs.

Another significant recent trend in this area is the increased emphasis upon biographical data as predictors of success. Studies made in past years in industry have indicated the potential value of biographical items, available from application blanks, in the selection and placement of personnel. However, industry has largely confined the use of weighted application or biographical item scores to the selection of sales personnel, where such factors as age, marital status, number of dependents, amount of insurance, etc. have been found useful in selecting men who are successful in selling. Evidence available from wartime research, leading, for example, to the use of such items in the selection of naval aviation cadets, points to the advantages of extended research in this area which can often provide a tool less costly and less cumbersome than psychological tests and considerably more effective in its return. This possibility should be of particular interest to those working in the field of accident prevention because of indications which have appeared here and there that such items as number of fractures sustained by an individual, number of accidents sustained in the home, and other biographical data of the

same kind may sometimes predict the extent to which the individual will become involved in accidents on the job.

In research on selection in industry, the great difficulty has been to obtain trustworthy estimates of achievement during training and of performance subsequent to training as a means of validating or determining how well the tests are performing in the selection and classification of personnel. For this reason, advances made during the War in the improvement of criteria represent an important development in fitting workers to jobs. For example, in the selection of pilots, instructors' judgments as to the progress of the student, inspectors' scores given at the end of flight training, etc., have been found to have as little reliability as the foreman's gross estimate for employee performance. Comparisons of such judgments with student pilot performance as recorded photographically laid the basis for the improvement of such estimates. Similar studies can produce similar results in industry.

In addition, in aviation research, such subjective criteria have been further supplemented by the direct analysis of photographic recording of instrument readings and of control movements which provide completely objective pictures of pilot performance and plane responses. The measurement of flight performance has been revolutionized through the application of "standard flights" which insure comparable situations in obtaining information on the student's progress in learning to fly.

Moreover, in other areas, standard work samples of operations actually performed have been developed and used to advantage both in the validation of tests and as aids in measuring progress in training. Industry can profit greatly in the way of better fitting the worker to the job by taking advantage of the advances in the measurement of performance which have characterized the application of psychology in the war effort.

Other trends and recent developments in testing could be mentioned but time does not allow a further exploration of this area.

The topic assigned to me by the committee responsible for this program is "Fitting the Employee into the Right Job by the Use of Placement Tests." From both the title and the accompanying correspondence, I have assumed that it was not especially desired that attention be centered upon the use of such tests

for the specific purpose of identifying the accident-prone individual. However, it does not seem altogether proper to address a group at an annual meeting of the National Safety Council without at least referring briefly to this aspect of the problem of fitting workers to jobs.

There is no question that the use of tests can contribute to accident prevention, because certain traits measured by tests are associated with accident-proneness. For example it seems quite reasonable to believe that one factor entering into automobile accidents, is the excessive accident-proneness of certain drivers. Accident-proneness is not a simple trait, as some workers in the field appear to believe. As Chambers, a pioneer investigator in this area has recently pointed out, "accident-proneness is the sum of personal qualities and activities which render a person unable to make the requisite and adequate responses in a moment of danger which may be due to a number of personal conditions." Some of these are physical such as poor eyesight, a tendency to fainting or epileptic fits, inability to stand physical strain, etc.; others are psychological and include inefficient eye-and-hand coordination, temperamental instability, mental preoccupations and liability to distraction, thoughtlessness and selfishness, a concerted reliance on one's own skill, and so on."

Some of these factors can be picked out by means of tests, but others, at least in our present state of development, cannot. However, certainly some reduction in accidents can be expected from using these tests, such as eye-hand co-ordination which are subject to measurement by means of well-standardized and well-validated tests.

The nature of anticipated outcomes is illustrated in a study, reported by Chambers,<sup>10</sup> of 128 London bus drivers. These were tested prior to employment and then followed up for a period of 5 years. During this time the entire group of 128 drivers sustained 1022 accidents, representing an average of 8.3 accidents per man for the 5 year period and of 1.6 accidents per man per year. In a total of 1022 accidents 260 were sustained by only 14 of the drivers, each of whom had 15 or more accidents in the 5-year period (an average of 18.5 per man) and who on such grounds were defined as being highly accident-prone. Keeping in mind that accident-proneness is due to a variety of factors, the question

may be asked as to how many of these 14 men could be regarded as accident-prone because of the factor—lack of coordination—which can be measured by means of psychological tests. As indicated above, all of these bus drivers (who were already experienced in driving heavy vehicles) had been tested prior to employment, although the test results were not used as a basis for employment. Reference to these test results, which had been filed away for just this purpose, showed that of the 14 drivers who made the poorest results on the psychological tests of coordination 5 were included in the highly accident-prone group.

As a result of these tests Chambers infers that among well trained experienced drivers who can be described as accident-prone approximately 35 per cent are so because of inferior eye-hand coordination. Extrapolating further from the data on a small group to a less selected population—which is of course a dangerous thing to do—it is suggested that by eliminating those applicants for driving jobs who are approximately the worst 10 per cent of the population in eye-hand coordination it would be possible to eliminate men who have an accident rate well above 3 times as high as that of their fellow workers.

This would represent a real accomplishment, but accidents would still occur and there would still remain the men who are accident-prone for reasons not susceptible to testing. As a result, considering both this study and others, the use of tests to detect the accident-prone individual represents, in my opinion, only a beginning—and a very small beginning—of the accident prevention program. There is much evidence that even some accident-prone drivers may become relatively safe if they are given special indoctrination and training. Other drivers who are not essentially accident-prone develop unsafe habits of work which can be corrected.

This means that a proper training program becomes an extremely important factor of the accident prevention program. It has been clearly demonstrated that fatigue is an important cause of accidents, and this can be eliminated by proper distribution of work hours, rest-pauses, and by considering other factors in the work situation which produce fatigue. The attitudes of employees resulting from the industrial relations policies and practices of the industrial firms need much more consideration than they have been given as



potential accident habits. Finally, developments during the war have drawn attention to the importance of considering psychological factors in machine design as a basis for increasing the safety as well as the efficiency of the worker on the job.

The personnel function has been largely thought of as one of providing a competent man to operate tools and machines. In a large sense, training may be viewed as a method of adapting the man to the machine. However, there is growing evidence that the need for speed and efficiency in industry and the conditions for the adjustment of the worker can better be satisfied if more attention is given to the adaptation of the machine to the man.

This is the principle well recognized in industrial psychology, and yet constantly neglected, largely because in an era of technology, engineers, concerned with the development of the machine, and psychologists, concerned with the individual who is to operate the machine, have worked in almost complete insulation from one another. Not only are provisions for direct contact generally absent, but conditions have been such as almost to ensure against any danger of a possible short-circuiting of ideas between the two groups. Disregard of basic principles of perception, of basic patterns of motor coordination, of human limitations in the integration of complex responses, has led to the production of mechanical monstrosities—unsatisfactory from the viewpoint of both human efficiency and human safety—which could have been avoided if there had been cooperation between psychologist and engineer in the process of designing the machine.

While the application of psychological techniques for identifying, selected individuals capable of operating such equipment and in training them has alleviated the situation, there nevertheless remains the basic problem of designing apparatus in advance so that its operation is less difficult and requires less in the way of selected personnel. For example, as Bartlett<sup>1</sup> has pointed out, in the case of the motor vehicle, "it is about as certain as it could be that the design, grouping and positioning of dashboard and other instruments, and of controls should be considered experimentally from the point of view of what a normal driver interpret and uses most efficiently and with the least strain," and that this involves the services of in-

dividuals trained in the principles of experiments applied to human beings.

Electric generating stations and substations provide many opportunities for the design of equipment with greater regard for the human factor in their operation.<sup>2</sup> This refers not alone to the design of major equipment but perhaps even more specifically to the design of instruments and controls with a view of reducing liability to human error in their operation.

Studies conducted recently by the Army Air Forces and by the United States Navy indicate the extent to which errors and accidents may be reduced through collaboration between engineer and psychologist in the design and presentation of instruments and controls.

In operating a plane, for example, an error in reading the altimeter can be the direct cause of an accident in instrument flight during bad weather. In one study, it was found that 11.7 per cent of altimeter readings by experienced pilots were in error.<sup>3</sup> This error was generally in the order of one thousand feet; the altimeter being read at 1900 feet instead of 2900; 4900 feet instead of 5900, etc. The same study shows that redesigning the instrument so as to permit pilots to make a direct reading instead of combining readings from two pointers reduces the errors in reading by experienced pilots to 0.4 per cent. There are doubtless many instances in the electric utility industry in which similar improvements could be effected.

Other studies by the military services show that errors and accidents grow out of the uniformity of control handles used in entirely different operations.<sup>4</sup> So, for example, in an airplane the control used in raising and lowering the landing gear is similar and in close proximity to that used in operating the flaps. There are instances in which the pilot has mistakenly operated the flap control when he should have been lowering his landing gear. As a result of experimental studies, control handles are being diversified with distinctive functions assigned to each type of control.

Many generating stations identically shaped controls are used for three widely diversified operations. In addition, control handles governing still other operations are so much like the first as to make difficult the discrimination between the two. Diversification of controls under such conditions can

contribute markedly to the reduction of error and accidents in operation.

There is much to be gained by all industries, including the public utilities, from an application of psychological principles in the designing of machines. In the military services there is an increasing dependence upon the psychologist, working in close cooperation with engineers, for advice on the suitability of a proposed weapon, vehicle, detector, and other varied equipment in the design stage. The problem of machines not suited to the men who are to operate them exists on perhaps a larger scale in industry than in the armed services. It is such as to call for close collaboration between the psychologist and the engineer not only in the initial design of the machine, but also for the determination, as an essential feature of good personnel management, of those speeds and rhythms and other conditions which, in the operation of the machines, are optimal from the viewpoint of the safety as well as of the productivity of the worker.

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#### THURSDAY AFTERNOON SESSION

October 9, 1948

Presiding: J. O. LESLIE, Director of Safety, Gilbert Associates, Inc.

#### The Fundamentals of a Safety Training Program

By CECIL L. HIGHTOWER

Safety Director, United Gas Pipe Line Company

Accident prevention is so closely related to and integrated with employee relations and operating procedures that it is difficult to discuss any phase of the safety program without bringing into the picture employee attitude and morale, supervision, job planning and work practices. In discussing the

fundamentals of a safety training program these factors must be considered as they have an important bearing on training results.

The individual worker will not be receptive to training, no matter what the method of approach, unless he feels secure in his job, knows and believes in company policy and

has developed an attitude of loyalty and job pride.

Many factors are involved in job security. Possibility of continued employment, a fair and equitable wage schedule, an established promotional plan which recognizes ability and length of service, a retirement plan, an adequate group insurance program, hospital and surgical benefits and assurance of pay during absence because of illness and injury—are some of the things that develop in the worker a feeling of stability and security.

One of the recognized weaknesses of modern industry is its system of communication between management, line supervisors and workers both from the top down and the bottom up. As a result of this weakness, company policies are often times not known throughout the organization or they are misinterpreted, misunderstood or misapplied. Some companies have used policy handbooks to good advantage. We have not prepared a policy handbook as such but we have developed policy bulletins which have been beneficial in establishing uniformity of policies. Copies of these bulletins have been assembled in book form and distributed to District Managers and District Personnel, Safety and Insurance Supervisors, and, through policy talks at meetings that we have held with all levels of supervision, we feel that we have clarified the intent and purpose of our policies so that supervisors can properly interpret them to employees. We also feel that these meetings have been helpful in improving the supervisor with the need for discussing policies with workers and to pass back comments and suggestions to top management, insuring better communications both up and down.

Loyalty is a priceless ingredient. It can not be bought but must be earned by honesty and fair treatment. It is based on respect and mutual understanding.

Loyalty to the company normally exists in direct proportion to the worker's loyalty to his supervisor emphasizing the grave responsibility that rests upon foremen, department heads and executives for good leadership and direction.

With these three elements: job security, fair and properly applied relations policies and loyalty and job pride, any training program can be made successful. Without these three things, no program can be fully successful.

Safety training methods will vary between companies, depending upon the organization set-up, the geographical area covered and the type of industry. There are, however, certain fundamentals which are considered basic and which may be applied under most any conditions.

The program that we are following in our companies has been developed largely from our own experience over the past seventeen year period. It has been revamped and enlarged from time to time to meet changing conditions in organization set-up and to cope with special accident problems arising because of varying operating conditions. The plan is not new or unusual but the improvement in our accident frequency and fatality rates over the period of the past ten or twelve years has given us reason to believe that it is well adapted to the needs of our particular organization.

Up until 1948 field assistance on safety problems was furnished the operating personnel by field safety engineers stationed in the districts. One engineer was assigned to handle safety work in from three to four districts, depending upon the geographical area covered and the number of employees involved. Realizing the close relationship that exists between personnel, safety and insurance activities and with the thought of more closely co-ordinating these functions and intensifying the service rendered the operating districts, plans were worked out in 1948 for setting up a personnel, safety and insurance supervisor in each district. These men are primarily line supervisors and work directly under the district managers. However, they carry on staff functions and work directly with the general personnel, safety and insurance departments in the general office.

While it is too early to fully evaluate the results of this plan, all indications point to the fact that it is sound and that the results will be highly satisfactory when the program becomes fully effective. In so far as accident prevention is concerned, the record so far this year indicates that the work has not suffered. The frequency rate of 3.3 through June compares favorably with the same period last year.

Our SAFETY HANDBOOK, which was developed for the use of personnel, safety and insurance supervisors, foremen, department heads and district members, is a complete

blueprint of our accident prevention program. It outlines the safety responsibilities of supervisors and employees and provides instruction and reference material for the guidance of the supervisory personnel in putting the program into effect. In discussing the fundamentals of safety training, I would like to follow the outline of this handbook as it covers the more important tools and techniques that we employ in training supervisors and employees.

The purpose of the handbook is well stated on the preface page in these words:

"The SAFETY HANDBOOK is designed to serve as a guide and reference text for supervisors in planning and conducting foreman's and safety meetings; to assist in the instruction of new employees in safe work practices; to provide review material for experienced employees; to outline procedure for the proper completion of employee injury and automobile accident reports; and to set up standards for personal protective and other safety equipment and supplies to insure the proper selection, use and care of such equipment."

Under the heading of safety organization the duties and functions of the general safety department, the district personnel, safety and insurance supervisor, district manager and foreman are listed in detail. As an example of the items covered, the duties of the district personnel, safety and insurance supervisor and the operating supervisor are listed below:

#### Duties of District Personnel, Safety and Insurance Supervisors

1. Assist the district manager and his supervisors in scheduling, planning and holding safety meetings.
2. Assist the district manager in planning and holding regularly scheduled foremen's meetings.
3. Prepare annual schedules of foreman's and safety meetings—secure approval of the district manager and forward to the general safety department not later than December 1 of each year.
4. Assist district supervisors in their investigations of all accidents to determine the cause and develop recommendations for correction of hazardous conditions or unsafe work practices responsible.
5. Complete investigator's report on all em-

ployee injury accidents and forward to the general safety department.

6. Assist district supervisors in their investigation of all automobile accidents to determine the cause and develop recommendations for correction of unsafe driving practices or conditions responsible.

7. Complete investigator's report on all automobile accidents and forward to general safety department.

8. Maintain close personal contact with physicians and hospitals on progress of all employee injury and welfare cases.

9. Maintain contact and develop factual information on all welfare cases, reporting the findings to the district manager and the general safety department.

10. Assist and advise district supervisors in the selection, use and proper maintenance of approved first aid and personal protective equipment.

11. Assist and advise district supervisors in the selection and proper maintenance of fire protective equipment.

12. Serve in an advisory and consulting capacity to district operating personnel on all accident prevention, welfare, fire protection and first aid problems, maintaining a close contact with the general safety department at all times to insure an exchange of ideas and information between districts and in order to make use of the information and resources of the general safety department in serving the operating departments.

#### Safety Duties of Operating Supervisors

The supervisor, district department head, superintendent or foreman, is the most important link in the safety chain. In the final analysis the program succeeds or fails according to the interest and effort that he puts forth. He wields a greater influence over his own men than does anyone else in the organization, and if he shows by his attitude and manner of conduct that he is for safety, he will convince his men that it is a necessary part of their work, and will win their support for it. If, on the other hand, he is opposed to the work or shows indifference, the same lack of interest and disregard for safety will be evidenced by his men.

The supervisor's safety duties may be summarized up as follows:

1. Selection of mentally alert, honest and dependable workers who are physically quali-

ted for the work to which they are to be assigned.

2. Proper assignment of men to the job, giving detailed instructions as to job performance and explaining probable hazards and safety precautions to follow.

3. Provision of safe tools and equipment.

4. Provision of protective equipment, and follow-up to see that it is used in the correct manner.

5. Planning the work to see that men, materials and equipment are available to complete the job with safety in the time allotted.

6. Active participation in Foreman's and safety meetings.

7. Personal supervision of all hazardous work, or work that is new and unusual.

8. Adherence to a regular schedule of inspection and maintenance of physical properties to insure that good housekeeping practices are followed and that mechanical failures do not occur.

9. Personal investigation of all accidents and the correction of any unsafe practice or condition revealed by the case in point.

10. Investigation and report of "no-injury" or near accidents, with the view of determining the cause and taking corrective action.

11. Constant observation of work procedures in order to detect and correct unsafe practices and conditions, and with the thought of developing improved methods of work.

While the selection of physically qualified applicants has no direct bearing on training methods and procedures, it does have a direct effect on overall results in accident control. The section of the Handbook on physical examinations outlines the purpose of such examinations, the procedure for examining applicants and re-examining former employees who are re-hired. It also includes a copy of our "Guide for Physicians in Making Physical Examinations" and emphasizes the supervisor's responsibility for checking completed examination forms before assigning the applicant to duty.

Since the supervisor is the control point for all phases of operations, including safety, it follows that he must be trained to understand and accept his safety duties and informed on methods and procedures for putting the safety program into effect. Our district supervisors' meetings are utilized for this phase of safety training.

District supervisory meetings are scheduled

quarterly and are held on schedule unless work of an emergency nature makes it impractical. Such meetings are held on company time; the usual practice is to hold them at a local hotel, convening at 9:30 a.m. and adjourning at 4:30 p.m. with time out for lunch.

The chairmanship is rotated among the supervisors in the district in order to give each man an opportunity to preside. The chairman works with the district manager and the personnel, safety and insurance supervisor in planning programs for the meetings.

The following list of suggested subjects as taken from the Safety Handbook will give some idea of the scope of the discussions included in the programs:

- Proper Selection and Placement of Men
- Induction Training
- Job Training
- Developing Men
- Maintaining Morale
- Proper Maintenance of Equipment and Property
- Construction and Operating Standards
- Expenses
- Case Studies of Accidents
- Operation of Transportation Equipment
- Safety As It Relates To Other Operating Problems
- Accounting Procedure and Paper Work
- Production Methods
- Improving Operating Efficiency
- Sales
- Customer and Public Relations

Accident prevention is not featured by special talks but is discussed as a regular routine along with other operating problems. This approach has the effect of placing safety on a par with other phases of operation and serves to impress upon the supervisor that the prevention of accidents is just as much a part of his job as producing oil or moving gas.

The safety results obtained from our supervisory meetings have been so outstanding that we value this activity above all others. If we were called upon to discontinue all but one phase of safety training work, we would retain the supervisory meetings in preference to employee safety meetings, first aid training or any other activity.

On-the-job training is generally recognized as more effective than class room training. It follows that safety training on the job is

more beneficial and more lasting than the group training provided through safety meetings. Since safety is an integral part of operating procedure it also follows that correct job training is the most effective type of safety training.

Safety training on the job is of two types: breaking-in training and continuous training. Breaking-in training includes not only a proper introduction to the job and instruction on the correct use of tools and equipment but also an explanation of the company's policies on safety and a statement of what is expected of the worker in the way of safe conduct and team work. Continuous training simply means observing, detecting and correcting over and over again.

Although on-the-job safety training is the most beneficial, it is also the most difficult to carry on. This is true largely because many supervisors are unfamiliar with training methods and have not been furnished detailed information and material for their guidance in setting up training classes. I have no specific solution to offer but feel that we can make good use of supervisory meetings in discussing this problem and helping to arrive at a solution.

Employee safety meetings continue as an important part of our safety training program. In most districts, these meetings are held bi-monthly. They are always held on company time and employees are paid regular time for attending.

There are three general types of safety meetings; namely,

1. The Safety Rally or General Meeting.
2. Family Meeting.
3. Group Meeting.

All three types serve a specific purpose which should be considered in scheduling meetings and in preparing the programs.

The Safety Rally or General Meeting is best suited for the presentation of safety awards such as merit certificates, National Safety Council or A. P. I. plaques, safe driver cards, first aid certificates, McCarter medal, and similar awards. It is also useful in making a special drive on a specific type of accident or for the purpose of stimulating employee interest when the accident frequency curve begins to climb.

All employees of the district or department concerned should be invited to attend and the top supervisor, district manager or department head, should preside.

These meetings provide an opportunity for top executives and general superintendents to participate in the safety programs. This should be considered in planning the program for the Safety Rally and executives, operating superintendents, and general office department heads should be invited to attend and take part on such occasions.

Our companies are interested in the safety of employees off the job as well as on the job and are also interested in the prevention of accidents in the home, on the highway, and in the community as a whole. The Family Meeting serves as a medium for developing interest in these fields of safety among employees and members of their families.

Such meetings should not be scheduled too often but one or two a year would seem justified.

Programs for this, as well as for all other type meetings, must be carefully planned in advance in order to be effective. Talks and discussions on some phase of home, traffic or public safety should be featured and fire prevention and first aid may also be included. Interesting and instructive meetings have been prepared and presented in many districts by the women employees in cooperation with the wives of men employees.

The group Safety Meeting with attendance of from ten to thirty employees engaged in the same or a similar type of work is best suited for safety training work. A good Safety Meeting is a good job training meeting, as the best type of safety work is that which teaches the worker to perform his duties in the right way.

A small group engaged in the same work and having common problems will feel freer to express their ideas and to participate in discussions and they are also more likely to come out with a workable answer.

It requires thought, ingenuity and planning to develop interesting Safety Meetings and some one person in authority must accept the responsibility for arranging the programs and making the meetings go.

The following aids and devices may be used to lend variety to the programs:

1. Use as many visual training aids as possible, such as demonstrations, drawings, film strips, and moving pictures.
2. Get active worker participation—call on individual employees to demonstrate safe practice procedures or proper use of tools and equipment.

3. Use questions to provoke discussion. Safety baseball with two sides competing in answering questions on safety, operations and first aid are especially worthwhile.

4. Make free use of the blackboard to illustrate accidents and unsafe acts or to list safe practices for given operations.

5. Bring tools, equipment and safety gadgets into the meetings and have employees demonstrate correct care and use.

6. Discuss current off the job safety questions to bring out the fact that safety is a twenty-four hour proposition requiring a man's interest, thought and attention at work, at home, or at play.

The responsibility for scheduling, preparing programs for and conducting safety meetings rests with the supervisor in charge, district manager, department head, district superintendent, chief engineer, plant foreman, or pipe line section foreman as the case may be. The district personnel, safety and insurance supervisor is available to assist the operating personnel with this phase of the program but the final responsibility rests with the operating people. The meeting chairman may be appointed by the supervisor or elected by the group and he can and should plan for the program of each meeting. However, since safety is an operating responsibility, it is up to the supervisor or foreman to confer with the chairman well in advance of the meeting date to insure that a program has been planned and that the meeting will be instructive and worthwhile.

To assist the operating personnel in preparing programs for Safety Meetings, the General Safety Department prepares and distributes monthly the bulletin, UNITED SAFETY. Discussion outlines, accident trends, off the job safety problems, first aid questions and serious or unusual personal injury and automobile accidents are featured.

In an effort to familiarize key employees with accident cause factors, we have included sections in our Handbook on Employee and Automobile Accidents. A definition of a reportable accident is given under each section and the procedure for reporting and handling both personal injuries and vehicle accidents is outlined. In addition, classification of accidents as to agency, type, and cause are listed.

The Safety Award Section of the Handbook describes the "No Accident" contest in effect between districts and outlines the awards available to districts, departments, crews and

individuals for accomplishment in accident prevention.

The two awards that have created the most interest is the penalty award in the "No Accident" contest and Safe Driver Awards to vehicle operators.

The contest penalty award is a miniature goat, known as Lost Time, which goes to the district reporting the highest accident frequency rate during the preceding month.

Safe Driver Award cards are issued annually on a calendar year basis to each operator who completes a year without a reportable accident. Special awards are made for cumulative records of five year periods.

The procedure for reporting illness and off the job accident cases and the functions of our Employees' Welfare Committee is covered under the Employ Welfare Section of our Handbook in order to thoroughly familiarize supervisors with company policy and the proper handling of employee disability cases.

First aid training is an essential part of safety training. It helps the worker to better understand the seriousness of accidents and the need for prevention as well as to prepare him to act quickly and intelligently in an emergency.

In the oil and gas industry where the danger of asphyxiation is always present just as the danger of electrical shock is present on electrical utility properties, it is imperative that employees be instructed in the Schoeffel method of artificial resuscitation.

We have our own first aid training course and our district personnel, safety and insurance supervisors organize and instruct the classes.

The company course, which is based on the U. S. Bureau of Mines course, covers ten hours, consisting normally of five two hour classes. Part of the fifth class is devoted to demonstration and practice use of Company approved personal protective equipment.

We are experimenting with a new training method this year. Instead of the lecture and demonstration method as normally followed by Bureau and Red Cross Trainers, we are using primarily the conference method, supplemented by lecture and demonstration. The idea was first developed by the Dallas office of the Bureau of Mines and it has been readily accepted where we have tried it. It seems especially well suited in re-training or re-

fronter courses where many employees have had the training three and four times.

The primary advantages of the conference method are that it provokes discussion, provides a greater opportunity for individual employee participation and creates interest in and enthusiasm for the work.

To insure uniform purchase of first aid kits and supplies and to assist the supervisory personnel in properly maintaining first aid units, our Handbook includes a section on first aid supplies. A list of approved kits and refills is given, with a location schedule specifying the type kit recommended for the different plants, crews and operations. Instructions on inspection and maintenance for each type unit is also included.

One of our most serious problems on personal protective equipment has been that of getting the supervisor to order the right type of equipment for the hazard present, then getting the worker to use the correct item in the right way, to recognize its limitations and to properly maintain and care for it when not in use. In an effort to overcome these difficulties, a large section of our Safety Handbook has been devoted to personal protective equipment items. The list includes:

1. Eye Protection
2. Respiratory Protection
3. Head Protection
4. Safety Clothing
5. Safety Lights
6. Safety Tools and Equipment
7. Fire Protection
8. Miscellaneous Items

Each item of approved equipment is illustrated and detailed instructions as to its intended use, limitations, manner of fitting and adjusting, and maintenance and care are given. These sections of the Handbook form

the basis for the discussion on personal protective equipment that is included in our first aid instruction course.

With the thought of providing specific safety information on given operations, we have developed a series of safe practice guides. Operation of motor vehicles, teams and horses, measurement operations, and producing and pipe line are some of the guides that have been developed and distributed. The material is informative in nature and is intended, as the title implies, as guides to safe practices rather than mandatory rules.

As a follow-up, our monthly safety program bulletin, UNITED SAFETY, includes discussion questions based on suggestions contained in the guide. This practice insures that the material is read, discussed and understood.

In conclusion I would like to point out that these methods that I have outlined are tools that we have been able to use with some measure of success. However, let us remember, that these and other methods are but tools and like the wrench of the pipefitter or the pliers of the lineman they are worthless until they are put into use by skilled hands. More than that, those of us engaged in accident prevention and allied phases of employee relations work are dealing with individual human beings with minds, personalities and hearts of their own. Even with all the skill and technical knowledge in the world our efforts will not be fully successful unless and until we realize that we are striving to mold the minds, change the habits, arouse the interest and sway the hearts of these people. We must then employ the wisdom, patience and understanding necessary to insure acceptance of our program and results from our efforts.

## How to Make Safety Meetings Click

By J. W. READ

General Plant Employment Supervisor, Ohio Bell Telephone Company

The subject assigned to me—"How to Make Safety Meetings Click"—is, in my opinion, of utmost importance in our accident prevention job. Certainly the holding of effective safety meetings is one of the key tools in our kit, and possibly is second to

"direct on-the-job supervision." This important medium in our accident prevention efforts is one which emanates the human approach, makes each and every employee a participant in the program, affording the employee with an accurate knowledge of the

problem, and integrate the accident prevention phase of the work operation into the day-to-day job and not just an overlay on the job. Meetings maintain the wholesome interest of the entire employee group and assist in building the job pride and team play necessary to keep our accident experience at an irreducible minimum.

But not to stray too far from our subject matter—just what makes these meetings click? To recite a platitude to you, I believe Rudyard Kipling gives us a good approach to this question in his pithy saying:

"I keep six honest serving men

They taught me all I know

Their names are *What* and *Why* and *When*

And *How* and *Where* and *Who*."

Let's apply this to the safety meeting that clicks.

*What* kind of meeting?

There are generally three types of meeting. The "gang" meeting usually held by the foreman, which we know produces good results if properly done. These meetings are the intimate meetings on the job, in the garage, in the class or conference room. Just the foreman with those for whom he is responsible. The foreman should be assisted. He should have conference leader training and should have available package material to make his meetings interesting and to make them produce good results.

There should be discussion of past experience, not only that of his group, but in related activities outside his group. In the telephone business, a monthly pamphlet, "How Plant Men Are Injured", describes significant accidents and is an excellent source of material for our foreman's meetings. New and revised work methods and safety lesson plans may be discussed, and the meetings frequently are used for introduction of new work techniques. The planning of the more complicated or specialized job, such as extensive tree trimming, the ticklish underground job, the wire or cable job near power lines, may also be discussed. If meetings are properly planned and if assistance is given, most of the foremen can do a very creditable job in affording their people with first hand on-the-job information, indicating our honesty of purpose based on the facts of the immediate and contemporary situation.

The Safetygraph is an excellent tool, which was developed by the National Safety Council for use in such meetings. Those of

you who have not used this material could well afford to investigate the Safetygraph, since it is of great assistance to the group leader and can be adapted to almost any matter of coverage.

There is an excellent opportunity in meetings of this type—to use visual aids, movies, slides and film strips. Many types of these may be obtained from the National Safety Council. They can also be prepared locally in an inexpensive fashion. One of the telephone companies has a station wagon in which is mounted a motion picture projector and demonstrating equipment, in which they bring such visual aids directly to the job, so that meetings can be conducted at most any location.

You "Power" people have done an excellent job in your so-called "tailgate board" meetings, as is shown in the sound strip "Pole Top Talk." We in the telephone business have a strip film called "Construction Crew Planning," and there are a number of others which are available through the National Safety Council. In this type meeting each gang member should contribute, then the foreman can get a good idea of the effectiveness of his training job and what his crew's training needs are.

So much for the gang meeting.

Many companies hold so-called district or departmental meetings. The size of these meetings is usually from 10 to 125 employees. These meetings generally take an hour or so; are held on company premises, garage, storerooms, conference rooms, etc., and are usually conducted under the direction of the local district superintendent. A brief talk frequently is given by a division superintendent or the general manager, which demonstrates management's whole-hearted support of the accident-free job. These meetings should include a review of performance, an outline of the job ahead, movies, charts or model demonstrations, and a period for general discussion.

Then there are the annual dinner meetings.

In these, some companies follow a plan wherein the vice president or general manager has an opportunity to discuss the accident prevention job in a very short talk. A review of the accomplishments for the year is given, and this type of meeting affords an opportunity for presentation of trophies or other awards, where award plans are used.

Meetings of this sort frequently include some type of entertainment and with such groups, sports movies, on football, baseball or golf, are popular. Other types of entertainment would include either local talent or professional productions.

There are also one-day meetings for employees who are scattered over wide areas. For these, the employees are brought to a centralized point. In addition, many companies plan one-day meetings for supervisory only, to consider some special aspects of the accident prevention job—and I believe you are familiar with the general scope of these meetings.

I believe this covers the *What* phase of our problem.

*Why* should we have a meeting? I believe we should recognize that any meeting requires time away from the productive job. If we have no sound reason for the meeting, we are better off without it and we certainly avoid the reaction which we sometimes hear resulting from the unplanned, unnecessary meeting—"that was time wasted." We should first plan with a well established reason as to why we should have a meeting. Then, if each meeting is planned to its last detail, we will have gone a long way toward our objective, that of making the meeting click.

*When* should we hold such a meeting? As stated, only when there is a sound reason and only when our objective is clearly established. These determinations can only be made in the light of accident experience factors that are peculiar to your job or your business. The experience and training of your force and the job ahead at a particular time, would be some of the factors determining "When" meetings should be held.

*Where* should the meeting be held? The meeting should be held at a location which is most accessible to all who are to attend. It should be held where we have adequate facilities, such as seating arrangements, proper ventilation, minimum outside interference, and at a location that affords us all the physical requirements to do a well planned job. It is recognized, of course, that some of these will need to be sacrificed for the many other advantages which accrue in the first general type of meeting mentioned, the gang meeting on the job.

*Who* should attend the meeting—and *Who* should conduct the meeting—are matters, again, of good planning. We should assure

ourselves of proper representation and that the individual conducting and leading the meeting is an individual who is capable of doing so, and that he has been afforded the training and materials to do a job which is acceptable and meets the objective.

And now as to *How*, specifically, to handle the meeting and have it follow the plan you have prepared. What are some of the mechanics of conducting a good meeting?

1. Have a plan—establish your objective. Plan to meet your objective by the use of the tools available to you.
2. Stick to your subject. Don't wander but stick to your plan and therefore your subject.
3. Be considerate and understanding of your conferees. If a question is presented and your plan has not contemplated such a question or reaction, don't delay—settle it at the time of presentation. Don't promise that you will get back to it and then forget it. If the question is premature, honestly advise your conferee that you will get to it—and live up to your promise. In this connection we would be remiss if we didn't mention—rapport—the psychologists have given us this term for harmonious relationship between individuals. Such a relationship, both mental and physical, is necessary for a true and accurate understanding. You might say the meeting is a scilling endeavor with all sales resistance removed. In our meeting we must have good rapport, both mental and physical.
4. Keep your props under cover. If you are going to show a chart, keep it under cover until you are ready to display it. If you don't, the boys will read it and get a partially baked idea of its meaning. Their attention is distracted and they may even build up objections to it. If they see it for the first time when you display it and interpret it, then they get your position first. The greatest value of such props is the element of surprise; and by keeping it under cover, it will serve its maximum usefulness to you.
5. Have everything ready. Don't pass out an item, such as a pamphlet, and ask the boys to pass it around while you are discussing it. The noise and the competition you set up for yourself certainly do not help you gain the attention of your conferees. If you want to pass out some ma-

- terial, make it a part of your meeting. Give it to one of the men at the center of the conference table and make its distribution a part of your demonstration; or if you want to review some written material, have each man participate in the reading of the material. Don't send an assistant out in the audience to set up a projector while you go on with your phase of the meeting. Have your projector set up in advance, and your film tested and ready for immediate presentation. And we will repeat again, make sure your room can be darkened for the proper display of visual aids by projection, adequately and promptly.
6. Make sure you have sufficient seating facilities and that the ventilation is good and outside interference is at a minimum. Make sure all physical arrangements are such as to contribute to your meetings, rather than have some such item in competition with you for attention of your conference.
  7. Don't depreciate. When you set out to do a demonstration, don't say, "I don't know whether or not this will explain my point." Don't announce, "These charts were made up for another purpose, and I am not sure that they will show you what I want." Don't start, "If you will bear with me—" If you have any doubts about the interestworth of your material, how can you expect the audience to believe anything? If you feel it doesn't make the point, discard it, or use it without comment. It is probably poor enough without your knocking it.
  8. Place special exhibits at the back of the room. If you want the boys to examine models or parts after the meeting, put them at the back of the room near the exit. Don't put them up front for most

of the boys want to run as soon as you are finished, anyway. And don't leave them back there unattended! Get back there quickly and call attention to them and answer questions about them.

9. Practice every demonstration. Never take a prop into a meeting until you have looked it over and know how it works, and know that you have mastered it. It may work with a simple flick of the wrist if you know how to flick! Never admit, "This is supposed to do so and so, but I never worked it before." If you have to demonstrate, practice until you have the demonstration letter perfect. Try it before a group only when you can make it look easy.

In conclusion—if you want your meeting to click, establish your objective, and adopt a carefully laid plan of presentation to meet this objective. Balance your plan with judicious use of conference development, statistics, demonstrations and the visual aids. Make your presentations interesting, timely and orderly. Don't use suited terms, be considerate and understanding and demonstrate an air of willingness to get the other fellow's point of view. Be honest in your approach, lay your cards on the table, don't hedge. Be fair, state the problem accurately. Be firm in your position and assure you are supported by facts in such position. Make sure your conference are in a harmonious state of mind for easy acceptance of your proposition. Recall "rapport"—make sure you have it, not only from the mental point of view, but from the physical as well. Create a desire for your product—"the accident proof job" and demonstrate your sincerity of purpose by a well-planned, interesting and purposeful meeting and I know you'll get the results desired and the record will take care of itself.

### How to Investigate an Accident

By T. D. HUGHSTON  
Safety Engineer, Texas Power & Light Company

The investigation of an accident is a very important phase of accident prevention, as it is one of the channels through which information may be obtained regarding the work habits of men. All accidents should be investigated. Those of a minor nature should be

left up to the foreman, or possibly the manager, but those of a serious nature, such as fatalities and those with high severity rates should have a formal investigation by a committee. The setting of an investigation must lend dignity to the occasion. Those present

should include the department head and manager, foreman and representatives of the safety department. One person, preferably the safety engineer, should ask questions, guiding the witness in his testimony regarding the actions of the other men, as well as the injured, prior to and at the time of the accident. After he has finished other members of the group may ask questions. When one or more points of interest are brought out regarding the past performance or practices of the crew, this must be followed in order to bring before the investigating committee all of the details that might have a bearing on the reasons for the unsafe act that was committed or the unsafe condition that lead up to the accident. Nothing must be left uncovered.

Too often an accident is investigated without a purpose. That is, the question is often asked "Just what do we want to find out?" "What information is essential to a good accident prevention program?" Our accident report is so arranged as to place the responsibility on one of two groups—management and the injured. In order to set forth the exact information required in an investigation of an accident, we have developed a formula which we call:

#### THE SIX PROVEN STEPS

- Step I. Employ Good Men
- Step II. Train Them
- Step III. Provide Good Work Conditions
- Step IV. Inspect Equipment and Men's Work Habits
  - Q. Whose job is it to do these four steps?
  - A. The foreman's.
  - Q. What's the result?
  - A. The newer a perfect job is done in each, the fewer men are injured.
  - Q. But suppose an accident does occur?
  - A. Then Step No. 5 is necessary.
- Step V. Investigate or audit to determine where there has been weakness in any of the first four steps.
  - Q. Then What?
  - A. The responsibility for the accident rests with someone, either the foreman or the workman, maybe both. If the foreman, then he must strengthen the steps involved. If the workman

(assuming the foreman has done a good job in Steps 1 to 4 inclusive), then No. 6 is necessary.

#### Step VI. Constructive discipline.

The records show that a very large percentage of the more serious accidents, and especially those resulting in electric shock and burn, are the responsibility of management which includes the foreman and can be classed under one or more of the first four steps. Therefore, when an investigation is completed, we must first audit management to determine any weakness in one or more of the first four steps. If there has been a weakness, then it must be corrected at once. A good example can be cited from an accident in our company when a lineman climbed a pole and reached up and attempted to hang his hand line on an energized primary. Without a thorough investigation we would be tempted to say that his mind was somewhere else, he was not thinking or he probably thought the line was dead. But such accidents should not be dismissed without determining just why a man would commit an act of this nature.

The investigation brought out that approximately twelve months before, this crew, including the foreman, at one of their safety meetings decided on the policy of not installing protective grounding equipment on de-energized circuits where they could see the open switch. They had formed the habit of working on de-energized primaries without protective grounding equipment. They merely looked to be certain that the switch was open and went to work. It was a statistical certainty that at some time an accident of this nature would occur. They had formed a bad habit and it eventually caught up with them. On the other hand if management has done a good job of carrying out its responsibilities as outlined in the first four steps, then it is necessary to move toward the employee and institute some form of discipline. In administering discipline we must never forget the purpose, that is, to make a better employee.

In summarizing this, the investigation of an accident must have a definite purpose, and that purpose must be to improve the work conditions and, more important men's work habits on the group involved in the accident and those at other locations in the company.

# *Transactions*

**35TH NATIONAL SAFETY CONGRESS**



**VOLUME XXI**

**RAILROAD SECTION**

**NATIONAL SAFETY COUNCIL, INC.  
20 NO. WACKER DRIVE • CHICAGO 6, ILL.**

## Foreword

**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

### THE NATIONAL SAFETY COUNCIL

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## TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: C. M. BOWLING, Supt. of Safety, Louisville &amp; Nashville Railroad Company

## Annual Report of General Chairman

By C. M. BOWLING

Superintendent of Safety, Louisville &amp; Nashville Railroad Company

I want to pay tribute to the chairmen and members of the subcommittees which make up the executive committee of this section, and all the other officers for their labors during the past year, and, particularly, to Mr. Leonard Hoffman for his good work as chairman of the committee which arranged the program for these three days.

At least 10,000 delegates are attending this Congress. This has organized safety grown in importance since its first Congress in 1912, just a little over a third of a century ago.

We, as railroad men, may take special pride in this growth, because railroad men were very active in the organization of the first Congress.

At that time, a number of American railroads already had established organized safety programs, and they were getting results.

In the ensuing years, safety has had its ups and downs, in railroading as in other industries. But in the main, they have made great progress. The American railroads established their lowest injury ratio in 1939: 6.75 reportable injuries per million man-hours, whereas the ratio for 1943 was 30.89.

Beginning with 1941, with the coming of war, the ratio started up again, reaching a high point of 12.17 in 1945. In 1946 it dropped to 10.78. As well as can be determined, we are just about holding our own this year with possibly a slight improvement in some spots. So we still have some ground to recover.

The signs are all encouraging. Everything indicates that the American railroads intend to redouble their efforts to reduce the accident toll in the future, first, because railroad managements are becoming more keenly alive to the importance of enlightened personnel policies, and, second, because more and more of them are coming to realize that an effective accident prevention program will not only improve the service but will, at the same time, also reduce the cost of operation. Accidents are costly in dollars. To get a pic-

ture of just how costly they are, one needs only to realize that every dollar paid out by our railroads represent 100-cents-to-the-dollar dollars. This comes from net earnings, which are from gross earnings. And gross earnings come from service rendered.

Going a step farther, say your railroad in one month's time pays out \$50,000 in claims. That \$50,000, as previously stated, represents "100-cents-to-the-dollar" dollars. To get a true picture of what that means in service rendered, you only need to look at your operating ratio, which we might say is 80. That would simply mean your \$50,000 claims represent 450,000 gross dollars. So, when we save a dollar by preventing a personal injury, we are saving five gross dollars. As management becomes more and more conscious of that, our jobs will become less difficult.

The safety director of a very large industrial concern recently said privately, that his department had such complete financial backing from the management that it was actually embarrassing at times. The result was that they felt an ever-present need to examine their own recommendations with the utmost care to make sure that nothing was put into effect which might in the long run be unnecessary. To say the least, that liberality on the part of management had a good moral effect on that safety director.

Our chief problem is not that of financial support as it is that of moral support and, in that respect, we still have a selling job.

I am persuaded that our problem is a human problem. The great majority of railroad employees are loyal. They take their cue largely from their immediate superior. The key man is the employee's immediate superior and on up the official ladder. It all gets back to the old slogan "Safety First." Is it trying to get up the ladder or down the ladder, or is it a broken rung in the ladder?

I am further persuaded that, when all concerned join hands in coordinating their efforts, we may be out of a job, but the job

will be done. It can only be done through cooperation.

Cooperation is the keynote in all our efforts. Cooperation is the reason for our meeting here today. Through our membership in the National Safety Council, we are provided with a great opportunity for mutual help, not only among members of this railroad section, but among all the members of all the sections of the council. There are certain other sections of the council have a much better approach than we, and, no doubt, certain other sections have problems to which we hold the key. It might even be a case similar to a deposit box, where two keys are needed and we have that other key. We have achieved much but there is much more in store for us.

Another fine achievement is the cooperation which today exists between this group and the Safety Section of the Association of American Railroads, and, likewise, between

the National Safety Council as a whole and the Association of American Railroads as a whole. This was exemplified by our joint grade crossing and trespassing accident prevention program. There was also a series of joint meetings of our executive committee and our grade crossing committee with the committee of direction and the grade crossing committee of the safety section of the association last winter, and no doubt there will be future meetings of the same kind.

When this section was organized more than 30 years ago, it became known as the Steam Railroad Section. At that time, it was necessary to make that distinction. Today the situation has changed. Therefore, on June 15th past, your executive committee made a resolution recommending to the Executive Board of the National Safety Council that our name be changed, by eliminating the word "Steam." The executive board approved, and from now on we will be known as The Railroad Section.

### Greetings From Safety Section, A. of A. R.

By L. E. HOFFMAN

Chairman of the Safety Section, Association of American Railroads, and  
Supt. of Rules and Safety, St. Louis Southwestern Railway Lines

I bring you greetings from the Safety Section, Association of American Railroads.

The activities of the Railroad Section of the N. S. C., and those of the Safety Section, A. of A. R., are so closely related that much good always comes from meetings of this kind.

I am glad to state that I have noted for several years, with real and sincere pleasure and satisfaction, the increased co-operation that prevails between officers and members of both Sections. This has been manifested, particularly, in the joint accident prevention programs for highway-railroad grade crossings and trespassing, and the duplication or interlocking of committee memberships, as well as the harmonious co-operation in their joint meetings.

The problem of promoting safety is quite

similar on all railroads, and we safety officers have much to do to sell safety to all officials, supervisors and employees, both individually and collectively. Surely all of us realize full well the necessity of securing the whole-hearted co-operation of everyone, including proper rule observance or enforcement, if we are to accomplish the much-desired reduction in accidents and injuries.

The statistics thus far for 1947 disclose that not as much progress has been made in the reduction of accidents and injuries, compared with 1946 and immediate preceding years, as we anticipated. Therefore, it is earnestly hoped that, with more stable employment conditions, this meeting of the Railroad Section, N. S. C., will cause a decided impetus in accident prevention efforts that will result in much greater reductions in casualties.

### Report of Standing Committee Chairman Secretary and News Letter Editor

By W. H. ROBERTS

Superintendent of Safety, Chicago and North Western Railway System

When I accepted the job of news letter editor, I asked for help—and I got it. I have received advice, articles, clippings—all of which have made the task of editing the news letter easy. It has been work, it has taken time, but it has been fun. At times it has been a little difficult to meet the deadline because of pressure of duties of our bread-and-butter jobs, but nevertheless it has been an enjoyable task. And the deadlines have been met.

My appreciation is extended to each of you who have helped. Particular thanks go to Herman Danke of the Erie, who so kindly provided the stencils for the cover in recent months.

The only way the news letter can be kept interesting and useful is for all of us to contribute to it. I know you will all give your new editor the same support and help you gave me.

### Contest Committee

By C. L. LAFOUNTAIN

General Safety Supervisor, Great Northern Railway Co.

Awards were presented to the following winners in the Railroad Employees' National Safety Contest for the year 1946:

| STANDARD RAILROADS                             |                                                |
|------------------------------------------------|------------------------------------------------|
| Group                                          | Operating Official                             |
| A Illinois Central Railroad                    | W. A. Johnston, President                      |
| B The Michigan Central Railway Company         | C. L. Jellingsham, Vice President              |
| C Duluth, Missabe & Iron Range Railway Company | P. H. Van Hoven, President and General Manager |
| D The Colorado & Southern Railway Company      | Robert Rice, Vice President                    |
| E Missouri-Illinois Railroad Company           | R. C. White, Vice Pres. and Gen. Mgr.          |
| F New York Connecting Railroad Company         | Dean F. Willey, General Manager                |
| THE PULLMAN COMPANY                            |                                                |
| G Atlanta Zone                                 | E. P. Schwotzer, Superintendent                |
| H St. Louis Shop                               | P. A. Wagner, Manager                          |
| SWITCHING AND TERMINAL RAILROADS               |                                                |
| A Alton and Southern Railroad                  | James Davies, President                        |
| B Birmingham Southern Railroad Company         | H. E. Parker, President                        |

The Green Book was issued in May, 1947, announcing the results of the contest, and, as usual, listing the standings of all the Class 1 railroads, together with some tables showing the gain made in safety from 1923, the first year of publication of the Green Book, through and including 1946.

By action of the Executive Committee of the Railroad Section, the 1947 Green Book was dedicated to the late Lew R. Palmer, one of the organizers of the National Safety Council, and founder of the Green Book, and

was entitled "The Lew Palmer 24th Annual Green Book."

The Executive Committee took action to clarify some points in the contest rules. In one case, the Executive Committee was polled by letter ballot to secure an interpretation of Rule 5. This rule formerly provided that no contestant could win a group award for two consecutive years. A majority vote of the Executive Committee held that no railroad having won an award in one group in one could win an award in the same or any

other group the following year, and the Committee at a meeting on June 11 amended the rule to provide that no contestant is eligible to win an award for two consecutive years, eliminating the word "group." The Committee felt that this change would clarify the intent of the rule.

At the meeting on June 11 the Committee also amended Rule 1 (b), which provided that "no railroad is eligible to win an award unless its accident records have been included in Table No. 99 of the official Accident Bulletin of the Interstate Commerce Commission for two consecutive years." The amendment of the Rule eliminates the words "for two consecutive years," thus requiring only that a

contestant's accident records must appear in Table 99 of the ICC Accident Bulletin. This amendment takes care of such a situation as a consolidation taking place during the year. Such a situation has occurred in the consolidation of the Gulf, Mobile and Ohio Railroad and the Alton Railroad of May 31 of this year. These were both Group C Railroads, but the consolidated system becomes a Group B railroad and will be carried as such in the contest for 1947.

The 1948 edition of the Green Book will be the 15th Annual Green Book, and it is our hope that we can recognize this significant anniversary in an appropriate way.

#### Highway-Railroad Crossing Committee

By G. W. ELSTE

Supt., Safety Dept., The Baltimore & Ohio Railroad Company

On June 1 of this year, all the highway-rail intersection activities of the National Safety Council were centered in the Signs of Life Program, a new campaign to encourage better observance of traffic signs and signals.

The potential benefits to be derived from the program are apparent in the fact that a recent special study indicated that 51 per cent of the driver violations in urban fatal crossing accidents and 40 per cent of the violations in rural fatal crossing accidents were disregard of the sign or signal at the crossing. With this in mind—as well as the knowledge that proper observance of all traffic signs, signals and roadway markings is vital to traffic safety—the Signs of Life Program was inaugurated.

A flood of materials went out to state and local traffic officials and to state and local safety councils to enable them to carry on a complete sign-emphasis program of any scope they might deem advisable in their particular territories. Backing up this material were the contacts made by National Safety Council field representatives to sell the program and to advise on the most effective ways of conducting it on either a state or a local basis.

The response by all persons connected with traffic safety was overwhelming. At this time—only four months after the program was inaugurated—there are only four states in the nation which have not requested Signs of Life materials or undertaken activities to emphasize the importance of observing signs properly.

Thirty-six states have carried on Signs of Life activities under the leadership of state traffic officials or state safety councils. In eight more states the program was carried on by municipal officials or local safety councils and thus the large cities in those eight states were also covered.

The basic piece of literature for the program is an attractively colored, pocket-size leaflet entitled "Signs of Life." The quantity distributed was nearly four times greater than the distribution of the previous publication, "The Engineer and You." Almost 2,000,000 copies of the Signs of Life leaflet—most of them specially imprinted for the organization responsible for their local distribution—were sent to 44 states by the Council.

A sound slidefilm of the same title, "Signs of Life," is now in the hands of traffic officials and safety people in 37 states and a constant promotion is being conducted to increase its distribution. In addition, a number of railroads are using it for both employee and public showings and some of the large insurance companies have added "Signs of Life" to their circulating film libraries. The film, besides presenting a brief history of signs and explaining why and how they should be observed, features a special appeal for safe driving by movie and radio star Eddie Cantor who kindly contributed his services to help assure the success of this important project.

To promote use of the film, 25,000 copies of a special flyer were distributed by the Council or made available to local or state

traffic safety organizations for their use. Nearly 20,000 copies of the official poster of the program were sent to participating groups and organizations. A handy-sized one-column mat of the poster was offered to all daily and weekly newspapers in the nation as well as to house organs, educational journals, trade journals, traffic and police magazines and women's magazines. As a result, 515 publications throughout the country wrote in to the National Safety Council to request copies of the mat in order that they might carry it in their columns. This is one of the greatest responses ever accorded an individual mat handled by the Council, a good indication of the public acceptance of the Signs of Life idea.

Shortly before the Signs of Life Program got under way in June, a series of radio transcriptions featuring Breakfast Club star Jack Owens was offered to every radio station in the country. Again the response was overwhelming. More requests were received for this series of transcriptions than for any series ever previously handled by the National Safety Council. Four hundred and eighty seven radio stations requested permission to broadcast the series of six 5-minute shows. The net result was 2,262 separate broadcasts on traffic safety in support of the Signs of Life Program.

Every radio station was also sent a series of short announcements on Signs of Life. In addition to these general short announcements, another set was also sent to the women's director and to the farm director of every station. Two special scripts were sent to about 300 of the larger police departments throughout the country in order that they too might go on the air for Signs of Life.

The opportunity afforded by the fourth annual observance of National Farm Safety Week to reach the farm people of the country was well utilized. Specially imprinted Signs of Life leaflets were distributed through the county agricultural agents of all the counties in the nation and also through state farm safety committees in all states.

Special local promotional activities took many forms. In Missouri, for example, the slidefilm was shown continuously at the state fair to an audience estimated at approximately 200,000. The State of Delaware hands out a copy of the Signs of Life leaflet to every motorist who goes through the State's Motor Vehicle Testing Lanes with the suggestion

that he read it carefully. Wisconsin prepared a fine kit of radio and news materials with a state plan in order to enable the newspapers and radio stations of the state to publicize the importance of observing traffic signs. The St. Joseph, Missouri Safety Council utilized store window displays to get over the message to the public. Many industrial firms featured the Signs of Life message in their house organs and one large oil company devoted all its summer advertising in radio, newspapers and magazines to it, as well as working with the National Safety Council to prepare a small leaflet of its own on traffic signs for distribution at its service stations.

Backing up all these activities was the featuring of Signs of Life in all National Safety Council magazines and in all materials relating to grade crossing safety in order to bring it to the attention of persons everywhere who are concerned with safety.

The Signs of Life Program and all the activities which it engendered on state and local levels had one basic purpose in so far as highway-rail intersection safety was concerned: to change the public attitude toward highway-rail intersections, toward the signs and signals thereof and toward the question of the individual responsibility involved in negotiating crossings safely. The achievement of such an aim is, of course, difficult to measure in the four months which have elapsed since the Signs of Life Program began. However, the overwhelmingly cordial response to Signs of Life activities everywhere is an unquestionable indication that its goals are being attained.

While the Signs of Life Program was the spearhead of the grade crossing safety effort for 1947, the National Safety Council continued as in the past to hammer away steadily on the subject in all the regular materials which it produces for many diverse groups throughout the country. It has been integrated into lesson units for schools along with school posters on the subject. Materials—posters, dash cards, letters, "The Safe Driver," and other leaflets—which go to bus and truck drivers throughout the country, constantly emphasize the importance of safe driving at crossings. Farm safety materials feature crossing safety regularly. The necessity of walking and driving carefully at crossings is emphasized in the industrial safety publications of the Council. Finally, it is an integral part of all traffic safety literature and activities.

The publicity releases of the Council for the radio and the press aid in the work by carrying crossing safety items in their proper perspective. Council magazines and newsletters also strive to keep the public aware of the need for safe habits at crossings.

Coordinating all these activities and providing necessary counsel and guidance are the Railroad Section of the National Safety Council and the Safety Section of the Association of American Railroads, especially the Grade Crossing Committees of both these groups. While crossing safety is essentially a traffic problem and is being handled as such, it is also a railroad problem and these two committees have devoted much work and study to insuring the soundness of the activities during the past year.

Everyone is fully aware that it is impossible to measure in any short space of time the

results of so vast an undertaking as endeavoring to change the driving habits of every motorist in America. However, we firmly believe that in the past year we have utilized the soundest methods possible and have achieved our greatest results to date. We have made the greatest distribution of materials during the past year and covered the most territory ever reached by the program in placing Signs of Life materials in 44 states and stimulating some special activities in those states. This, however, is not an end but a beginning. We have achieved an entire and an acceptance in those areas and we must now continue to furnish materials, assistance and guidance in order that the interest and activities we have stimulated may continue and may expand so that we shall have lasting results as evidenced by a constant reduction in highway-rail intersection accidents.

#### Membership Committee

By JOHN E. LONG

Superintendent of Safety, Delaware and Hudson Railroad Corporation

The membership of the Railroad Section of the National Safety Council now stands at 90, as against 95 a year ago.

This represents a loss of seven members, and an offsetting gain of two members.

The loss of seven members is not entirely an actual loss. Three of these were lost through consolidation. These railroads are the Alaska Railroad, which is government operated, and which now comes under the general membership which covers all government agencies; the Alton Railroad, which is now a part of the Gulf, Mobile and Ohio System; and the Pere Marquette Railway which is now a part of the Chesapeake and Ohio Railway System. Thus, we cannot say that we have lost these members, and we confidently expect that the safety officers of these roads will work as closely with us in the future as they have in the past.

The roads which have cancelled their memberships are three small railroads and one good sized road of 1750 track miles. We are working on the latter and hope to get them back into the fold.

The new members are both electric lines, the Chicago, South Shore and South Bend Railway, and the Chicago, Aurora and Elgin Railway. The CARE is a long standing mem-

ber of the Council, but recently transferred to the Railroad Section.

Incidentally, this is an indication of the logic of the change of our Section's name which consists of dropping the word "Steam" from the title.

As of today, there are only six railroads of 1,000 miles or over, including the member lost during this past year, which are not members of the National Safety Council. Two of these we consider as active prospects, and we have every expectation of welcoming them into the fold before another Congress rolls around.

You will hear about the National Safety Council's "Member-Get-A-Member" Campaign. From what I have just said, it appears that the number of prospects available to the railroad members is limited, but this is not true, for two reasons. First, there are still a lot of Class I railroads less than 300 miles in length which are not members of the Council, and second, as will be explained more fully to you, we need not confine our efforts to railroad companies.

The membership situation is most gratifying, but as long as there are six major railroad which are not members of our Section, there still remains a gap to be filled. The Fall Membership Campaign will give us an excellent opportunity to fill this gap.

#### Visual Education Committee

By L. B. HARPER

Personnel Assistant, Illinois Central Railroad Company

Production of the special series of railroad safety posters began early this year, the first two posters being intended for March posting. As you know, these are 17" x 25" two-color posters, and they are currently being issued at the rate of two posters each month. Every effort is being made to make them of the most excellent quality so far as art work, design, paper stock and printing is concerned. The Council staff feels that these posters represent the utmost value possible for the price. The art work is done for the most part by the Council's own Art Staff, and the printing is done in the Council's own Print Shop, making it possible to produce them at the lowest consistent price.

The poster series is more or less experimental in nature. Future productions along this line depend primarily upon acceptance by the members of the Railroad Section. It is felt that we will not know just where we have been on this deal until a full year has elapsed. However, it is necessary to work on a schedule five or six months ahead, and for that reason, the January and February posters are already in process of production. For that reason, also it has been necessary to come to a decision even before Congress time as to whether the series was to be continued for another year beginning next March.

Now, there are a considerable number of railroads which do not use the large size poster, but stick exclusively to 8 1/2" x 11 1/4" posters. In order further to determine what the demand for posters is, next year's series will consist of one 17" x 25" poster and one 8 1/2" x 11 1/4" poster each month.

It is further intended that beginning with the March posters, which will start off next year's series, a more streamlined and effective method of securing constructive criticism on the poster designs will be developed, in order to assure that the details of the posters will be beyond criticism.

Your suggestions and criticisms concerning the poster series are cordially invited. Full and free discussion of the subject will enable us to provide most efficiently the service you want.

On the subject of films, both motion picture and sound slide, considerable further study and discussion is needed. Production of sound slidefilms on a professional basis is expensive, and the production of motion pic-

tures is several times more expensive than sound slidefilms. Indications are that future sound slidefilms produced by the Railroad Section will sell at a somewhat higher price than have those of the past. The price is likely to be in the neighborhood of \$5000 per print. The experience of a great many of our members, however, indicates that by using one of these sound slidefilms over a period of months, the eventual cost of taking its message to several thousand employees figures out in the neighborhood of one penny per head.

Within the near future, there will be made available to you what we call Detail Sheets. These will be working drawings of various safety gadgets, devices, and ideas. We have in our files at the present time a couple of dozen excellent devices suitable for reproduction in this manner. Our friends Bert Lowe, Charlie Bowling, Fred Koeler, Ed Seyfarth and others have submitted plans for various devices, which should be very valuable to all of you. For one single example, Mr. Lowe submitted plans for a device which can be attached to an ordinary two-wheel hand truck, by which it is possible for one man easily and safely to handle a steel dock plate for gangplank. You are all invited to submit ideas of this kind, with plans and photographs if possible, to Les Dutton at Council headquarters.

Most of you are familiar with these Detail Sheets, having received them as technical releases within the past few months. This requires a little explanation. As a member of the National Safety Council, you are entitled to receive special materials from time to time. These consist of Detail Sheets, as mentioned, reprints of exceptionally good articles in various publications, Industrial Data Sheets, and, in fact, almost anything of a similar nature. These come to you stamped with the following legend: "This is part of the service for your Administrative Unit."

You will receive shortly a copy of Service Guide No. 120.1 entitled "Railroad Accident Prevention Materials." This is a rather extensive listing of all the National Safety Council's Industrial Safety Material which have application in the railroad industry, classified according to the various departments of railroad operation. I believe it will well repay your study.

In conclusion, I want to make one observation. The service of the National Safety Council can be effective and helpful only to the extent that we as a body and individually make our wants known. For this reason, I urge you to keep in constant touch with National Safety Council headquarters and with the officers of your Section, and let your ideas be known. We have only begun to get the advantage of the possibilities which lie in our organization.

### Human Relations—Handling Men

By C. R. YOUNG

Director of Personnel, Illinois Central Railroad Co.

The success or failure of any business is dependent upon the proper blending of three elements: men, money, and material. The latter two are of little avail without the first—men. Man is the soul of business—he is the moving spirit which animates it and gives to it character and ideals. The responsibility for the judicious combination of men, money, and material into an efficient organization rests with management.

On the Illinois Central, we believe that a supervisor in any level of responsibility and authority is just as much a part of management as the president of the company. These positions differ only in three respects; namely, the number of persons supervised, the number of activities supervised, and the amount of territory supervised.

Although the extent of responsibility becomes increasingly greater in the various levels of supervision as we move upward to the presidency, the direction and disposition of the responsibilities remain the same. Just as the president's responsibilities are divided between the board of directors and the employees, so is the supervisor, within his own unit, responsible both to his superior and to his subordinates.

No less important than the supervisor's responsibility to management is his responsibility to his subordinates. The executive officers formulate the policies, but it is the supervisor who administers and interprets those policies to those whom he directs.

The selection and proper training of supervisors are therefore of paramount impor-

tance, if we hope to build a truly creative partnership of men and management. The heart-break of failure can be avoided if we use every means at our disposal to determine that a prospect for promotion to a supervisory assignment has the prerequisites for development into that responsibility before he is placed.

Promoting men from the ranks to fill supervisory positions should be a standard practice, because it is generally agreed that the best morale and the best production results will be found in organizations which do this. Here is where scientific aptitude and preference tests prove valuable, because, instead of floundering around in the outmoded trial-and-error method, only those who pass satisfactory tests need be selected. Of course, prospective supervisors should not be selected on the basis of these tests alone. The background of the prospect should be studied—his family connections, his home life, his habits, his education. If he is found to have a satisfactory background, he should be given assignments that will give him opportunities to develop leadership. He should be assigned to work with successful supervisors in order that he may observe their methods of handling men.

Workers look to their immediate supervisor for the administration and interpretation of company policies. To many of his subordinates, the supervisor personifies the company. Employees frequently consider themselves as working for their immediate supervisor rather than for the company. In such

### Statistics Committee By T. H. CARROW

Superintendent of Safety,  
The Pennsylvania Railroad Company

The table on page 15 shows the breakdown for accidents on railways of all classes. The table is arranged to show the type of accident, and then a comparison is made between the casualties incurred in 1940 and those in 1947.

| Kind of Accident                                     | 1940   |         | 1946   |         | 1947   |         | Increase over 1940 |           |
|------------------------------------------------------|--------|---------|--------|---------|--------|---------|--------------------|-----------|
|                                                      | Killed | Injured | Killed | Injured | Killed | Injured | Killed             | Injured   |
| <b>Train Accidents:</b>                              |        |         |        |         |        |         |                    |           |
| Collisions                                           | 16     | 132     | 26     | 240     | 27     | 265     | 11                 | 133       |
| Derailments                                          | 13     | 72      | 17     | 152     | 27     | 249     | 14                 | 177       |
| Locomotive boiler accidents                          | 7      | 4       | 3      | 11      | 7      | 12      | 0                  | 8         |
| Other locomotive accidents                           | 2      | 1       | 6      | 35      | 13     | 4       | 11                 | 3         |
| Miscellaneous                                        | 38     | 215     | 52     | 444     | 74     | 580     | 36                 | 365       |
| <b>Total</b>                                         | 76     | 532     | 114    | 882     | 148    | 1,107   | 72                 | 575       |
| <b>At highway grade crossings, classified above:</b> | 1      | 7       | 3      | 21      | 6      | 27      | 2                  | 20        |
| <b>Train-service accidents:</b>                      |        |         |        |         |        |         |                    |           |
| Coupling or uncoupling cars or locomotives           | 5      | 144     | 11     | 340     | 11     | 352     | 6                  | 208       |
| Coupling or uncoupling air lines                     | 4      | 48      | 6      | 105     | 5      | 125     | 1                  | 77        |
| Operating hand brakes                                | 6      | 49      | 6      | 74      | 6      | 107     | 0                  | 58        |
| Operating switches                                   | 8      | 226     | 8      | 744     | 6      | 428     | 0                  | 212       |
| Coming in contact with fixed structures              | 8      | 78      | 9      | 145     | 5      | 127     | 1                  | 49        |
| Acting on or off cars or locomotives                 | 14     | 88      | 12     | 216     | 15     | 219     | 1                  | 131       |
| Accidents at highway grade crossings                 | 1      | 1       | 3      | 14      | 3      | 20      | 2                  | 19        |
| Struck or run over not at public crossings           | 61     | 73      | 101    | 146     | 85     | 132     | 24                 | 59        |
| Miscellaneous                                        | 59     | 1,462   | 53     | 3,548   | 76     | 3,425   | 17                 | 1,963     |
| <b>Total</b>                                         | 163    | 3,564   | 211    | 8,803   | 214    | 8,666   | 48                 | 3,099     |
| <b>Total—Train and Train-service accidents</b>       | 201    | 3,779   | 263    | 9,247   | 268    | 9,246   | 67                 | 5,467     |
| <b>Casualties per million units</b>                  | 317    | 5,96    | 336    | 11,81   | 358    | 12,9    | 41                 | 6,92      |
| <b>Total—Neutral accidents</b>                       | 42     | 4,775   | 61     | 9,490   | 103    | 8,679   | 61                 | 3,874     |
| <b>Grand Total—Accidents of all classes</b>          | 243    | 8,554   | 324    | 18,737  | 371    | 17,925  | 128                | 9,379     |
| <b>Casualties per million man-hours</b>              | 198    | 6,98    | 185    | 10,36   | 195    | 9,85    | 17                 | 2,87      |
| <b>Total locomotive and motor train-units</b>        | 634    | 312,380 | 713    | 878,028 | 804    | 617,744 | 170                | 285,364   |
| <b>Total man-hours (Class I roads)</b>               | 1,224  | 858,316 | 1,712  | 509,384 | 1,705  | 862,430 | 481                | 1,004,114 |

Source: Interstate Commerce Commission, Statement M-400.

cases, whether the employee admires, respects, and trusts his immediate supervisor, or just the opposite, is reflected in the employee's attitude toward the entire organization.

It is important, therefore, that all supervisors be given a thorough schooling in the principles of supervision, which includes the application of psychology in dealing with the day-to-day human relations problems which confront every supervisor. It is only fair to the individual who is placed in a position which requires leadership and teaching. Supervision is largely a teaching job. If every employee in an organization reacted exactly alike under the same circumstances, supervision would be relatively easy, but they don't.

Psychologists tell us that everyone is different and the only one of his kind, and that, equal to our need for food is our need to have this fact recognized by others, and particularly by those for whom we work. Therefore, it is important that a supervisor be well schooled in how to size up his men, analyze their differences, anticipate their reactions to his directives, and plan his approaches accordingly.

Whenever a supervisor is not satisfied with the quality of the performance of the men under his direct jurisdiction, he had better look to the improvement of his own qualities; that is, he should strive to learn more and more of the art and science of dealing with people. You can generally gauge the calibre of the boss by the performance of his men.

During the late war, two million foremen were trained, not in managing machines and materials, but in managing men and women. Having learned that, they increased production from 25 to 500 per cent.

The purpose of a doctor's examination of a patient is to determine the underlying cause, or causes, of the patient's illness. We wouldn't think very highly of a doctor who made a practice of prescribing remedies without taking this precaution. In a like manner, it is important that the supervisor understand the underlying causes of employee grievances in order to do an intelligent job of handling men. Usually a grievance is an opportunity. When the cause of the grievance is located, better operating practices are frequently developed.

One of the first and most important things to remember in human relations is that the desire to be important is the strongest urge

in human nature—stronger even than hunger or sex, and that to ignore this is to invite trouble. Everyone yearns for a feeling of personal security, worthwhileness, self-esteem and self-respect; he wants to be able to compare himself with others around him without feeling ashamed or cheated.

Employee-opinion polls taken in recent years indicate the chief causes for employee discontent are:

1. Failure to commend work well done.
2. Failure to give credit for suggestions.
3. Failure to correct grievances promptly.
4. Failure to encourage.
5. Criticizing employees in front of others.
6. Failure to ask employees their opinions.
7. Failure to inform employees of their progress.
8. Favoritism, either deliberate or unintentional.

Supervisors should be taught to avoid these eight things if they want to have good human relations within their organizations.

We believe that, in order to maintain healthy human relations within an organization, management should pay close attention to those things which are known to be beneficial in this field.

Working conditions should be provided that safeguard the life, limb, health, dignity, and self-respect of the individual employee. By all means, this includes the elimination of on-the-job injuries.

Employment should be stabilized to the greatest extent possible.

The organization should pay salaries and wages commensurate with earnings and business conditions generally.

We believe employees should be given a voice in the operation of their company through a suggestion system, and the employee who presents a suggestion that is adopted should be granted an award equal to the value of the suggestion to his company.

Where at all feasible, we believe the company should assist its employees in obtaining low-cost hospital, medical, and surgical care. Since 1911, the Illinois Central has had an excellent hospital department. It is operated by a board of managers on which labor and management are equally represented.

We think low-cost group life, health, and accident insurance should be made available to employees through their company.

It would not be reasonable to expect good

employee morale in an organization in which management is indifferent to safety.

Thus far, the Illinois Central has employed three methods of schooling officers and key supervisors in the application of psychology to supervision. We made our first experiment with this early in 1945. We purchased a series of 32 pamphlets dealing with supervisory problems and mailed them periodically to 500 of our key men. We doubt that much benefit resulted from this initial attempt to give a course in the principles of supervision by mail. However, it is likely that had the contents of these circulars been discussed by our supervisors in group conference, the benefit therefrom would have been considerable.

In 1946, we began experimenting with the group-conference method, and it has proven quite satisfactory. Approximately 400 supervisors are presently enrolled. They use manuals which the company purchases from the National Foreman's Institute. The supervisors are divided into groups that number from 12 to 15. They meet fortnightly and the course runs about two years.

Our third and latest plan for training supervisors in the principles of supervision was adopted in 1945. Thus far, we have sent approximately 1200 officers and key supervisors to school where they have received 32 hours' instruction from psychologists on how to apply psychology to supervision. The primary purpose of this course is to develop the supervisor's individual personality, and to make the supervisor more conscious of the human elements that must be considered in supervising others in order to improve job relations, promote efficiency, and make his job easier and more pleasant. We have conducted classes at 20 points on our railroad. The average enrollment in a class is 25. The company pays the tuition.

An employee wants to feel that he is part of the enterprise; therefore, it is important that workers be kept fully informed on company policies, problems, prospects, and finances. We believe that if our people are given the facts, their conclusions will be sane.

Twenty-seven years ago, it was almost impossible to get the average railroad man to talk about his business. There were two reasons for this: one was fear of criticism from a supervisor for saying the wrong thing; the other was often a lack of information as to

what was going on outside his own immediate surroundings. Our president's bulletin to all employees, entitled "Things to Talk About," was designed to correct both of these conditions—to let everybody on the railroad know that informed discussion of the company's business had the sanction of higher authority and to give everybody some things to talk about. These bulletins, issued every month for the past twenty-seven years, have dealt at one time or another with almost every phase of the vast, complex business of the railroad, and they have been the forerunner of a whole train of developments in the sharing of information with the members of the Illinois Central organization.

Employees should be provided with opportunities for self-development both as to their education and their skills. Means for arousing and maintaining employee interest, initiative, energy, and enthusiasm should be developed and employed.

We are cooperating with one of the state universities on our line in an experiment in adult education in which members of the university teaching staff give such of our employees in the area territory as may elect to take advantage of it, a 12-hour course in Public Relations and Business Organization. This course is open to all employees.

Some of the principal subjects discussed are: What the employee wants out of life; the employee's responsibilities to his family, his job, his union and to society; desirable personal traits, skills, knowledge, understandings and conduct; useful job practices; how the individual learns; how partnerships and corporations are formed and their sources of capital; the general structure of the Illinois Central, its origin, how it is regulated by laws, its sources of capital, why it needs money, material, and men, the balancing of its capital structure, how it distributes its income, the amount of taxes it pays; the prices necessary to produce a profit; the necessity for profits; the equity of stockholders; the part the employee can play in bettering the Illinois Central's relations with the public; the rewards of courtesy, and so on.

Employee reaction to this course has been excellent. Thus far, over 500 of the personnel have completed it. Enrollments have included every classification found upon our payroll. To me, this is a definite indication that workers do want information about their

company. This confirms the information gathered in 1945 by the Opinion Research Corporation for the Railway Age. The Illinois Central studies the university to carry expense incident to conducting the course. We hope to expand the plan, and believe a greater percentage of the personnel will enroll as the plan becomes better known.

We have been discussing the development of the personnel already in our service. A discussion of this subject would not be complete without some consideration being given to the selection of new employees. Many of our troubles at present are due to poor selection which was made in the past. A higher standard of entrance requirements should be adhered to, and tests which will measure intelligence and aptitudes should be used in ascertaining an applicant's qualifications. These tests will enable those responsible to place men in work to which they are best

adapted and will keep unfortunates out of service.

We believe that, so far as feasible, employees should be assigned to the type of work best suited to their intelligence and aptitudes, thus eliminating the frustration to the employee, and the needless expense to the employer, that usually result from improper placements. A highly intelligent individual assigned to menial work, non-creative work is likely to become an unhappy employee and a potential trouble-maker. It is likewise bad to assign an employee to work that is beyond his intelligence.

In this connection, Dr. Albert Watson, an eminent industrial psychologist, tells us that no man who calls himself a manager, a superintendent, a foreman, or a personnel officer can justify failure to discover aptitudes that exist in his own forces and to develop these aptitudes into profitable abilities.

#### WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: C. M. BOWLING, Supt. of Safety, Louisville & Nashville Railroad Company

#### Train Accidents and Train Service Accidents

By R. C. WHITE

Chief Operating Officer, Missouri Pacific Lines

I am not going to quote statistics. We are all aware that we have had train accidents and we have had train service accidents. One accident is one too many. To not have accidents, a railroad must be operated safely. To be operated safely, a railroad must be operated by safe, thoughtful men. A thoughtful man can, by training, become the best safety "device." Why? Because he is endowed by the Creator with eyes to see; ears to hear; mouth to speak; hands and arms, feet and legs to act, plus a God-given thinking apparatus on top of his shoulders to study and plan, in the directing of these various apparatuses safely and efficiently.

For men to become safe men, they must be taught and trained by competent, patient, and considerate teachers—superiors. This teaching and training must be inspirational, particularly as to the detail. Interest, yes, enthusiastic interest must be created and imbedded in the mind of the individual—in

terest in himself and his work; a desire to excel; interest in, and consideration for, his fellow-worker, his family and his railroad. He must be taught to know what to do, how and when to do it, and most of all, appreciate why he should do it.

With safe men, a railroad devoid of any mechanical safety appliances can and will be operated safely.

One of our superintendents, in his report of a safety meeting, included an item about a man who reported a light on a coal chute not burning at night. This superintendent was reminded that this was an "efficiency item", not a safety item. While it would take a little more time to do the job safely in the dark, if the man were a safe man educated to do his work safely, he would function safely in the dark as well as with light, until the light could be repaired.

An ill-considered view as to the cause of a disastrous collision was heard not long ago.

It was to the effect that "the accident was caused by a fog so dense the engine crew could not see the block signals." Train accidents occur in fogs, but fogs do not cause train accidents. A safe crew will function as safely in the dark, in a fog or in bad weather, as it functions in daylight and clear weather, the only difference being that it takes a little longer to do the job under "fog" conditions.

The teaching and training factor in safety is a continuing task. Daily on-ground instruction, demonstration and supervision is imperative. Without safe men, made so by teaching and training, a railroad will not and cannot be operated safely, regardless of all the known mechanical safety devices—air brakes, block signals or whatever those devices may be.

The plan of work of a safe man in train and engine service is the book of rules. It is the blue print which is always on the bulletin board of a safe worker. There is much thought and many important details between the front and back covers of the book. It is not theory but a working plan, the essence of accumulated thought of practical and experienced railroad men for many years. It can accurately be said to be the result of the application of common sense and good judgment, based on experience. But the thought contained in the book of rules will be useless, if it is allowed to remain "embalmed in words" in the book. The safe man will open the book, study, assimilate and learn its requirements. He will bring to life the thought therein and suit action to the words by application to his daily tasks.

If we could hand the book of rules to a man, tell him to study its requirements, then to do what the rules require, the task would be simple. But it is not as easy as that. As we need teachers to teach and train students in schools to learn from text-books, so we must have teachers to teach and train the men on a railroad to know what to do under the rules, before they can become safe members of a team. Every officer or supervisor on a railroad division is a teacher and must understand that teaching and training are his obligation to his fellowman and his railroad.

Rules which are not uniformly complied with and are not enforced, have ceased to be the instrument of safety and should be termed "hazard rules." I recall several train accident reports of the Interstate Commerce Commission,

in which the testimony developed that it had become common practice to violate certain rules, if not with the expressed consent, then the implied consent of the supervisory officers. I refer specifically to the acceptance of verbal information as time on first-class trains within yard limits in lieu of time in the time-table or a train order, and in lieu of the only authorized substitute for such time, namely, adequate flag protection. I also refer to failure to move at restricted speed within yard limits becoming a common practice without correction, therefore, with implied consent of supervisory officers. I can mention other rules but this reference will suffice to emphasize knowing and cheerfully complying.

Therefore, the teaching and training, however thorough, will be expended in vain unless we follow through with constant on-ground supervision, including well-planned surprise tests. One of the most destructive elements to the safe operation of a railroad is the tolerance of rule violations by a supervisory officer instead of immediate corrective action. To see or know of a rule violation without doing anything to correct it voids the usefulness of the officer involved. The man he supervises loses respect for him when he fails to supervise. It is not the first mistake that a man in train and engine service makes that usually causes an accident; it is the development, by continued failure to comply, often unnoticed by supervisory officers, that finally leads to disaster.

A prominent military officer has said: "There are three basic ingredients in every organization, military or civilian: they are—Leadership, Discipline and Morale." Leadership on a railroad starts with the top ranking officer of that railroad and continues down to the supervisors and foremen. That leadership must be such as will inspire and maintain "esprit de corps"—a spirit of common devotedness or support among members of the organization—comradeship. That leadership must motivate the thought, "Do unto others as you would have others do unto you." That leadership must recognize the importance of rules, the necessity in team play that all (members of the team) know and know alike the rules; that ignorance or infraction invites penalty—accident, personal injury and property damage.

Leadership should be ever mindful of the fact that rules are made to be observed and not to be broken; that it is as bad practice



to be "blind" to a violation of even a minor rule as it is for the most vital rule to be flagrantly violated. The most insignificant rule in the book may forthwith become an important rule if its violation causes an accident. Dire, disagreeable and sometimes disastrous accidents have their beginning in rule laxity.

That leadership must appreciate that harsh punishment for a rule violation may in some cases have an effect opposite to that desired. In other cases, sternness and firmness are both necessary and desirable. It is a fact that at times on a railroad, assessment of demerits or dismissal is made for the violation of a rule which has caused an accident, when probably a previous violation of the same rule by the same crew not involving an accident, has passed unnoticed by the supervisory officer.

No railroad can be made without discipline. The shortened dictionary definition of discipline is divided into three progressive parts: First,—teaching and training; second,—cheerful obedience; third,—chastisement or punishment. If teaching and training have been thorough and if competent leadership has brought about that "esprit de corps" to effect cheerful compliance with the rules,—the third phase of the definition,—"chastisement or punishment," will seldom be invoked.

The term "morale" can be underwritten as meaning, "Team play and cooperation" between members of the team. The leader must have respect for his men, if the men are to have respect for their leader. The leader must know his profession and the details of the work. He must be fair, considerate and patient, but firm. The men study their leaders as much as the leaders study the men. The leader must play no favorites. He must inspire interest of the men in their work. His work cannot be successful unless he has constant daily contact with the men on the job and holds frequent class and rules meetings with the men.

In these meetings, he should by local, personal approach inspire questions as to the application of certain rules to certain local conditions and in this way put over his intense interest in their individual and collective welfare. When a job of work is well done, he should commend the men for it. When handling a man's shortcomings try to make him understand that it is the offense which you are condemning, rather than

the man personally. When a man does a praiseworthy thing, praise him in the presence of his fellow-employees. When he does a blameworthy thing, take him to one side and talk to him alone.

Attention to details is one of the most important factors in preventing accidents. Every detail is important. No detail is unimportant. A safe man knows the details. The supervisor or teacher, in bringing about a "working knowledge and proper understanding" of the rules, must give a detailed picture—remove any question; there is no room for doubt if a play is to be properly, efficiently and safely executed.

One of the most disastrous collisions that has occurred in recent years, in which about 70 persons were killed, could have been prevented if the fireman had remembered the detail to take the prescribed flagging equipment with him when he went out to flag "ahead." He took a red lantern and one fusee, with no topopeds. He fell down and broke the only fusee he had, tried to stop the oncoming train with his red lantern, which could not be seen between two burning headlights. If he had taken topopeds and placed them a sufficient distance, had taken fusees and used them properly, the accident would not have occurred. The engineer failed in his duty as a "captain" when he did not see that the flagman was properly equipped to perform his duty.

A serious collision of a passenger train with a freight train occurred because the engineer of the passenger train overlooked the meeting point. It could have been avoided had members of the crew of the passenger train been familiar with location of emergency valves in the passenger cars. This crew overlooked the important detail of locating the emergency valves before leaving the terminal.

To my mind, the most important factor in preventing train accidents is "team play" between members of the crew; this includes consideration for the other fellow. The brakeman or fireman who does not call attention of the conductor or engineer to meeting points, waiting points, superior trains to be cleared or to apparent rule violations, does not appreciate his obligation to his fellow-workers; and, conversely, if engineers and conductors do not teach and require their brakemen and firemen to do these things, they do not appreciate their responsibility and obligation as "captains" of their trains.

A train or engine on the main track within yard limits, working under the protection of Rule 93—without a flag out against second and inferior class trains, extra trains and yard engines, must be protected by such trains moving at restricted speed. To say it another way, the crews on such trains entering yard limits must have consideration for their fellow-workers on trains and engines occupying the main track within yard limits and protect them by moving at restricted speed as the rule requires.

The flagman who goes back to protect the rear of his train is not only protecting his own train but is protecting his fellow-workers on the engine of the approaching train.

A sideswipe recently occurred in a yard, in which both engines were backing up. An engine backing slowly out of a track onto a lead track, pulling 18 cars, sideswiped a light engine backing in the opposite direction on the lead track. The crew of the light engine had lined the switch against the engine pulling 18 cars but had not had an understanding with the other crew before taking the switch away from them. The engine crew on neither engine was looking backward in the direction of its movement. This accident was caused by a lack of team play between members of two crews and between members of each crew.

Officers and supervisors can make no mistake by emphasizing the importance of team play,—consideration for the other fellow, including the responsibility of the conductor and engineer as captains.

Whenever there is more than one man employed to do a job, there must be a captain. If the section foreman sends two men to do a job, he should delegate one of them

as the captain. The conductor and engineer are captains. This principle is tied up with proper team play.

When men on the railroad, through teaching and training, have a proper understanding and working knowledge of the rules and appreciate their obligation to their fellow-workers and understand and appreciate the importance of team play, train accidents, such as I have briefly described, will not occur.

For the purpose of reporting accidents, the Interstate Commerce Commission has defined "Train Service Accidents" as, "Accidents arising in conjunction with the operation or movement of trains, locomotives or cars that result in casualties to persons, but not in damage to equipment or other railroad property in excess of \$10,000." The principles which I have endeavored to explain concerning employee relations, leadership, supervision, teaching and training, cooperation and team play, therefore, apply to train service in the same manner as they apply to train accidents.

To bring out this point, I will cite one specific instance. A car inspector working in a small yard where there was a yard engine employed, went between cars for the purpose of coupling the air hose and while thus engaged, was badly injured by movement of the cars by the yard engine. This inspector had gone between the cars without having a proper understanding with the crew of the yard engine performing the work and without their knowledge, thereby jeopardizing his own personal safety. Had this inspector cooperatively established himself as a member of the yard crew, and had he arrived at a proper understanding with his teammates as to moves that were to be made, this train service accident could not have occurred.

## Train and Train Service Accidents

### (Panel Discussion)

Discussion Leader—E. L. DUDMAN, Supt., Safety Dept., the Atchison, Topeka & Santa Fe Railway System.

#### Participants:

T. H. CANNON, Supt. of Safety, The Pennsylvania Railroad Co.  
M. M. KELLER, Supt., The Atchison, Topeka & Santa Fe Railway System

A. A. LOWE, Supt. of Safety, Southern Pacific Co.

D. E. MUMFORD, Supt. of Safety, New York Central System

J. J. O'TOOLE, General Supt. of Terminals, Chicago, Milwaukee, St. Paul & Pacific Railroad Co.

W. J. FENCURE, District Safety Agent, Canadian Pacific Railway Co.

A. S. FITZGER, System Rules Examiner, Illinois Central Railroad Co.  
L. W. POWELL, Acting Supt., Southern Kansas Div., The Atchison, Topeka & Santa Fe Railway System.

CHAIRMAN E. L. DUGGAN: I believe the panel is sufficiently diversified that they will be able to answer any problem that emanates from the floor.

I was particularly pleased to hear Mr. White say that the rule book was the bible, or the blue print, for the guidance of employees, and I was more pleased to hear him say that if the information therein was left embossed in the book, it was of no value.

You cannot permit employees to become rule pickers, and by "rule pickers" I mean permitting them to choose which rule they will comply with. A trainmaster or a supervisory officer who says, "Well, he was going a little bit fast coming into yard limits that time. I am sure he didn't mean to do it"—and winks his eye at that rule violation, sets us a situation where, in the later experience of that particular employee, he will come into the yard just a little bit faster and meet with an unfortunate accident.

Now, Mr. Callahan, of the Pullman Company, is concerned about the protection of his workers when working under and about trains.

MR. CALLAHAN: Our problem not only concerns the Pullman Company but all the railroads in this country as well. I think it has to do with the protection of employees at railroad stations. Today, all of you men know that we have more apparatus under not only Pullman cars, but railroad cars as well, than we have ever had before—air-conditioning apparatus and everything else. It is almost impossible for a man who has to work under a car to get out safely if he hasn't very much time to get out. He can't very well roll out today, as he used to.

I spent a good many years in the yard department of the Pullman Company. I had charge of the maintenance of our cars all over this country for about twelve years, and I have seen a lot of it. I know that on every railroad there is a rule and regulation of some kind to govern whether or not a man can go under a car in a station. A day doesn't go by that it isn't necessary for either our men or a railroad man to get under a car to hurriedly replace a belt or do some other job. From my observation, I don't believe

that men working under cars are properly protected in all stations.

Recently, at one of the largest terminals in the country, we had one of our electricians under a car doing a job. A railroad inspector was standing alongside the car, acting as a watchman. Although he hadn't completed his job, he found it necessary to get out from under that car to look for his partner for some help. As he was getting out, the train started out of the station. He very narrowly escaped serious injury or death.

I feel that we should have a uniform method of protection for employees that have to work under cars. Some of our men are getting fidgety about it, and we have heard quite a bit about it from our employees.

On some roads, in some stations, what I consider to be about the best practice is being followed in this way. They have a small blue banner hung on the throttle in the locomotive, and another banner that is attached to the draw bar of the rear car. The banner is not removed from the throttle or the rear car until the man himself notifies the engineer that he is out from under the car.

I would like to see something along these lines used to afford the utmost protection for the men that are engaged in work under the cars.

CHAIRMAN DUGGAN: I would like to have Mr. Killen give his understanding of what protection is provided.

MR. KILLEN: It seems to be general on all railroads that there is some form of protection provided the employees as outlined by Mr. Callahan, but from his remarks it appears that it is simply a question of the enforcement of the rules that might be in effect on that particular railroad.

So far as the Santa Fe Railroad is concerned, all such movements are protected by a blue flag or light on both ends of the train. We don't put them on the throttle. We put them on the front end of the locomotive, and on the rear of the rear car in the train. At many points where there are a number of different classifications of employees working on the equipment, each class is responsible for placing their own protection. There may be a number of the blue banners or lights displayed on a particular train, therefore, but each class of employees are protecting themselves and they are permitted to remove only the banner that they

place there for their particular classification, and in no instance is a train permitted to depart until all such banners, if there be more than one, have been removed.

This, of course, applies at points where trains are normally serviced. We operate through one terminal, that does not provide that particular type of protection, but protection is afforded equally as well by having the car inspector who finally delivers the air brake clearance card to the conductor and engineer to personally be responsible to see that all classes of employees have finished their duties and are clear and free of the train.

I can't imagine any more safeguards that might be thrown around the operation at points where trains are normally serviced. If servicing of any nature becomes necessary at an intermediate point where such work is not normally done, then our practice is to arrive at a common understanding with the train and engine crew. In this case the train is not moved until the work has been completed and the person making the request has personally O.K.'d the release of the train.

I see no objection to putting a banner of some kind on the throttle, but I doubt if we would find it necessary. An engineman is not permitted to move until the banner, wherever it is located, has been entirely removed from the train.

MR. CALLAHAN: I still would like to see the banner hung on the throttle.

MR. EAGAN (New Haven): May I answer that question? We will assume that you stop a dozen or fifteen trains at Omaha, for example, on your railroad. That is the practice every day. You are going to change engines there. What would you do in that particular circumstance?

MR. KILLEN: If it is necessary to service the train and detach the engine, the servicing may be done after the engine has been detached, but the operator will be protected by a blue flag under the rules, while the engine is away. Then, before the engine can be attached to the train, the personnel will have to be moved in the clear, the banner removed, the engine attached, and flag attached to the locomotive.

MR. EAGAN: I still don't think that we answered Mr. Callahan's question. He is asking the question of all railroads. What protection is afforded to car inspectors, mechanics,

or electricians who are working under cars in stations?

I don't know who puts this blue flag up in the cab of the locomotive. I know the car inspector won't, because I think his idea is to protect all mechanics. It might be all right on the Santa Fe. I am doubtful if it is done on other railroads.

MR. LOWE: I don't know any better rule that can be made than Rule 26. As far as I am concerned, I don't think there is ever a mechanic, a Pullman man or anybody else, who goes under one of our cars that can be moved unless it has the blue flag on both ends. On many places in the yard where there is Pullman equipment, the Pullman people put on a "derail" with their own blue flag, and you can't get it to move if you tried. I wouldn't take a chance with a man under a car without a blue flag on it.

We also had instances of engines on a grade, where someone accidentally released the air, allowed the train to move. We put a padlock on that so that it is impossible to release the air on the engine.

MR. FITZGER: The Illinois Central method is identical with the Santa Fe's. The blue flag is attached, and only the man who puts the flag up can take it down.

I recall last winter we had some trouble on the road with steam leaks at intermediate points where we stopped our passenger trains. The car man would go to the engineer and tell him not to move until he came back and told him to move. No signal would move that train until the car man released it.

I don't know that it could be made any safer, and I don't know of any train that was ever moved or coupled into without blue flag protection. There is a lantern or a flag hung on the engine and on the rear of the train, and anyone under that train would be safe until he went back and took it down.

MR. EAGAN: Let me ask you this question. There are twenty-five engines coming into Chicago, and you are going to change engines every day. Do I understand that when you take off engine No. 1 and put on engine No. 2, you put on a blue flag, and you have five minutes to change?

MR. FITZGER: I don't know that that is done at all times. The car men handle that. They uncouple the engine, it moves away, the engine is coupled on. But they are in charge of the train while that is being done, which places them in charge of the safety of

anybody that might be around or under that train.

MR. CARROW: You seem to raise the question as to the protection provided. Have you covered it on the New Haven?

MR. EAGAN: We have the same as this gentleman who just spoke. The car inspector, of course, tells the engineer. But I am trying to get to Mr. Callahan's question as to a general rule of all railroads as to how we should handle it, in that respect. As far as the blue flag is concerned, we handle it as efficiently on the New Haven as anywhere else.

CHAIRMAN DUGGAN: It is my understanding, Mr. Eagan, that Rule 26 is standard and in effect on most major railroads. There may be some deviation from that rule that is tolerated by management on some railroads and not tolerated by others. Again, we have a man from Canada here. Let's hear what he has to say.

MR. PESCU: Gentlemen, the practice in our country and on the Canadian Pacific is very similar to what has already been expressed here. We allow the judgment of the car men to determine to a certain extent, what rules shall govern the work that is to be done on the trains. In the case of an engine being changed, no work is allowed under the train until the engine has been coupled and the slack taken. Then the necessary work under the train may be taken care of.

In answering the other questions that have gone before with regard to removal of the blue flag, the flag is attached to both ends and is removed only by the men in charge of the work on the train. The engineer does not move the engine until the blue light or blue flag has been removed.

MR. MUMFORD: With the immense passenger traffic and multiplicity of connections on our railroad system, we cannot use blue flag protection at our passenger stations. Not only do we change engines, but we have connections coming in from a number of trains which must be added to the train sometimes on the head end, sometimes on the rear.

We have two rules in our safety rule book. One is that men must not work under engines or cars without protection. The other says that men working under or about cars must first look or use such precautions as are necessary or reasonable protection.

For through train movement we do not

find it possible to use blue flag protection. We have the car inspectors tell the engineer on the road engine not to move the head end because some of the men are going to be working under or about there. They will then establish a gap between cars on the rear and possibly set the air so that the cars on the head end cannot be moved while the men are working on them. Meanwhile, switching is going on at the rear end, cars are being added to the train, switching is being done by yard engines. There may be several yard engines involved. And may I say that the cases of death and serious injury we have had in the last several years have not been where we are engaged in this work in through passenger train operation, but have rather been at points where we had Rule 26 in full operation, and because of failure of men to apply the blue flag signal which they were privileged to use, they were killed or injured.

The rules, as pointed out today, must be lived up to, in order to insure safety. We feel that if the rules we have mentioned are lived up to, we can have safety, by complete understanding, as was emphasized in our operating man's statement. Understanding is necessary, and if you have that complete understanding between crews and car inspectors, there need be no accidents.

CHAIRMAN DUGGAN: There are many things that confront the railroads in reducing accidents of all kinds, both passenger and train service. In going over the causes of train accidents, I find that employee negligence leads the list. Out of a total of 15,556 train accidents in 1946, 6,722 of the total were listed as a result of employee negligence, which indicates that we are falling down on the job.

Now, the question is, just what are we doing, what are we going to do to stop it?

MR. GUERTIN (Canadian Pacific): On the Canadian Pacific about ninety per cent of our train accidents are due to the failure of road crews in yard limits.

I am wondering, and we would be very much interested to know if there is any particular way of efficiency testing, within yard limits, on the American roads. That is to say, can you put up a situation such as tail lights on a caboose, within yard limits, for the purpose of efficiency testing?

MR. O'TOOLE: I think there is no set rule that you can follow. You can take off marker lamps and you can hang up marker

lamps. You can do other things, but Rule 93 primarily states that you will move in yard limits at restricted speed, and restricted speed is prepared to stop short of train or obstruction.

We all have terminal officers and road officers, and it doesn't take a very experienced officer to observe whether or not a man is operating a locomotive at restricted speed in yard limits. I sometimes think, as was said here before, that the terminal officers are perhaps not as conscientious about the observance of the yard limits rules as they should be. They set up stock schedules and merchandise schedules and they crack the whip and insist that they be maintained when they may not be practical schedules within the yard limits.

The yard limit rule says that the approach signal or clear signal does not eliminate the necessity of running at restricted speed.

I just don't get your question as to what you have in mind specifically, as to when a train might or might not be under control. An engine might be under control at 15 miles an hour in one location in observing the yard limit rule, and in another location it might have to move five miles an hour to observe the yard limit rule.

MR. GUERTIN: But how do you test your crews as to the observance of the Rule 93, if you use fuses?

MR. O'TOOLE: If you use fuses you are getting into Rule 93. Suppose that you had on a double track railroad an engine that has 15 or 20 cars, and covered a distance of 40 miles an hour in yard limits. Somebody ought to be thinking of whether or not that fellow could run 40 miles an hour around the corners and bends and certain switches where he might have to stop and still be running at restricted speed.

As an example, you can leave a switch set wrong and see whether it wouldn't create a condition that was more hazardous than the test. A switch is a signal and he would be prepared to stop at a switch that would be improperly set.

Or you might have a switch light that didn't have a target on it. How would he come up to that switch? If he couldn't see any indication that it was properly set, would he go hammering over it at 35 or 40 miles an hour?

I don't know of any set rules that we have

ever used. It has been a rule of common reason in the observance of yard limits.

MR. CARROW: Mr. O'Toole, just to clarify the question, do you actually pick people up in your procedure?

MR. O'TOOLE: I have had occasion to criticize men for not observing Rule 93 by running too fast where they shouldn't be running, or coming by the yard limit board at a speed that was obviously too fast, because there was no switch in the vicinity. Then they brake down perhaps a half or three quarters of a mile beyond the yard limit and get down to reasonable speed.

I don't think a month goes by on the signal test when somebody isn't called in for some violation of the yard limit rule.

MR. GUERTIN: We have put on a test simulating fuses or extinguishing a signal, with the result that the fire boy jumped and suffered a severe injury, and that ended that. I was wondering whether or not you had any system in the States here of putting up a fuse or extinguishing a signal, more closely resembling it.

MR. POWELL: Supervisors must teach. Any time there is a failure of rules and the observance of them, it all reverts back to the supervisor.

I wouldn't use the test of putting up a pair of markers to indicate a rear end because it might cause a man to jump off and possibly another injury would occur.

I have made many and many of those yard limit tests, and I caught three or four violations. Since then, there have been no more. If you get right down and teach the men what you want them to do, the average American citizen will do what you want him to do. Tell him, explain the rules to him. Explain the hazards connected with violation of Rule 93 in the yard.

We have had places where trains enter a yard around a curve, and a running track is next to a track that invariably has cars on it. You will never find a violation in those places, because we will have long trains that possibly the yard crew has to cut and pull in and leave the rear end sticking out for a while, and these fellows on the following train are quite frequently stopped by these rear ends. They come down there expecting to find those rear ends.

In yards limits out in the country, such as Mr. O'Toole mentioned, our men all understand what they are supposed to do, be-

cause they have been instructed on what to do, I don't know whether I have found any occasion to criticize anybody on account of failure to observe Rule 93, that is, in the last six or seven years.

Just as Mr. White told you in his paper, it is all teamwork, and the supervisor must be a teacher. Tell your men what you want them to do. I stand around in places where the men do not expect to find me, with a red flag in yard limits. Very, very seldom do they ever get up to me, and it isn't necessary to make an emergency stop, either.

**CHAIRMAN DUGGAN:** At least we know that they are doing something to the train. Mr. Guertin, about your last case, I personally think that is one of the most important facts that a train master or a supervisory officer can make, because that is where many accidents occur, as you think.

There is no question but that employees, unless they are properly trained, unless they are properly supervised, and we can then live up to the requirements of Rule 93, are going to run into this.

I would like to submit further evidence from the State on any particular problem, other than your last case.

**MR. ELSTE (Staten Island & Oyster Bay):** This case into this problem on common sense. Train service employees climbing over trains will frequently jump from one track platform of a bus car to the track platform of another bus car. My own personal observation is that it is a dangerous practice. I just wondered what the experience of these other roads has been, whether or not they have a rule prohibiting that.

**MR. POWELL:** About jumping from one track platform to another, I don't know, I never saw anybody do that. This little board or stand is about 20 or 25 inches one way and 8 or 10 inches the other way, and it looks to me that, if you had two cars, two box cars with the B ends placed together, a man would have to jump across a space three feet wide, and I don't think that anybody would try that. There isn't anything to hold on to. The running board sticks out over the end of the car, and that's not a very good thing to grab a hold of while you are making this flying trapeze leap from one car to the other.

I believe it is just a step up to the top of the car to go across to the other car in the normal manner, or the way that you are supposed to do it. Personally, if I saw any

of our men doing a trick like that, I would stop them dead in their tracks; I wouldn't allow that.

**MR. ELSTE:** I am assuming the same practice is indulged in to some extent on all railroads. We don't have a rule prohibiting the practice, and I was wondering if there is any other railroad that has a rule.

**MR. O'TOOLE:** We have no rule on that point but we have a rule forbidding unsafe practices, and I would say that was an unsafe practice.

**MR. GUERTIN:** The closest rule to that, Mr. Chairman, is that employees must not at any time be between the running boards of the cars.

**CHAIRMAN DUGGAN:** You have such a rule? That is, while the train is in motion.

**MR. GUERTIN:** At any time. We don't come the employees between the running boards of the cars. In other words, even in opening the hand brakes, there is no reason to be between the running boards.

**CHAIRMAN DUGGAN:** How about you, Mr. Mumford?

**MR. MUMFORD:** Whenever you have a case caught between the running boards of the cars, you can make up your mind he is coming from one brake step board to the other.

**MR. ROBERTS (Northwestern):** I might say that just these days ago, in the Northwestern, we had a brakeman who had one foot on one brake platform and the other foot on another brake platform, and he got his run end between the two running boards. (laughter) It was a reportable injury.

**CHAIRMAN DUGGAN:** Mr. Pitzer, can tell us if they have a rule? The IC has a pretty good safety record.

**MR. PITZER:** We have a page of rules in our safety rule book covering the handling of brakes and the operation of brakes, and that practice is prohibited.

**MR. DEMPSEY (Milwaukee Road):** You talked about employee negligence, and I presume you are referring to train accidents. I would like to learn a little bit about employee negligence in connection with train service accidents. This particular table here shows that the greatest number of casualties outside of the "miscellaneous" column occur in getting on or off cars or onto obstacles. If there is a gentleman on the panel who will be good enough to tell us how to keep these switchmen and trainmen from turning ankles,

and what have you, on supposed objects on the ground, or objects on the ground, I think we would all appreciate it very much.

**CHAIRMAN DUGGAN:** I am going to give Mr. Mumford an opportunity to say what they do on the New York Central.

**MR. MUMFORD:** For your benefit, George, we try to educate men to look out for obstacles on the ground, holes, and so forth. But we haven't yet found a way to combat those imaginary objects on the ground.

**CHAIRMAN DUGGAN:** George, you might tell them how you do it.

**MR. DEMPSEY:** I tell you frankly, it is quite a problem with us. It is one of the things that actually keeps me up at night, but the fellow that imagines there is something there that we have our men trouble with. Of course, we do, as undoubtedly the rest of you do, try to train these people to look before they get off. But what confounds me is, why they don't look when the car is standing still.

**CHAIRMAN DUGGAN:** I agree with you. Maybe this question can be by somebody might explain that because of finding objects that aren't there, there's the question.

"What is done about false injuries, if there is such a thing? That is, once when there is evidence that the man didn't actually sustain an injury, but has off on a bogus injury." I think perhaps that we can talk in saying that we do have problems of that kind on all the railroads. I don't know how general it is, but there is some at the present time. We know the Census Bureau gives quite a lot of encouragement to take advantage of it, and perhaps there is some malingerer or some taking of injury.

I think we can briefly poll the committee for Mr. Garner, and see if that practice is prevalent on some of these other railroads. I believe that we could start with our man from the Canadian Pacific, and ask what his experience is.

**MR. PESCU:** Gentlemen, I believe we all seem to have that general trouble with the fake injury, and some of these are hard to break down, in fact, some of them are impossible to break down, particularly the back injury, the back strain. Our medical men have tried in various ways sometimes to break these down, but sometimes to no avail, and there seems to be quite a temptation on the part of some who are so inclined to fake an injury, particularly in our provinces where

the high rate of compensation is paid. In my own province our rate of compensation is 65% per cent of the wage earned by the employee, and in our neighboring province of Saskatchewan, it is 100 per cent. I think you can understand some of their problems there, when a man has a chance of getting 100 per cent compensation and has the nerve to try to fake an injury.

So it is something that we must keep hammering away at, and try to shame the employees out of it. If we can, and that's all we can do. Thank goodness, we haven't many of these cases, but the few that we have do affect our records.

**CHAIRMAN DUGGAN:** Now I am going to give you a cross section view. Mr. Killen tells me they follow up injuries in some sort of a way to avoid the so-called fake injury, and I would like to have Mr. Killen tell you what he does on his division.

**MR. KILLEN:** We discourage fake claims by closely following them up and questioning the employee who claims the injury, and coming common sense from all other employees involved at the time and attempt to point out to the men making the claim, in many instances, where it is obvious that the claim is false, how ridiculous it is.

The most effective thing I think we are doing, however, is not after the employee is injured, but in our group meetings. We caution the employees about being careful in getting on and off cars, and we try to instill them with the spirit that they are hurting not only themselves but their fellow employees in diverse ways when they are either negligent in their work or when they claim injuries that do not exist. We appeal to the employee groups to work among themselves to discourage injuries of any kind, whether real or faked. I believe that our work among employee groups is doing more to reduce actual and fake injuries than any other single procedure that we have or that we have even heard of.

**MR. ELSTE:** One other question I would ask is this. In approaching a terminal firemen will frequently go back over the coal pile to be in a position to take water. We all know if the coal pile is very high it is a dangerous proposition. We have had men fall off a coal pile, and I have just been wondering whether any other railroads permit their men to do that, or whether they have a rule prohibiting their doing it.

MR. FITZER: We have a rule that prohibits that. The engine must be stopped, the fireman will get down, get up on the back of the tank, pull the spout around before he opens the manhole and takes water.

MR. POWELL: We have a bulletin that reads about the same as your rule. Of course, with our high tanks, some of the engines can't get back up there, but oil burners can get back up there, and they have a hand rail, of course. There is always some residual oil on the top. The part that has been cleaned off hasn't been cleaned down to the bare metal, and it's more or less slippery. But we have bulletin instructions that the manhole cover must not be opened until the water crane is pulled around and in place, and then the crane is not thrown back until it is closed after the water has been taken.

I don't know about any firemen ever falling off a tank.

MR. ELSTE: Mr. Powell, I wonder if you would be kind enough to give me the benefit of that rule some time at your convenience. One of the arguments against such a rule by our management has been that you might unnecessarily delay the train and the employee might suffer more injury by climbing down the gangway and climbing up the rear of the tank than by climbing over the coal pile.

MR. POWELL: No, sir. We have had several cases of firemen stepping into the manhole when he pulled his spout around, and that rule was put into effect, and since it has been in effect I don't know of any case of a fireman being injured.

MR. CONNOR (B & O): We have a number of firemen who fall off the tanks in the winter-time on account of the ice accumulating after taking water. I was wondering whether any railroad has any way of keeping that ice from forming on top of the tanks. It has been suggested from time to time that some kind of pipes be put around underneath the tank sheet, and I am just wondering whether or not any railroad does have any method in effect of preventing that ice from forming.

MR. PESCUDE: The only thing we have is the return flow to the tank which keeps a certain amount of heat in the tank and does eliminate a lot of the ice from the deck of the tank during the winter-time. We have not had a great deal of trouble with respect to ice with this method.

MR. POWELL: Our engine is equipped

with feed water heaters that have the return to condensate. The return in the tank is the same. There is no ice forming on top of the tank. The tank is full of steam all the time.

We only have the injectors on the one side. We use the feed water pump.

MR. CONNOR: The problem is where you use the injectors.

MR. POWELL: If you had injectors, I suppose there would be ice formed on the tanks in the winter time if there was any overflow.

MR. CONNOR: Not necessarily overflow. It could be rain or snow.

MR. POWELL: Or run the tank over. It has been so long since we have had engines just equipped with injectors on both sides that I have never got away from it. But that would solve the problem, if they had a pipe connection back there.

MR. LOWE: Gentlemen, we depend largely on the sunshine. However, we do run through some very heavy snow country, with lots of freezing weather, and we equip the top of the tenders with this metal stripping, with the holes through it, for a walk-way, the same as we have on modern box cars.

Best to begin with, the oil engine is always hot. We keep it at about 150 degrees, and the feed water heater kick back into the tank keeps the tank quite warm.

Then we have a hand-rail, a foot-rail for our men to brace their feet against when they pull or push on the column, and we are not getting very many men overboard now.

MR. LEAHY (Chicago, Waco Pullman and Southern Railroad): I would like to know if any of the roads have any warning device for men on the side of cars where there is no clearance. You have your tell tales for overhead spots, but on the side of cars, there is nothing to warn a man on side clearance.

CHAIRMAN DUGGAN: Do you have any, Mr. O'Toole, on the Milwaukee?

MR. O'TOOLE: Nothing except to illuminate them at night.

MR. KILLEN: We have none except on our time-table notation of close clearances at certain points. I have seen on other railroads a warning device along the side of the track at close clearances, but the Santa Fe does not maintain them.

MR. LEAHY: You don't know who made them?

MR. KILLEN: I couldn't tell you. I only saw it in passing over. I believe it was the

Marshall Ross Co.  
53 State St  
Boston 9, Mass.  
Railroad Section

Wabash Railroad that had this one that I noticed, and it was where a track went under a viaduct, with rather close clearance. They had a number of apparently flexible fingers on a post that stood out to contact a man, and I assume give him the warning.

MR. JOE McNALLY (Wabash): We do have the side tell-tales. They are made of rubber composition. Anybody riding the side of a car or an engine will get the warning just the same as by the tell-tale overhead. They are a certain distance back from the bridges and places like that.

MR. ELSTE: Do you have them at all close clearances?

MR. McNALLY: Yes, sir.

CHAIRMAN DUGGAN: In yard tracks and main tracks, both?

MR. McNALLY: Not in yard tracks.

MR. ELSTE: I meant particularly in home tracks and industrial tracks.

MR. McNALLY: The only thing we have there is a non-clearance sign. We have those at all of them.

MR. DUGGAN: Mr. Mumford says the side warnings are nationally advertised, they are a commercial product and can be purchased.

MR. CONNOR: I would like to ask whether or not any of you have had any trouble handling drenched lumber carrouse.

MR. LOWE: That's a Sixty-four Dollar

Question for a railroad that handles 200 cars a day of 35 per cent grade. We do have a great deal of trouble with it. We have worked very closely with the shippers, and we are trying it down. We have partitions and side partitions in between the ends and the short sticks, but at that, it still bothers us. We had two men killed in recent years, one injured just a short time ago on account of the lumber sticking out over the side of the car.

The question is not one that we have been able to solve. We can't get any of the box cars, and even with the gondolas we have the trouble, and of course in any kind of open cars, flat cars. A great deal of it is dressed in short sticks, 12 foot lengths, 14 foot lengths, and it is very hard to handle.

MR. KILLEN: Mr. Lowe, are you able to load them slanting in from each end, elevate the ends, in other words?

MR. LOWE: Nearly all the lumber nowadays is loaded with stripping between and put in with cranes. They load in great sections of it, about half the width of the car at a time, and then they strip it and it is level, it is not slanted. Our trouble also is that a great deal of it slips through the center and then strikes out through the holes between the ends of the loading, and that is what we are attempting to cover now with bulkheads between them.

#### THURSDAY AFTERNOON SESSION

October 9, 1947

Presiding: C. M. BOWLING, Sept. of Safety, Louisville & Nashville Railroad Company

#### Non-Train Accidents

By JOHN M. BUDD

President, Chicago and Eastern Illinois Railroad

While the safety movement today probably has its greatest impetus in the United States, it is not confined to this country alone. It is interesting and instructive to note what some foreign countries are doing. In 1939 I spent three months in Russia as a member of a committee studying the railroad situation in that country. We traveled extensively during those three months and saw innumerable engine houses and shops, yards and other terminal facilities on the Russian railroads.

We found the most graphic safety posters that the world will ever know. As an example, one depicted an employee's head being squeezed between the buffers, which are a part of the coupling device on the European railroads. The man's tongue and eyes were forced out of his head, and blood was squirting from different parts of his face. As the poster was done in colors, you can well imagine how effective it was. Another one of these posters depicted a line shaft in

a shop with a big splatter of blood on the ceiling, and a man without one arm lying on the floor; this was also profusely colored. The general conception of safe working conditions and practices on the Russian railroads, however, was as primitive as their peasant hum. The country as a whole had a long way to go before their safety program would approximate ours. I have not followed up to determine just what has happened in the past seventeen years.

In 1943 and 1944, I had occasion to spend several months in North Africa on the railroads of Tunisia, Algeria and Morocco. The operation of these railroads differs greatly from the American system principally because of the type of employees handling the trains. For the most part, the engineers, firemen and conductors were rather low-class Europeans, and the brakemen and switchmen were Arabs. I recall at least a half dozen Arabs being killed, but the loss of these lives was of no great moment; it was more of an inconvenience than a tragedy. The unsafe practices which were prevalent on those railroads would horrify any of our safety supervisors. How the operation continued without more serious mishaps is still a mystery to me. While the use of air brakes on freight trains was nonexistent, grades up to two and one-half percent were encountered.

The number of hand brakes required by the operating rules was very small; even on the heaviest grades it ran to only about one car in every five. While this has its effect on train accidents it serves to illustrate the general conditions prevailing in that area. Incidentally, the American troops used to assist in the operation were not seasoned railroad employees. Many boys with experience up to possibly six months as firemen in the United States were required to operate as locomotive engineers. They had a bad habit of tipping over the tops of hills too fast and attaining too high a rate of speed before calling for brakes. In several instances there was no response from the Arabs and in any event, the small number of brakes in the train was ineffective. You can easily picture the results of such a combination.

Our relationship with British railway troops in North Africa indicated that in Great Britain the safety movement is of great importance. MODERN TRANSPORT, a magazine covering news of transportation agencies, in its issue of August 23, 1947, comments

editorially on railway accidents in Great Britain as reported to the Minister of Transportation for the year 1946. "The British phraseology is interesting, but I believe understandable. The comment brings out the fact that while there has been an improvement in safety, the record is not yet satisfactory, and this is attributable to the 'increasing arrears of maintenance, both of track and rolling stock, which have accumulated since the autumn of 1939.' Quoting further from the editorial, it is interesting to note the conclusions reached by the Chief Inspecting Officer concerning deaths of employees 'working, walking and standing on the permanent way.'"

"The Chief Inspecting Officer expresses the hope that action being taken by the railways will correct this (condition), though the prospect of substantial improvement lies mainly in the exercise of greater individual caution. Moreover, statistics show that besides the considerable changes in personnel, which were perhaps partly responsible, a number of casualties occurred amongst men of long experience." The same condition certainly exists in the United States today.

In looking back over the past, it is encouraging to find a splendid record of accomplishment on the railroads in this country. There was a very great reduction in casualties, both in number and in the rate per million man hours, from 1923 to 1940. The war period brought on a reversal of the trend, but the record is showing a decided improvement since hostilities ceased.

What has brought about this remarkable reduction in accidents and what can be done toward making our record even better? Our line of reasoning, our safety program, and our results seem to reach far beyond what our neighbors in Russia and North Africa have done. Many trainmen still carry a missing finger as a badge of their service in the old link-and-pin days. No more attention was given to the loss of a finger in those days than to the death of an Arab in North Africa at the present time. It was an inconvenience. Gradually more progressive and humanitarian railroad managements revolutionized ideas on operation and made their employees safety conscious. This was not an easy task. Safety departments were set up and definite programs were undertaken to determine the safest methods of performing work and teach-

ing employees these methods. Interest generally started at the top and filtered its way down through the ranks. In the old days of the hard-driving foreman, it was with difficulty that the ideas of strawbloss were changed. The safety movement was very effective, however, after it got under way, and rapid strides were made in the late twenties and thirties.

The railroads came out of the First World War in somewhat the same condition that the British railways now find themselves; they had arrears in the maintenance of both track and rolling stock which had accumulated for some time. An era of prosperity brought on a heavy volume of freight traffic, while higher wages and competition from other forms of transportation made larger cars and heavier and faster locomotives necessary. A better track structure, improved roundhouses and shop facilities and modern terminals had to be added. Fully as important as the physical changes was a training program for the employees. The whole operating and maintenance procedure had to be overhauled and the same personnel had to be taught to use new tools in new ways to produce better results. The program was made more difficult when the bubble burst and the country was blown into the greatest depression of its history. The aid did not come only a few short years after the depression when World War II threw an almost unbearably heavy burden upon the roads. Their success in handling it needs no comment. Safety was one of the important elements in the program and has shared in the progress up to this time.

Non-train accidents have followed the general trend and have shown about the same relative improvement as train accidents and train service accidents. Non-train accidents have as a peculiarity the fact that they occur among employees engaged in a great many different types of work under a variety of conditions. The most hazardous tasks are, for the most part, involved in the maintenance of fixed property and rolling stock, and in the handling of freight and materials. There have been radical changes in the conditions under which men work on these jobs.

Not many years ago, trackmen pumped their way across a railroad on a hand car. Gradually, the old hand pump was replaced by a crude gasoline engine of some kind. This was refined until we developed the

modern track cars of today. Even this equipment has its limitations, however, and some railroads are now transporting their M. of W. & S. employees on the highways to the greatest extent possible. The men are carried to and from work in buses or trucks, and hazards involved in movement over railroad tracks are changing to those of highways. As dangerous as our highways are, I firmly believe that greater safety is offered by this change. While there are still thousands of miles of railroads which are maintained principally by section gangs in charge of a relatively small piece of track, there are an ever increasing number of miles maintained principally by floating gangs, and the trend in this direction is gaining in tempo. The larger gangs lend themselves very readily to movement by large buses and the opportunity for supervising the forces on the job is immeasurably improved.

We know that higher speeds and heavier power require a different type of track maintenance than in former days. Greater refinements in machinery and tools have been designed to simplify these problems, although the field has not been fully covered by any means. The old No. 2 hand shovel has been replaced by mechanical tampers. Innumerable off-track machines are now available. Angle dozers, scrapers, small power shovels (on pneumatic tires or on tracks), weed mowers, wood burners, electric welders are some examples. Bridge men have air drills, spotwelders, concrete mixers and numerous other mechanical tools. New conditions have created the quality of new men hired to do the track and bridge work. Great difficulty is now encountered in employing the type of men who were formerly content to live in an outfit car and make this his home. Our standards of living have improved to an extent where outfit cars are getting to be just a place to eat and sleep between week-ends. The cars themselves have been greatly improved, but they are no longer considered home.

Likewise, in the maintenance of rolling stock great strides have been made in maintenance practices and the equipment for carrying out the work. The rolling stock itself has undergone a considerable change. The railroads were able to accomplish things during the past war that they themselves did not believe possible. Locomotive runs were extended by improving the lubrication, the

a shop with a big splatter of blood on the ceiling, and a man without one arm lying on the floor; this was also profusely colored. The general conception of safe working conditions and practices on the Russian railroads, however, was as primitive as their peasant huts. The country as a whole had a long way to go before their safety program would approximate ours. I have not followed up to determine just what has happened in the past seventeen years.

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Our relationship with British railway troops in North Africa indicated that in Great Britain the safety movement is of great importance. MODERN TRANSPORT, a magazine covering news of transportation agencies, in its issue of August 25, 1947, comments

editorially on railway accidents in Great Britain as reported to the Minister of Transportation for the year 1946. The British phraseology is interesting, but I believe understandable. The comment brings out the fact that while there has been an improvement in safety, the record is not yet satisfactory, and this is attributable to the "increasing arrears of maintenance, both of track and rolling stock, which have accumulated since the autumn of 1939." Quoting further from the editorial, it is interesting to note the conclusions reached by the Chief Inspecting Officer concerning deaths of employees "working, walking and standing on the permanent way."

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type of bearings and the firing equipment. Diesels are becoming important in the locomotive field. Management has recognized that, because of the large investment, rolling stock must be kept in operation as many hours per day as possible to bring in enough revenue to meet the ever increasing bills. Work has been planned and machinery has been designed and laid out to perform work more easily, quickly and efficiently. Incidents and dangerous line shafts have been replaced by individual motors. Floor surfaces have been improved and through concerted efforts of supervisors they are kept neat and orderly. The more delicate equipment on rolling stock today makes cleanliness essential. Supplying the maintenance forces has undergone a revolution. Mechanical devices for handling and transporting materials, supplies, and repair parts have replaced the old methods.

Even in the freight houses some improvements have been made, but in my opinion, this is the most backward of all of the functions of a railroad. Methods of handling LCL freight are still very backward for the most part. Without seeming to alibi, attention should be called to the fact that this part of the railroad's business dwindled to a very small volume for a period of many years and seemed to be dropping out of the picture. LCL traffic has taken a new lease on life, however, and progressive managements are again coming to the front with improved devices and methods for handling this class of traffic. There is still a very broad field to cover.

Progress is not easy. Many times new equipment has been installed without sufficient consideration being given to the training of employees who must use it. There is too often a lag between the installation of new equipment and the proper use and maintenance of it. This sometimes results in unsafe conditions. Probably our greatest difficulty is the necessity of changing old habits that have become fixed in faithful and well-meaning employees.

Bad habits are hard to break, as we learn when trying to carry out New Year's resolutions. I was interested when visiting with some mine operators recently to hear their comments on conditions they have had to face. A few months ago a disastrous explosion in one of the mines in Illinois brought forth an investigation of considerable magnitude. Recommendation was made by Gov-

ernment inspectors that electric lanterns must be used, replacing flame type lamps, in some mines. This recommendation was certainly in the interest of the workmen, but on one property the miners went on strike rather than to use the new electric light. In another, great difficulty was encountered in installing safety helmets, which were also recommended by the inspectors. It was the opinion of these mine operators that a new mine can easily be opened with rigid safety rules and that they would be successful in enforcing these rules, while it would be an impossibility to change to those same rules in a mine which had been in operation for some time.

The same thing is true as a limited extent in safety work on railroads. The older employees are usually interested in preserving lives and avoiding possible injuries, not only to themselves but to others. Safer practices developed by Safety Departments are often hard to sell to these employees, however. This is one of the many problems facing supervisors.

Recent changes in the relationship between employees and management have resulted in many new problems for supervisors. The days of driving employees have passed and in their place we have an era which calls for leadership of a high type. While it is true that safety departments are of the utmost importance and can go a long way in helping to prevent accidents, the final results depend upon the direct supervisors. The supervisors need the assistance of safety departments in carrying out a safety program. First of all, there is a definite need for assistance in the way of safety rules, either in the form of separate volumes or combined with other operating rules.

There can be no doubt of the need for safety committees, partly as a manifestation of the company's interest in safety work and partly to develop safer working conditions and safer practices. The safety department can be of great assistance in establishing a proper tone for safety committee work. It can also be very helpful by securing and distributing bulletins, passing out other such devices. It can assist materially by writing up and passing around a record of accidents that have occurred on other parts of the property or on other railroads, so that employees can take advantage of the sad experiences which their neighbors have suffered.

Certainly this material is important, but the mere fact that it is furnished to the employees is not going to prevent accidents without the supervisors following up and seeing that the lessons that are pointed out by these various safety tools are used constructively by their employees.

Accident prevention needs the sympathetic support of all of the officials and this support should carry on down from the very top. Loyalty to the company demands that the personnel follow out the policies set by the management. A good supervisor will know the man he is working for and know what he is interested in. He will try to carry out his work in such a way that his superior's wishes are complied with. This point was illustrated when one day my old boss asked, "Why is it whenever I ask about a car of hops moving across the railroad everybody gets pig-headed?"

Safety supervisors are called upon any number of times for advice on the design of new equipment, machines and other purchases.

One of the important factors pointed out by the exhibitors at a recent machine tool show was the fact that the present tools have safety built right into them. The additional cost for this design runs into large figures, but the purchasers have indicated that they must have that feature incorporated in the machines. Such interest in the safety movement from the general officers will certainly be reflected immeasurably in the attitude of the supervisors and in the employees.

The future will bring about a great many new types of equipment and new conditions. We can already see some of these and may speculate on others.

The great era of railroad expansion ended some time ago, and there is no indication that there will be additional railroad mileage in the United States of any consequence. Some reduction in the mileage will probably come about. There is room for a great deal of refinement in the operations, however. Diesel locomotives have already established themselves. There are now other types of locomotives being developed. One is the

steam electric; another is the gas turbine. Experiments in steam turbine direct-drive engines have been under way for some time.

The Germans developed a condensing engine of the reciprocating type. Development of water power resources, particularly in the Western part of the United States, may make it economically sound to expand the present electrifications. Freight cars are now being equipped with roller bearings. Streamlined passenger cars are no longer a novelty. On the other side of the picture, we have experiments in welded rail; new types of rail fastenings have been developed; extensive study of ballast is now being carried out; standards of ties are being changed; the function and design of tie plates was made the subject of considerable discussion and is still under study; angle bars have been under the microscope; bridges are being strengthened or replaced with structures of a more permanent nature; modernization of buildings is already under way. We seem to be on the threshold of as many changes now as we were after World War I. Experience gained in the twenties and thirties will make the execution of another improvement program so much the easier.

Safety has become such an integral part of the planning on our railroads that there is no likelihood of its being forgotten. At the present time, we have not fully recovered from the effects of World War II. Many employees hired during the war had to gain all of their knowledge and experience at an age when training is not as effective as it should be. The armed forces are still demanding a substantial part of our younger men for defense and occupation troops. This and the expanded industrial activity have prevented the return to higher standards of employment on railroads. Railroads have as one of their problems the task of making employment sufficiently attractive to obtain the high type of personnel required. I have every confidence that given the higher standards of new employees, given safety tools by our safety departments, given the proper support by our managements, the supervisors will lead their men to new records of achievement.



### Non-Train Accidents (Panel Discussion)

Discussion Leader—D. W. NAFF, Supt. of Safety, Norfolk & Western Railway Co.

#### Participants:

F. W. CREEDLE, Div. Eng., Chicago & North Western Railway Co.  
O. F. GNABINGER, Supt., Safety & Personnel, Elgin, Joliet & Eastern Railway Co.  
O. F. HARR, Asst. Supt., Motive Power Personnel, Norfolk & Western Railway Co.  
J. R. TENNEY, Supt. of Safety, Western Maryland Railway Co.  
J. R. TREXTON, Supt. of Safety, The Delaware, Lackawanna & Western Railroad Co.  
C. L. LAFOUNTAIN, General Safety Supt., Great Northern Railway Co.  
A. J. WELSH, Superintendent, Car Department, Illinois Central Railroad  
W. S. SHANNON, Safety Inspector, Chesapeake & Ohio Railway Co.  
C. B. MACLELLAN, Safety Supervisor, Southern Pacific Co.

CHAIRMAN NAFF: I will not take up your time to comment on the non-train accident situation. You know it is serious. You know it is high time we were doing something about it.

We all know that non-train accidents come from specific causes. They are not different from other accidents in that respect. We must, therefore, analyze our accidents, non-train and others, and we must know the causes and we must seek the remedy. When we find the remedy and apply it, and remove the cause, we will have no more accidents.

We will now proceed with our program. Who will be the first to call for a question?

MR. BARNES (New York Central): What are the advantages of dynamic or other scientific painting or coloring?

MR. LAFOUNTAIN: I picked up this article in "Standardization" magazine, September, 1947, and after reading this, I don't believe that anyone is agreed as yet upon any practical method of painting the machinery in the shops that they feel is going to be fully effective. There are two or three paragraphs of this that I could well send to you if you want to take the time to look to it.

This authority is Mr. Carlton B. Ryder. "One difficulty appears in the form of

psychological dislocation of the employee when transferred, not merely from one operation or one plant to another, as often occurs in large companies, but also, and of more general interest, when shifting from one company to another. For example, if a worker becomes adjusted to color surroundings that give him a "lift" and then he moves to a new position where functional color either has not been applied at all or has been differently applied, the worker will suffer a period of readjustment involving distraction from his work. This will consequently result in temporarily reduced efficiency, depending upon the color sensitivity of the individual. A change as usual as that from green walls to buff might have this effect. Even though it were too slight for conscious admission and the net effect only a matter of conjecture, in large companies, where such changes are constantly going on, the gross loss to production might prove formidable if it could be measured. It must be borne in mind that the gains as well as the losses resulting from the effects of color upon a worker can rarely be individually measured. It seems easier to avoid this difficulty through standardization than to measure it.

"Another difficulty is the least important although the most obvious. It is the 'patch-work' appearance that results from uncoordinated applications of different color systems in the same or different plants. Yet with the claims of our modernization intrinsically as good as those of another, what ground is there to reprimand the individual decisions of men individually responsible for factory painting and maintenance? Plant management also proves reluctant to repaint new machinery and apparatus for the sake of industrial interior decoration, particularly at this time when there are indications that machine product colors, grays, at least may eventually be standardized."

May we have another question from the list?

MR. HOFFMAN (St. Louis Southwestern Railway Lines): As accident prevention work is largely a promotional venture, what is the best procedure to follow in organizing for and carrying on safety work as related to non-train accidents?

MR. MACLELLAN: Inasmuch as nothing

worth while in life was ever accomplished alone, and this being especially true in preventing personal injuries, which is essentially a community project, I would say in answering this question that the first objective is to create and then maintain interest and enthusiasm on the part of all employees, from top officers on down through the ranks. As a matter of fact the success of any safety program will be in direct proportion to the amount of sincere interest manifested by management. This expression of sincerity must come from a genuine regard for the welfare of human beings, and not be just a part of some management policy.

In other words, we must, by our own actions, convince our people that the most important things in life are not locomotives, cars, track, stations, etc., but human beings.

Briefly, then, to organize for safety, first appoint safety committees, supply these committees with material for their scheduled meetings, maintain advertising and publicity on a sustained basis, follow through promptly on all safety suggestions, inaugurate contests with suitable awards, encourage employee contributions of ideas for safety devices or safe practices, etc., always remembering that safety must be made a "live" issue in every sense of the word.

MR. HOFFMAN: I feel that in order to sell safety to the employees, our supervisors, foremen, and even higher officials must show their real interest in safety.

In other words, I have been advised that in certain locations, shops, freight houses, they couldn't get the men to wear safety shoes until the supervisors and the foremen put them on and started wearing them. I think the supervisors have got to set the example in many ways. They should call attention to the infraction of rules and any unsafe practices, and not permit them to go unnoticed, because sooner or later they are going to result in accidents or personal injuries.

MR. THOMPSON (Monon Railroad): To what extent are safety shoes worn and by what groups of employees? What is the best method of getting employees to purchase and use safety shoes?

CHAIRMAN NAFF: I am going to ask Mr. Shannon, of the C. & O., to respond to that question, because they do use safety shoes extensively on the C. & O.

MR. SHANNON: We are using safety shoes

on our railroad to good advantage, and we are not too much troubled in disposing of them. We use the payroll deduction plan for disposing of our shoes to the employees. The shoes are stocked in the various store-rooms at our larger terminals along the line, and we find that the men, either from a safety standpoint, personal injury standpoint, or from the standpoint, maybe, of the fact that they are new employees coming into service, are glad to purchase safety shoes on the payroll deduction plan, especially if they are new and haven't had a pay day and need a pair of shoes pretty badly. After they have bought the first pair, it seems we don't have any trouble selling the second pair, and they wear safety shoes from then on.

The unusual thing about the sale of safety shoes on our railroad, at least on the territory that I am assigned to, is the fact that we are selling more safety shoes to operating men, men in the transportation department, train and engine men, than we are to maintenance of way and mechanical employees.

Of course, the shoes are sold to the employees at wholesale, and they are good shoes, and as I say, the fact that they can buy a shoe through the payroll deduction plan is the reason that we are selling so many shoes on our railroad, I believe.

The particular division that I am assigned to so far this year has sold over six thousand pair of safety shoes to the employees, and I think the secret of the whole thing is the fact that the men can buy them without laying down any money at the time. We handle them through either two, three, or four deductions. A man can buy a five or six dollar pair of shoes in three or four deductions that he never misses out of his pay.

MR. MUMFORD (New York Central): Would you be gracious enough and would it be possible for you to give the New York Central System some letters of commendation from people who have used safety shoes, so that we might use them in our educational materials?

MR. SHANNON: I will make every effort to do that. I understand your railroad is using the same shoe from the same company that we are on the C. & O., and that should be helpful.

MR. CONNOR (B. & O.): Should the striking of claw bars to get them under spike heads be prohibited?

CHAIRMAN NAFF: Mr. Creedle, will you comment on that question?

MR. CREEDLE: We do prohibit the striking of claw bars with spike mauls or other tools which are classed as hard steel. We do not absolutely forbid them to strike with a sledge, for instance, or some tool which is more adapted to that purpose. We, of course, find some of the men striking them with the spike maul, but invariably they get into trouble in so doing.

So to sum up the question, I think that if a tool could be developed which would eliminate the necessity of striking a claw bar on the head to get it underneath the spike head, it might solve the problem.

There is one tool on the market which comes nearest to permitting us to get under the spike head without the necessity of hammering the claw bar, and that is the flexible toe bar which will reach underneath and grab the spike.

MR. ROBERTS (Northwestern): Mr. Creedle happens to come from the same railroad that I do. Some time ago the National Safety Council got out a poster which suggested the striking of the tie under the spike head in order to permit the claw to be placed under the spike head, and I, without consulting our engineering department, distributed a few of those posters, and I was called to turn and was told that that practice was not a proper practice in that it destroyed the tie. I was wondering if any railroads do follow that practice which was advocated by the Council in the poster.

MR. MAAHS (Erie): We don't do, but wouldn't that be a lot more dangerous than just trying to drive your claw bar under? You still have a possibility of striking the tie.

MR. ROBERTS: I meant to remove the tie from under the spike head in order to permit the claw to fit under.

MR. DAVIS (Burlington): We use tie plates on our railroad, and I don't know how you are going to drive out tie plates so you can do as Mr. Roberts says.

CHAIRMAN NAFF: So far as the Norfolk and Western is concerned, we do have a rule prohibiting striking the claw bar with any kind of a hammer. There are places where you have spikes that you can't get to very conveniently with a claw bar, and we use, and I suppose all railroads use what we

call a road master to reach those ties in tight places. Yet you must get the road master on the spike.

MR. KELLY (Soo Line): The organization recognizes the value of safety rules by requesting that the spike maul must not be used in striking the head of the claw bar, but at the same time ignores the practice if it is done. That is a disregard for our rules, and it is one of our greatest difficulties in having safety rules. We all know from experience that you cannot get all the spikes out; regardless of the use of tie plates or otherwise, without the use of a striking force on the heads of the claw bar.

The Milwaukee Road and some others use a sledge of which the striking face is modified to avoid chips flying.

MR. DEMPSEY (Milwaukee Road): We have that identical rule, have had it for a good many years, and our method coincides with what has been explained here. We take the pointed end of the bar, pry up under the tie plate or the spike head until it gets to the point where you can throw the claw under the spike head.

MR. SLAVEN (Burlington): I might make a suggestion of help. We don't have any rule on our railroad prohibiting the use of the maul, but we advocate the use of the sledge, and I don't know of a case of an injury where the sledge has been used, except where the spike head itself might fly off from a hard blow.

MR. DABNEY (New York Central): On the New York Central we have developed a tool that is tapered and split through the middle and has a striking face like a chisel, and is used with a handle similar to a chisel. We call it the spike nipper. It is sent along with two men, and it is tapered down to a point similar to a V, goes under the spike, and is hit with the sledge by one man while this tool is held by another, and that raises the spike sufficiently to have the claw bar inserted under it.

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Just a rough example. Show a machinist, as an example, that because of the fact that he was involved in many falling accidents, it is to his own selfish advantage, to the advantage of his family and their future that he change to some other type of work which doesn't require him going off the ground, and I believe that in most cases he will be willing to do that.

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MR. DAAKE (Erie Railroad): What type of line-up should be issued to motor car operators? What information should be shown on line-ups and by whom should they be issued?

MR. CREEDLE: In the matter of train lineups for motor car operators, within the past two years on our railroad we have gone to a regular printed form with the hope that the use of this printed form would be a help to us in trying to minimize somewhat the danger that exists in this regard. It is similar to forms that are used on other railroads in the country. It shows the train and the station involved where the report is, and the approximate leaving time of the train so far as the information is available to the operator at that time. It also has other information such as the date, whom it is issued to, and the operator's name, and so forth.

We feel that since the introduction of this form we have made a distinct step forward and we require every motor car operator even though he takes his line-up over a telephone, to write this down on one of those forms. I have the forms available either at his home or the point where he takes the line-up, and we find, so far, that they attach a lot more significance to this line-up on this record form than they used to on a scrap of paper. That was invariably what we ran into in checking motor car line-ups. We found that the operator of the motor car had written it down on a scrap of paper, and he sometimes had difficulty in identifying today's from yesterday's. They were all in his pocket, undated in many cases.

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Diesels are becoming important in the locomotive field. Management has recognized that, because of the large investment, rolling stock must be kept in operation as many hours per day as possible to bring in enough revenue to meet the ever increasing bills. Work has been planned and machinery has been designed and laid out to perform work more easily, quickly and efficiently. Inefficient and dangerous line shafts have been replaced by individual motors. Floor surfaces have been improved and through concerted efforts of supervisors the

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Program is not sufficient. Equipment has been given adequate consideration being given to the training of employees who must use it. There is too often a lag between the installation of new equipment and the proper use and maintenance of it. This sometimes results in unsafe conditions. Probably our greatest difficulty is the necessity of changing old habits that have become fixed in faithful and well-meaning employees.

Bad habits are hard to break, as we learn when trying to carry out New Year's resolutions. I was interested when visiting with some mine operators recently to hear their comments on conditions they have had to face. A few months ago a disastrous explosion in one of the mines in Illinois brought forth an investigation of considerable magnitude. Recommendation was made by Gov-

ernment inspectors that electric lanterns must be used, replacing flame type lamps, in some mines. This recommendation was certainly in the interest of the workmen, but on one property the miners went on strike rather than to use the new electric lights. In another, great difficulty was encountered in installing safety helmets, which were also recommended by the inspectors. It was the opinion of these mine operators that a new mine can easily be opened with rigid safety rules and that they would be successful in these only, while it would be

Certainly this material is important, but the mere fact that it is furnished to the employees is not going to prevent accidents without the supervisors following up and seeing that the lessons that are pointed out by these various safety tools are used constructively by their employees.

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### Railroad Section

steam electric; another is the gas turbine. Experiments in steam turbine direct-drive engines have been under way for some time.

The Germans developed a condensing engine of the reciprocating type. Development of water power resources, particularly in the Western part of the United States, may make it economically sound to expand the present electrifications. Freight cars are now being equipped with roller bearings. Streamlined passenger cars are no longer a novelty. On the other side of the Atlantic, the expert-

# CORRECTION

**The preceding document has been re-photographed to assure legibility and its image appears immediately hereafter.**

way of safety rules, either in the form of separate volumes or combined with other operating rules.

There can be no doubt of the need for safety committees, partly as a manifestation of the company's interest in safety work and partly to develop safer working conditions and safer practices. The safety department can be of great assistance in establishing a proper tone for safety committee work. It can also be very helpful by securing and distributing bulletins, posters and other such devices. It can assist materially by writing up and passing around a record of accidents that have occurred on other parts of the property or on other railroads, so that employees can take advantage of the sad experiences which their neighbors have suffered.

new types of equipment and new conditions. We can already see some of these and may speculate on others.

The great era of railroad expansion ended some time ago, and there is no indication that there will be additional railroad mileage in the United States of any consequence. Some reduction in the mileage will probably come about. There is room for a great deal of refinement in the operations, however. Diesel locomotives have already established themselves. There are now other types of locomotives being developed: One is the

type of bearings and the firing equipment.

Diesels are becoming important in the locomotive field. Management has recognized that, because of the large investment, rolling stock must be kept in operation as many hours per day as possible to bring in enough revenue to meet the ever increasing bills. Work has been planned and machinery has been designed and laid out to perform work more easily, quickly and efficiently. Inefficient and dangerous line shafts have been replaced by individual motors. Floor surfaces have been improved and through concerted efforts of supervisors they are kept neat and orderly. The more delicate equipment on rolling stock today makes cleanliness essential. Supplying the maintenance forces has undergone a revolution. Mechanical devices for handling and transporting materials, supplies, and repair parts have replaced the old methods.

Even in the freight houses some improvements have been made, but in my opinion, this is the most backward of all of the functions of a railroad. Methods of handling LCL freight are still very backward for the most part. Without seeming to alibi, attention should be called to the fact that this part of the railroads' business dwindled to a very small volume for a period of many years and seemed to be dropping out of the picture. LCL traffic has taken a new lease on life, however, and progressive managements are again coming to the front with improved devices and methods for handling this class of traffic. There is still a very broad field to cover.

Progress is not easy. Many times new equipment has been installed without sufficient consideration being given to the training of employees who must use it. There is too often a lag between the installation of new equipment and the proper use and maintenance of it. This sometimes results in unsafe conditions. Probably our greatest difficulty is the necessity of changing old habits that have become fixed in faithful and well-meaning employees.

Bad habits are hard to break, as we learn when trying to carry out New Year's resolutions. I was interested when visiting with some mine operators recently to hear their comments on conditions they have had to face. A few months ago a disastrous explosion in one of the mines in Illinois brought forth an investigation of considerable magnitude. Recommendation was made by Gov-

ernment inspectors that electric lanterns must be used, replacing flame type lamps, in some mines. This recommendation was certainly in the interest of the workmen, but on one property the miners went on strike rather than to use the new electric lights. In another, great difficulty was encountered in installing safety helmets, which were also recommended by the inspectors. It was the opinion of these mine operators that a new mine can easily be opened with rigid safety rules and that they would be successful in enforcing these rules, while it would be an impossibility to change to these same rules in a mine which had been in operation for some time.

The same thing is true to a limited extent in safety work on railroads. The older employees are certainly interested in preserving lives and avoiding painful injuries, not only to themselves but to others. Safety practices developed by Safety Departments are often hard to sell to these employees, however. This is one of the many problems facing supervisors.

Recent changes in the relationship between employees and management have resulted in many new problems for supervisors. The days of driving employees have passed and in their place we have an era which calls for leadership of a high type. While it is true that safety departments are of the utmost importance and can go a long way in helping to prevent accidents, the final answer depends upon the direct supervisors. The supervisors need the assistance of safety departments in carrying out a safety program. First of all, there is a definite need for assistance in the way of safety rules, either in the form of separate volumes or combined with other operating rules.

There can be no doubt of the need for safety committees, partly as a manifestation of the company's interest in safety work and partly to develop safer working conditions and safer practices. The safety department can be of great assistance in establishing a proper tone for safety committee work. It can also be very helpful by securing and distributing bulletins, posters and other such devices. It can assist materially by writing up and passing around a record of accidents that have occurred on other parts of the property or on other railroads, so that employees can take advantage of the sad experiences which their neighbors have suffered.

Certainly this material is important, but the mere fact that it is furnished to the employees is not going to prevent accidents without the supervisors following up and seeing that the lessons that are pointed out by these various safety tools are used constructively by their employees.

Accident prevention needs the sympathetic support of all of the officials and this support should carry on down from the very top. Loyalty to the company demands that the personnel follow out the policies set by the management. A good supervisor will know the man he is working for and know what he is interested in. He will try to carry out his work in such a way that his superior's wishes are complied with. This point was illustrated when one day my old boss asked, "Why is it whenever I ask about a car of hops moving across the railroad everybody gets pig-minded?"

Safety supervisors are called upon any number of times for advice on the design of new equipment, machines and other purchases.

One of the important factors pointed out by the exhibitors at a recent machine tool show was the fact that the present tools have safety built right into them. The additional cost for this design runs into large figures, but the purchasers have indicated that they must have that feature incorporated in the machines. Such interest in the safety movement from the general officers will certainly be reflected immeasurably in the attitude of the supervisors and in the employees.

The future will bring about a great many new types of equipment and new conditions. We can already see some of these and may speculate on others.

The great era of railroad expansion ended some time ago, and there is no indication that there will be additional railroad mileage in the United States of any consequence. Some reduction in the mileage will probably come about. There is room for a great deal of refinement in the operations, however. Diesel locomotives have already established themselves. There are now other types of locomotives being developed: One is the

steam electric; another is the gas turbine. Experiments in steam turbine direct-drive engines have been under way for some time.

The Germans developed a condensing engine of the reciprocating type. Development of water power resources, particularly in the Western part of the United States, may make it economically sound to expand the present electrifications. Freight cars are now being equipped with roller bearings. Streamlined passenger cars are no longer a novelty. On the other side of the picture, we have experiments in welded rail; new types of rail fastenings have been developed; extensive study of ballast is now being carried out; standards of ties are being changed; the function and design of tie plates was made the subject of considerable discussion and is still under study; angle bars have been under the microscope; bridges are being strengthened or replaced with structures of a more permanent nature; modernization of buildings is already under way. We seem to be on the threshold of as many changes now as we were after World War I. Experiences gained in the twenties and thirties will make the execution of another improvement program so much the easier.

Safety has become such an integral part of the planning on our railroads that there is no likelihood of its being forgotten. At the present time, we have not fully recovered from the effects of World War II. Many employees hired during the war had to gain all of their knowledge and experience as an age when training is not as effective as it should be. The armed forces are still demanding a substantial part of our younger men for defense and occupation troops. This and the expanded industrial activity have prevented the return to higher standards of employment on railroads. Railroads have as one of their problems the task of making employment sufficiently attractive to obtain the high type of personnel required. I have every confidence that given the higher standards of new employees, given safety tools by our safety departments, given the proper support by our managements, the supervisors will lead their men to new records of achievement.

## Non-Train Accidents

(Panel Discussion)

Discussion Leader—D. W. NAFF, Supt. of Safety, Norfolk & Western Railway Co.

### Participants:

- F. W. CARMEL, Div. Eng., Chicago & North Western Railway Co.
- O. F. GHADINGER, Supvr., Safety & Personnel, Elgin, Joliet & Eastern Railway Co.
- O. F. HARK, Asst. Supt., Motive Power-Personnel, Norfolk & Western Railway Co.
- J. R. TENNEY, Supt. of Safety, Western Maryland Railway Co.
- J. R. THURTON, Supt. of Safety, The Delaware, Lackawanna & Western Railroad Co.
- C. L. LAFONTAINE, General Safety Supvr., Great Northern Railway Co.
- A. J. WELSH, Superintendent, Car Department, Illinois Central Railroad
- W. S. SHANNON, Safety Inspector, Chesapeake & Ohio Railway Co.
- C. B. MACLELLAN, Safety Supervisor, Southern Pacific Co.

CHAIRMAN NAFF: I will not take up your time to comment on the non-train accident situation. You know it is serious. You know it is high time we were doing something about it.

We all know that non-train accidents come from specific causes. They are not different from other accidents in that respect. We must, therefore, analyze our accidents, non-train and others, and we must know the causes and we must seek the remedy. When we find the remedy and apply it, and remove the cause, we will have no more accidents.

We will now proceed with our program. Who will be the first to call for a question? MR. BARNES (New York Central): What are the advantages of dynamic or other scientific painting of colorings?

MR. LAFONTAINE: I picked up this article in "Standardization" magazine, September, 1947, and after reading this, I don't believe that anyone is agreed as yet upon any practical method of painting the machinery in the shops that they feel is going to be fully effective. There are two or three paragraphs of this that I could well read to you if you want to take the time to listen to it.

This authority is Mr. Carleton B. Ryder. "One difficulty appears in the form of

psychological dislocation of the employee when transferred, not merely from one operation or one plant to another, as often occurs in large companies, but also, and of more general interest, when shifting from one company to another. For example, if a worker becomes adjusted to color surroundings that give him a "lift" and then he moves to a new position where functional color either has not been applied at all or has been differently applied, the worker will suffer a period of readjustment involving distraction from his work. This will consequently result in temporarily reduced efficiency, depending upon the color sensitivity of the individual. A change as usual as that from green walls to buff might have this effect. Even though it were too slight for conscious admission and the net effect, only a matter of conjecture, in large companies, where such changes are constantly going on, the gross loss to production might prove formidable if it could be measured. It must be borne in mind that the gains as well as the losses resulting from the effects of color upon a worker can rarely be individually measured. It seems easier to avoid this difficulty through standardization than to measure it.

"Another difficulty is the least important although the most obvious. It is the "patch-work" appearance that results from uncoordinated application of different color systems in the same or different plants. Yet with the claims of one recommendation intrinsically as good as those of another, what ground is there to regiment the individual decisions of men individually responsible for factory painting and maintenance? Plant management also proves reluctant to repaint new machines and apparatus for the sake of industrial interior decoration, particularly at this time when there are indications that machine product colors, grays, at least may eventually be standardized."

May we have another question from the list?

MR. HOFFMAN (St. Louis Southwestern Railway Lines): As accident prevention work is largely a promotional venture, what is the best procedure to follow in organizing for and carrying on safety work as related to non-train accidents?

MR. MACLELLAN: Inasmuch as nothing

worth while in life was ever accomplished alone, and this being especially true in preventing personal injuries, which is essentially a community project, I would say in answering this question that the first objective is to create and then maintain interest and enthusiasm on the part of all employees, from top officers on down through the ranks. As a matter of fact the success of any safety program will be in direct proportion to the amount of sincere interest manifested by management. This expression of sincerity must come from a genuine regard for the welfare of human beings, and not be just a part of some management policy.

In other words, we must, by our own actions, convince our people that the most important things in life are not locomotives, cars, track, stations, etc., but human beings.

Briefly, then, to organize for safety, first appoint safety committees, supply these committees with material for their scheduled meetings, maintain advertising and publicity on a sustained basis, follow through promptly on all safety suggestions, inaugurate contests with suitable awards, encourage employee contributions of ideas for safety devices or safe practices, etc., always remembering that safety must be made a "live" issue in every sense of the word.

MR. HOFFMAN: I feel that in order to sell safety to the employees, our supervisors, foremen, and even higher officials must show their real interest in safety.

In other words, I have been advised that in certain locations, shops, freight houses, they couldn't get the men to wear safety shoes until the supervisors and the foremen put them on and started wearing them. I think the supervisors have got to set the example in many ways. They should call attention to the infraction of rules and any unsafe practices, and not permit them to go unnoticed, because sooner or later they are going to result in accidents or personal injuries.

MR. THOMPSON (Mocon Railroad): To what extent are safety shoes worn and by what groups of employees? What is the best method of getting employees to purchase and use safety shoes?

CHAIRMAN NAFF: I am going to ask Mr. Shannon, of the C. & O., to respond to that question, because they do use safety shoes extensively on the C. & O.

MR. SHANNON: We are using safety shoes

on our railroad to good advantage, and we are not too much troubled in disposing of them. We use the payroll deduction plan for disposing of our shoes to the employees. The shoes are stocked in the various store-rooms at our larger terminals along the line, and we find that the men, either from a safety standpoint, personal injury standpoint, or from the standpoint, maybe, of the fact that they are new employees coming into service, are glad to purchase safety shoes on the payroll deduction plan, especially if they are new and haven't had a pay day and need a pair of shoes pretty badly. After they have bought the first pair, it seems we don't have any trouble selling the second pair, and they wear safety shoes from then on.

The unusual thing about the sale of safety shoes on our railroad, at least on the territory that I am assigned to, is the fact that we are selling more safety shoes to operating men, men in the transportation department, train and engine men, than we are to maintenance of way and mechanical employees.

Of course, the shoes are sold to the employees at wholesale, and they are good shoes, and as I say, the fact that they can buy a shoe through the payroll deduction plan is the reason that we are selling so many shoes on our railroad, I believe.

The particular division that I am assigned to so far this year has sold over six thousand pair of safety shoes to the employees, and I think the secret of the whole thing is the fact that the men can buy them without laying down any money at the time. We handle them through either two, three, or four deductions. A man can buy a five or six dollar pair of shoes in three or four deductions that he never misses out of his pay.

MR. MUMFORD (New York Central): Would you be gracious enough and would it be possible for you to give the New York Central System some letters of commendation from people who have used safety shoes, so that we might use them in our educational material?

MR. SHANNON: I will make every effort to do that. I understand your railroad is using the same shoe from the same company that we are on the C. & O., and that should be helpful.

MR. CONNOR (B. & O.): Should the striking of claw bar to get them under spike heads be prohibited?

CHAIRMAN NAFF: Mr. Creedle, will you comment on that question?

MR. CREEDLE: We do prohibit the striking of claw bars with spike mauls or other tools which are classed as hard steel. We do not absolutely forbid them to strike with a sledge, for instance, or some tool which is more adapted to that purpose. We, of course, find some of the men striking them with the spike maul, but invariably they get into trouble in so doing.

So to sum up the question, I think that if a tool could be developed which would eliminate the necessity of striking a claw bar on the head to get it underneath the spike head, it might solve the problem.

There is one tool on the market which comes nearest to permitting us to get under the spike head without the necessity of hammering the claw bar, and that is the flexible toe bar which will reach underneath and grab the spike.

MR. ROBERTS (Northwestern): Mr. Creedle happens to come from the same railroad that I do. Some time ago the National Safety Council got out a poster which suggested the adding of the tie under the spike head in order to permit the claw to be placed under the spike head, and I, without consulting our engineering department, distributed a few of those posters, and I was called to turn and was told that that practice was not a proper practice in that it destroyed the tie. I was wondering if any railroads do follow that practice which was advocated by the Council in the poster.

MR. MAHRS (Erie): We don't add, but wouldn't that be a lot more dangerous than just trying to drive your claw bar under? You still have a possibility of striking the tie.

MR. ROBERTS: I meant to remove the tie from under the spike head in order to permit the claw to fit under.

MR. DAVIS (Burlington): We use tie plates on our railroad, and I don't know how you are going to drive out tie plates so you can do as Mr. Roberts says.

CHAIRMAN NAFF: So far as the Norfolk and Western is concerned, we do have a rule prohibiting striking the claw bar with any kind of a hammer. There are places where you have spikes that you can't get to very conveniently with a claw bar, and we use, and I suppose all railroads use what we

call a road master to reach those ties in tight places. Yet you must get the road master on the spike.

MR. KELLY (Soo Line): The organization recognizes the value of safety rules by requesting that the spike maul must not be used in striking the head of the claw bar, but at the same time ignores the practice if it is done. That is a disregard for our rules, and it is one of our greatest difficulties in having safety rules. We all know from experience that you cannot get all the spikes out; regardless of the use of tie plates or otherwise, without the use of a striking force on the heads of the claw bar.

The Milwaukee Road and some others use a sledge of which the striking face is modified to avoid chips flying.

MR. DEMPSEY (Milwaukee Road): We have that identical rule, have had it for a good many years, and our method coincides with what has been explained here. We take the pointed end of the bar, pry up under the tie plate or the spike head until it gets to the point where you can throw the claw under the spike head.

MR. SLAVEN (Burlington): I might make a suggestion of help. We don't have any rule on our railroad prohibiting the use of the maul, but we advocate the use of the sledge, and I don't know of a case of an injury where the sledge has been used, except where the spike head itself might fly off from a hard blow.

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MR. FRENCH (Milwaukee): Accident

prone employees present a distinct problem. What can be done about them?

MR. MACLELLAN: I would say, briefly, that first and foremost, a railroad employee must be made to realize that safety first is just as personal as his toothbrush, that he as an individual stands to profit most by the safety program, that accident prevention is not an abstract, vague matter, but an every-day way of life and should be just as applicable as the law of gravitation and as comfortable as a pair of old shoes. Do that, and most accident-prone employees will automatically remove themselves from this category, and those who still remain can, I think, be handled by a good job of personal analysis.

Just a rough example. Show a machinist, as an example, that because of the fact that he was involved in many falling accidents, it is to his own selfish advantage, to the advantage of his family and their future that he change to some other type of work which doesn't require his going off the ground, and I believe that in most cases he will be willing to do that.

CHAIRMAN NAFF: I think we all have trouble with the accident-prone employee. It may be some physical condition, or he may be dissatisfied, or he may be a square peg in a round hole. You may have to change him to other work.

MR. BRAIN (Soo Line): The speaker may be answering our questions, but it is difficult for a railroad machinist to change into any other occupation. Can you ship him off to another road?

MR. MACLELLAN: Perhaps I could give a little personal experience on the Southern Pacific that may answer your question.

Certainly we don't want to peddle anybody off as dissatisfied, and there is enough diversification of assignments for a machinist to work as a machinist so that he can, if he finds that he is subject to dizzy spells or other factors, physical factors which would make him prone to falling, find another job that would never take him off the floor. This is what we do in cases where men are subject to epileptic fits. That certainly is an accident-prone employee, and we know it, so Mr. Lowe has gone to the extreme of getting that man a bench job and completely enclosing him with a fence, and he has given him a regular path to the rest room so that he would not be endangered in the event that he did have an attack while he was going to or

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That is an extreme example, but I think it could be done with the proper personal analysis.

MR. DAAKE (Erie Railroad): What type of line-up should be issued to motor car operators; what information should be shown on line-ups and by whom should they be issued?

MR. CREEDLE: In the matter of train lineups for motor car operators, within the past two years on our railroad we have gone to a regular printed form with the hope that the use of this printed form would be a help to us in trying to minimize somewhat the danger that exists in this regard. It is similar to forms that are used on other railroads in the country. It shows the train and the station involved where the report is, and the approximate leaving time of the train so far as the information is available to the operator at that time. It also has other information such as the date, whom it is issued to, and the operator's name, and so forth.

We feel that since the introduction of this form we have made a distinct step forward and we require every motor car operator even though he takes his line-up over a telephone, to write this down on one of those forms. I have the forms available either at his home or the point where he takes the line-up, and we find, so far, that they attach a lot more significance to this line-up on this record form than they used to on a scrap of paper. That was invariably what we ran into in checking motor car line-ups. We found that the operator of the motor car had written it down on a scrap of paper, and he sometimes had difficulty in identifying today's from yesterday's. They were all in his pocket, undated in many cases.

We haven't had it in service long enough to have any accurate record, but we feel that we have made a distinct step forward in this very important matter, because if anyone had developed, even in a small measure, something that will reduce train motor car accidents, we certainly will go forward in safety in this country.

MR. BARNES (New York Central): Is that form made in duplicate so that there is some record kept for the supervisory office?

MR. CREEDLE: It is generally made out in duplicate and a copy is always kept at the sending office, as well as given to the operator.

MR. BARNES: That prevents the section foreman, then, from using any piece of scrap paper in case he didn't have the forms. He has to have the forms with him.

MR. CREEDLE: The instructions are that he has to have the forms with him, at the location where he gets his line-up, and to use them even though he isn't able to get the line-up from the operator direct, that is, handle the actual line-up. Even though he takes it over the telephone at a distant point, he is supposed to write it down on this form.

MR. HOFFMAN (St. Louis Southwestern Ry. Lines): Mr. Creedle, when a motor car gang go to work between stations, several miles from an open office, in some cases they may be three or more miles even from a telephone, and they work there for several hours. What procedure do you follow for that motor car to get to a telephone or to an open telegraph office?

MR. CREEDLE: Of course, that is a tough problem, but we require them, wherever possible, to either go to the nearest telephone where they can reach an operator or use a company line which may be available as a signal line or dispatcher's phone, in order to make that contact, if at all possible. Of course, there are times when that is impossible.

MR. HOFFMAN: Do you furnish portable telephones to your gangs, and do you have any objection from any of the organizations to the men contacting the dispatcher?

MR. CREEDLE: Yes, we do, I will answer your last question first. We have a very definite objection, and we have recently signed an agreement with the organization which prohibits the motor car operator from receiving a line-up from anyone except an operator. I say "prohibits." In the case of an emergency, of course, we will get the line-up only in the best way available. Nevertheless, we will be subject to a penalty of a call for the operator who should have received the call. That, incidentally, is very restrictive, as you may guess.

MR. MUMFORD (New York Central): Should employees be permitted to get on and off slowly moving motor cars?

MR. TREXTON: Our rule is very explicit on that. Getting on and off moving cars except in emergency is prohibited. We have had accidents where they have violated that rule, where it wasn't an emergency. Section men, line men, with the clothes that they

have on, are very clumsy, and they come up with broken ankles and fractures.

MR. FAIRBAIRN (New Haven): What is the best method of opening and closing bulky car doors at freight houses?

MR. LAFONTAINE: I think the method of handling those bulky doors is very similar all over the United States. It makes a little difference if the car is up at the platform or standing out in the open where the man has to be on the ground in order to operate the door. If the car is up at the platform and we don't have these Monarch car openers, of which we have only a few, the man has either got to get the car open with a jimmy bar or attach the chain to the door and use a truck, and we use both methods. If it is down on the ground, a man can't use the truck, he has to depend on the bar. If there is freight leaning up against the door or something inside the car, there is always a possibility of that falling out on him when he is getting the door open.

MR. LOWE (Southern Pacific): May I offer a suggestion that you ought to seriously consider? May I suggest that you all frown on the idea of using a device of that kind and hitching it to the grab irons, because of the danger of interfering with or cracking the safety device. We have had some experience of that kind, and we absolutely forbid the use of any such equipment that is attached to a safety device on the car.

We are developing one of our own which we think will overcome that possibility, which has been patented and is on the market. I am not putting in a plug for it, but I just want to say that it is a very serious matter to put such heavy strain on any grab iron. Perhaps tomorrow a brakeman or switchman is going to go under the wheels by reason of the failure of that particular piece of equipment.

CHAIRMAN NAFF: Do you know of a failure?

MR. LOWE: Yes, sir.

CHAIRMAN NAFF: I, personally, am very glad to get that information, because we are now getting out some of the power pullers on our own railroad, and that is the thing that I feared in the beginning.

MR. DAVIS (Burlington): Mr. Chairman, we purchased four of those power pullers, and use them at our larger freight houses, and upon inquiry recently as to what the

men thought of them, with the thought that perhaps we might extend their use at other points, I was told that they are not using the ones that we bought.

Now, at your large freight houses you have plenty of help. But here is this brakeman, and the conductor, maybe the agent out here at Podunk or some other little point. He is the fellow that has to break his back to open some of these doors. You can't have one of these power devices on all of your cabooses. At least we don't think that is practicable. We have some injuries as a result of opening and closing some of these doors at our freight houses, but I am not convinced that the power puller is the answer. I agree with what Mr. Lowe says. A grab iron or other safety device on the car is a poor place to attach anything of this kind.

MR. DEWITT (Northern Pacific): Do you favor standardizing on two kinds of goggles, one for heavy work and another for light work, or do you favor the use of several different types for various operations?

MR. WELSH: Of course, the ideal situation would be to have one type of goggles, and we tried that, not with too much success, by having a heavy type overall goggle. I might say that goggle was adopted by putting it out to some of the bigger points and asking the men for their approval of it, and the majority of the men that had the goggle on the test approved this particular goggle. But later on we had discussion among the men, and they wanted a different type goggle. We have since adopted a spectacle type goggle, with side protection on it, and then also, in addition to that, we have a plastic goggle that we are using now. So we now have three, but we still have pressure for additional ones. I am sure that if we satisfied everybody, we would have even some home-made goggles on the job, and we have to stop somewhere. We had we have just about all the goggles we care to have or could have at this time.

MR. WARD (N & O): Should chore boys, lift trucks, tractors, and the like used at freight stations be equipped with governors

to control the speed? If so, what is safe maximum speed for such equipment?

MR. TENNEY: I don't believe our railroad is big enough, from my own experience, to give you the last word on this. But we have not recognized any need for governors. My viewpoint is that speed is just as relative with respect to those kind of self-propelled machines as it is on an automobile. On a large pier with no obstruction, self-propelled equipment can move much faster than in confined spaces. That's obvious, I don't believe a governor can replace supervision, in requiring this equipment to be handled at proper speeds to meet the many varying conditions.

CHAIRMAN NAFF: I am going to ask Mr. LaFontaine to comment on that.

MR. LAFONTAINE: I made a little note on it, on which I dictated these messages:

"The use of power equipment has entered into the picture very strongly due to the very large shipments which are being made packed in one particular container. The power equipment that we have assigned to us is in constant use, and I would say at the present time is very essential and necessary to the operation of a warehouse handling a large volume of freight."

"With regard to the speed of this tractor, in any case, we agreed, and I discussed this with some of our accounts, that we didn't need any speed controls on this tractor. It was a matter that depended largely upon the situation, whether the platform was open, whether they could move along, whether they could see with a little greater speed, although at no time is the speed of these chore boys high; while in another case, if the floor was congested or if it was inside the building, a little good judgment is necessary and the speed should be reduced in order to operate it safely."

CHAIRMAN NAFF: I wish to thank each member of the panel for his assistance, and you gentlemen in the audience, those of you who have participated in the discussion and those who have been so attentive while these questions have been discussed.

*Transactions*

**35TH NATIONAL SAFETY CONGRESS**



**VOLUME XXII**

**RUBBER SECTION**

**NATIONAL SAFETY COUNCIL, INC.  
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## Foreword

**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

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## MONDAY AFTERNOON SESSION

October 6, 1947

Presiding: ROLAND KASTELL, Assistant to Superintendent of Safety, U. S. Rubber Company

## Tire and Tube Curing

By L. E. SODERQUIST

Chief Engineer, McNeil Machine &amp; Engineering Company

A vulcanizer has been called "merely an apparatus for the opening and closing of a tire mold." However, the modern vulcanizer also performs other automatic functions, such as timing, valving the various elements that make up the cure, and stripping the tire from the mold. It is the combination of these various performances that makes the machine complex.

This discussion deals with these functions of the vulcanizer and their relation to the safety of the personnel operating the machine. The operator's job should be made as simple as possible. The following procedure represents the minimum routine that should be required.

## Operating Procedure

If possible, the vulcanizer should be arranged to open automatically when the operator is not in the immediate vicinity, in case the safety device should fail. On vulcanizers which the operator has to open, a curing bag may explode or the steam dome may open under pressure, causing serious injury to him.

After the vulcanizer has opened, the operator should disconnect the internal curing bag line, remove the cured tire from the mold, blow out the mold, or dope the mold according to the practice in his plant. Next, he should place the uncured tire in the mold, make internal connections, and put on the serial number. He is then ready to push the closing button or valve. After pushing the closing button, he should step away from the vulcanizer to eliminate any possibility of his being caught in the machine. All secondary operations, such as closing the mold and immediately opening it again for inspection, should be avoided. These operations add to the number of functions required of the operator and tend to confuse him. Also, the press should not be opened and closed for rimming of the bead.

Although the functions required of the operator seem simple, hazards are inherent in most of them.

For example, if hand connections are used to remove the cured tire, there is always the possibility that the operator may break the connections while there is sufficient pressure in the bag to burn him. Automatic connections, particularly on the passenger tire size press, are safer, because the connection breaks itself.

Doping of the mold, particularly where swabs are used, presents the hazard of burns in case the dope splatters from the hot mold.

Closing of the vulcanizer, if handled properly, does not present much of a hazard, but certain precautions are necessary to prevent serious accidents. It is essential that all operations on the uncured tire be completed before the closing button or valve is pushed. In many plants serial numbers are placed on the dome while the vulcanizer is closing. Sometimes hand connections are made while the vulcanizer is closing, or time are held during the closing operation. These practices probably do not have the approval of any safety committee, but nevertheless they have been followed.

## Vulcanizer Design

One of the first requirements in the design of the vulcanizer, whether tire or tube, is that it have sufficient strength to hold the mold together when the maximum mold air is loaded to the maximum bag or tube pressure.

The unit should have a factor of safety of at least five. In other words, all parts that hold the mold closed should have a strength five times that required under normal operations. With modern mathematical formulas, and strain gauge equipment, the manufacturer can meet this requirement.

There are several ways to hold the mold together, but perhaps the most popular and

widely used is the power driven toggle type. This method has proved popular because it is inexpensive and provides for a great deal of squeezing load.

The two types of toggles used are the overlocking type and the outward pressure type. As the toggle comes to a straight line, analysis will show that the load approaches infinity. However, because the bearings in the linkage absorb a certain amount of friction and because all metals will stretch or compress under load, the actual physical load a linkage will produce does not approach infinity but it does build up rather rapidly.

Users of vulcanizers should be familiar with these facts, for various conditions can change the factor of safety. For example, a vulcanizer may require holding a load of 400,000 pounds. All parts have been designed to hold the mold together with a safety factor of five. However, lifting the load of the mold at some unfavorable point in the linkage may require a motor or hydraulic cylinder of a certain size. After this motor or cylinder has been added to the vulcanizer, the unit works well, curing tires and tubes without any apparent overflow. However, unknown to the designer, this particular motor or cylinder is capable of producing a squeeze on the mold of 1,000,000 pounds, cutting the factor of safety to two. This metal is under very high stress and may break.

The user of a vulcanizer should make sure that the press is capable of the load indicated by the manufacturer. There are vulcanizers on the field today which can be greatly overloaded.

## Mechanical Protection

Some modern vulcanizers used in curing tubes close in  $\frac{1}{4}$  to 3 seconds. For the past eight years the majority of tube vulcanizers have been furnished with a safety bar in front of the mold, so arranged that if any part of the operator protrudes into the closing area, the bar will hit the part and immediately stop or reverse the vulcanizer.

Tire vulcanizers take from 15 to 30 seconds to close, depending on their size. It is considered good practice to have safety bars on these vulcanizers too, even though they move relatively slowly.

## Pressure Safeguards

Perhaps the most frequent accident on vulcanizers occurs when the vulcanizer opens

while pressure still exists in the curing bag and, as a result, the operator is burned. To overcome this hazard, Maynard, back in 1935, patented a combination which uses a pressure switch on the pipe line to the curing bag. This switch disconnects the power source so that the press can not be opened until there is no more pressure in the pipe line. This method has been universally adopted, and practically all tire vulcanizers today use some adaptation of this pressure switch combination.

This pressure switch, however, has a weak point in that it measures the pressure in the pipe line and not necessarily that in the curing bag. The curing bag is fed with a bag stem similar to that on a tire inner tube, and this stem has a very small opening. This opening is usually the smallest in the line and may become plugged from refuse in the curing bag. Since this stem must be located between the bag and the feeding pipe line (in which the pressure switch is located), its plugging means that the bag may have as much as 350 pounds of pressure while no pressure exists in the pipe line. Consequently, the vulcanizer can open with full pressure in the bag, causing a bad explosion. Furthermore, no pressure switch on the market today operates on pressures as high as 350 pounds and at the same time is sensitive to the lower pressures, as required for safety.

To prevent explosions of curing bags, which must be fed pressure by means of a valve stem, the strain gauge, a safety device reacting to the pressure in the bag rather than in the pipe line, has been developed.

Since the loading on the vulcanizer indicates the pressure in the curing bag, this pressure can be gauged by the load on the vulcanizer linkage. The strain gauge safety in its present form therefore becomes an integral part of the vulcanizer and prevents it from opening as long as any pressure tends to separate the mold.

The strain gauge safety is connected with the two parts that form the bearing and shaft immediately above the mold. Inasmuch as the linkage is holding the vulcanizer closed under pressure, the clearance in the bearing is on the lower side while the top of the bearing is tight and under pressure and the strain gauge prevents opening. When the pressure in the bag has been fully exhausted, the press can open. The linkage must now pick up the top mold, so the load

on the bearing has been reversed and the clearance is now on the top of the bearing. With shifting of the clearance, the electrical switch attached to the top link is raised in such a way that it subjects the arm attached to the shaft. Since this electrical switch is attached to the power source, if its contact is broken the press will stop.

If the valve stem has become plugged, the Maynard type switch is therefore inoperative, and the press has started to open. Since pressure exists in the curing bag, the linkage is still under load. There is no reversal of load and no change in the clearance. Since the switch attached to the top link does not rise, in its opening movement it interferes with the arm, breaking the contact to the motor and stopping the vulcanizer. So that this design can work, the press must open slightly, but this slight opening is not sufficient to cause the bag to explode, because the tire

casing and bag are of very heavy construction. If the valve is completely plugged, it is impossible to release the pressure in the bag. In this case, everyone should get at a safe distance, and the press should then be opened by other means.

This switch is being rather widely adopted. Its only disadvantage is that it is very sensitive to low pressure, and in many plants the exhaust lines contain pressure that will operate this switch.

#### Mold Changing

Safety men should make sure that the mold changers sufficiently tighten the top bolts that hold the mold in place in the vulcanizer. In most vulcanizers the top half of the mold is held in the press by means of bolts or cap screws. In some instances, men use washers under the bolts so that only one or two threads on the bolts enter the mold.

### Safety in Mechanical Goods Curing

By J. E. LOVAS

Safety Supervisor, U. S. Rubber Company

#### Horizontal Heaters

Since the discovery by Goodyear in 1839 of the vulcanization of rubber by heating with sulphur, many varied types of vulcanizers have been progressively designed.

In a mechanical rubber goods plant, various methods are used to carry out the operation of vulcanization. The most important are: open steam cures and press cures.

Open steam cures are used chiefly for curing hose, tubed goods and insulated wire. For this purpose a horizontal cylindrical vulcanizer, or heater as it is commonly known, is used. It is an unfired pressure vessel built to operate with high pressure steam.

They are safely constructed under the American Society of Mechanical Engineers, American Standards Association and State unfired pressure vessels codes.

Despite the fact these heaters are constructed according to the foregoing standards and regulations, attention should be paid to certain accessories when installing for operating purposes in the plant.

Some of the accessories are: pressure relief

safety valves, steam gauges, reducing valves or automatic regulators, thermometers, steam traps, blow down valves, vent or testing valves, safety door inter-locks, external and internal tracks, carriages and winches.

Whenever possible duplicate pressure relief safety valves should be installed. One set slightly above the operating pressure and the other at 1 1/2 times the safe working pressure of the vessel. In this way the first valve would give warning of excessive pressure. To insure against clogging by coming in contact with corrosive vapors from vulcanization these valves should be installed in the main steam supply line.

On extremely low heaters, an escape pipe with at least the same cross-sectional area as the safety valve, should be connected to the valve to conduct the steam beyond the working area. This is to prevent possibility of burns or scalds to anyone working in the area of the valve when it blows. The escape pipe should be so arranged as to prevent the high temperature of exhausting steam from coming in contact with overhead fire control and sprinkler systems.

indicating steam gauges should be installed where they are clearly visible to the operator, and should have dials reading up to at least 1 1/4 times the safe working pressure of the vessel.

Reducing valves or automatic regulators are installed before the safety valves. They should be controlled by a common gate or globe valve to insure safe operation should the reducing valve or automatic control fail to function properly. On all automatic regulators, the steam valve should be of the indirect acting type to guard against a possible interruption of the power medium.

If the valve was of the direct acting type, such interruption could allow steam to rush into an open heater. Besides possible burns to employees who might be in the area, such leakage of steam into the room might also cause the sprinkler heads to go off. This in turn could cause serious damage to personnel and raw materials and equipment. As an additional safeguard the gate or globe-type shut-off valve should always be closed when the heater is not in use.

Blow down valves are used to relieve the heater of the stored pressure after the main steam supply is shut, completing a cure. Where several heaters are connected to a common header through the blow down valves, a check valve should be placed in each blow-off line to prevent steam from being discharged into any open heater from another heater in the battery. As an added precaution, an open heater should not be left with its blow-down valve open.

The vent or testing valve should be located on the top of the heater shell, as close as possible to the door. It should always be used to determine if there is any pressure remaining in the vessel before attempting to open the door. This valve also acts as a double check on the safety interlock.

All heaters with quick-opening doors should be provided with a safety interlock. One of the most effective is the diaphragm-operated pin lock. Steam entering the heater forces the pin through the matched lug and door-ring holes, thereby locking the door.

External and internal tracks should be properly secured to prevent the heater carriage from slipping off the rails. The carriage wheels should be guarded with toe pushers, and winches should be employed to move the carriage in and out of the heater.

A qualified inspector should make periodic

and thorough internal and external inspections of all heaters including all accessories connected thereto. External inspection should be made once every three months and internal at least once each year.

All operators of heaters should be warned of the hazards involved in the use of steam under pressure, and carefully instructed to follow approved safe rules of operations.

The material to be cured should be securely placed on the heater carriage, and the door tracks securely placed in position before rolling the carriage into the heater. After the load is placed in the heater, the door tracks are removed. If the heater is equipped with a quick opening door, all lugs should be entirely closed so that each lug carries the proper load.

If using a bolted door, tighten all bolts gradually and evenly all around so that the entire pressure will not be thrown on a few of the bolts. Use a wrench which will not over-strain and injure the bolts. In tightening bolts, take those which are diametrically opposite each other to get uniform tension. All bolts should be used at all times.

Where automatic controllers are not used, partially close the blow-down valve and turn on the steam supply. When curing pressure or temperature is established, completely close the blow-down valve so that the steam trap can discharge the condensate.

As the curing cycle is completed, close the steam supply valve and open the blow-down valve. When the steam gauge indicates zero pressure, open the test vent valve for assurance that no pressure remains in the vessel. Loosen all bolts on the door in the same sequence as when closing it. The last bolt to be removed should be the one diametrically opposite the hinge.

The operator, when pulling the door open, should place himself in a position where he cannot come in contact with flash steam which is discharged when the door is partially opened.

#### Platen Presses

Platen presses are used for curing molded goods, belting, matting, rubber tiling, large rubber slabs, sheet packing, etc.

For molded goods curing the presses vary in size, in so far as the platens are concerned, from 18 inches to 48 inches. For belting and the other cures they vary in size from 48

inches to 60 inches wide and up to 90 feet in length.

The platens are heated internally with steam by manual or semi-automatic control, at different pressures, the maximum being 100 pounds. They are subjected to external pressures applied by single or multiple rams through the medium of hydraulic water pressure of 2000 pounds per square inch. Therefore, it is important that careful attention be given to the material used in the construction of the platens.

Steel or mechanite is preferable to cast iron. Cast iron platens have been known to become ruptured, causing them to explode. One of the causes is unseen imperfections when manufactured. Others are concentration on small areas of platen surface, platens not properly blocked to equally distribute the pressure, and metal fatigue due to constant use over long periods.

The most common injuries suffered by press operators are burns. Extreme caution should be employed to prevent coming in contact with the hot equipment. Long sleeve shirts and heat resistant gloves should be worn at all times while working around the equipment. Wherever it is possible, hot surfaces should be covered with asbestos material.

In mold curing operations the handling of molds is a big factor in causing accidents. This is especially true while opening the molds before and after the cure and also in handling them in and out of the press. Suitable tools should be provided for prying the molds open and they should be maintained in good condition at all times.

An important step in preventing injuries caused from handling the molds in and out of the press is the installation of hydraulically operated adjustable tables which can be leveled with the platens.

Forkes should be provided for the handling of heavy molds. Where hoists are used to open hinged molds, the top plate should be swung beyond the 90° angle. Where this is impractical, an auxiliary chain and hook should be used. This will eliminate possibility of injury while the mold cavities are being filled or emptied, should there be a failure in the hoisting equipment.

Some presses are equipped with quick operating snap-action valves. Such valves should be located in an area where the platens cannot be reached while the valve is being operated.

I am reminded of an accident that resulted in the loss of four fingers to an employee. When the cure was completed he opened the snap-action valve with his right hand. As soon as the press began to open, he reached into the press with his left hand to remove the mold. For some reason he did not remove his right hand from the valve and reversed the position of the valve to close the press, getting his fingers caught between the mold and platen.

It should be a strict rule that no attempt be made to reach into a press while it is in motion and certainly some disciplinary action should be taken whenever this rule is violated.

When repairing rams or the ram packing, blocking should be used between the bottom platen crosshead and the lower main crossheads. The laws of gravity respect no man.

The larger presses used for curing belts offer additional hazards inasmuch as auxiliary equipment is used such as, for example, overhead cranes, let-off and wind-up stations, clamps and stretchers, press irons and wood spreader blocks. In addition, usually an operator and a helper are employed on these presses and whenever such is the case, another accident problem is created.

Assuming that we are all familiar with standard safe practices for crane operations, I will not go into this phase. However, the cranes should be used at all times to place the rolled stock into the let-off station and for the removal of the stock from the wind-up. Never should the stock be permitted to fall out of the wind-up. The operator should be sure to lock the collars on the bar chucks of both the let-off and wind-up stations to prevent the load from falling out when revolving.

The operator should be solely responsible for the safety of the personnel and the equipment. Having control of all starting equipment he should be sure his helper or anyone else is in the clear when operating the clamp or stretcher. He should be sure that the helper is not making adjustments between the platens to the stock, press irons or the wood blocking while closing the press. He should see that no one is near the wind-up while starting this equipment, and he should see that the press irons and wood blocks are placed in the racks when not in use.

In so far as the large miscellaneous presses are concerned, the same precautions used in the operation of belt presses should be used.

The only difference between these and the belt presses is that no clamps or stretchers are used here.

In closing I would like to suggest some safety rules that can be applied to curing press operations.

1. Operate a press only if authorized.
2. Test your mechanical and hydraulic pressure valves at the start of each shift by operating the press empty.
3. Do not reach into the press while it is in motion. If any adjustments are necessary, stop the press.
4. Do not attempt to remove mold out of press until press is entirely opened.
5. Be sure everyone is in the clear before closing the press.
6. Use only proper tools (mold bars, hammers, knives, etc.) and keep tools in good condition.

7. Blocks should be placed between platens that are being repaired or cleaned.
8. Inspect hanger brackets frequently for breaks or signs of wear.
9. Report all leaks to your foreman.
10. Keep the floor clean, dry, and free of foreign material.
11. Wear safety shoes to prevent toe injuries.
12. Mark HOT on hot objects.
13. Molds with broken handles or other defects should be reported.
14. Be sure mold is properly loaded with insert in place before closing the press.
15. Use caution when using air hose. Do not use the air for cleaning your clothes or the equipment.
16. Prevent coming in contact with the hot equipment. Use long sleeve shirts and heat-resistant gloves.

### My Best Safety Idea During the Last Twelve Months

By M. R. BATCHE  
Safety Supervisor, Xylon Rubber Co.

Our best safety idea during the last twelve months is a safety slogan quiz contest. This contest was started four months ago. It is apparently not a new idea as contests go, but is new for us here in our plant. Through the co-operation of our safety department and management, we have had several contests for supervisors and departments. This time we decided to have a contest for employee participation and to stimulate more interest in the safety program.

For each of the next twelve months, employees on each shift will be approached by members of management for the wording of the safety slogan which is posted on our electric sign in the main hallway. If the employee can give the exact wording of the slogan, he will be given a dollar bill. If he cannot give the exact wording, other employees will be selected until one can give

the correct slogan. Prizes of \$1.00 each are given on all four shifts monthly. All clock card employees are eligible. Employees are selected to be contacted for the safety slogan by a drawing which consists of all clock card numbers placed in four boxes, identified—first shift, second shift and so forth. The winners of our monthly safety slogan contest have photographs taken and these are posted on our bulletin boards throughout our plant. To date, this contest has proved very satisfactory and can be done on a larger scale if desired, although in our plant the total employment is 750. This has already been extended to other divisions of Firestone. This contest has been made possible through the understanding of management that an effective safety program including many contests that stimulate interest has played a major part in the reduction of accidents.

### My Best Safety Idea During the Last Twelve Months

By G. E. TRANK  
Safety Engineer, Hewitt Robins, Inc.

At Hewitt we do not have rules requiring all employees to wear safety shoes. We pre-

fer to obtain foot protection with safety shoes by selling the employee on the need for them.

and creating a desire in his mind to have foot protection. Although we do not have 100 per cent protection in our plant, a very large percentage do wear safety shoes and the number of toe injuries occurring is practically nil.

Some time ago thinking to find out who are wearing safety shoes and who are not, I decided to send out a questionnaire. This questionnaire was made as simple as possible and asked the following questions:

1. Do you wear safety shoes at work?
2. If you do not, have you worn them in the past?
3. Would you be willing to wear safety shoes in the future? If not, please give reason.
4. If you wear safety shoes can you recall any incident where they have prevented injury to your toe?
5. Do you ever have difficulty in securing any type of shoe that fits your feet properly?
6. What size shoes do you wear, length, width?
7. Considering the fact that falling objects contribute to many injuries, do you think that safety shoes could prevent toe injuries on your job?

Answering these questions was enough to start some workers thinking safety, as many bought safety shoes who had not previously worn them. In answering question three a large number of the employees listed the objections to wearing safety shoes. The foreman then had a lead as to how to approach each worker. Many objections were broken down and the result of the whole affair was that with very little effort the wearing of safety shoes was greatly increased.

Another little incident occurred at the beginning of this year. Our Department Accident Progress Report Board, at the entrance

to our plant was not receiving adequate attention. Feeling that something should be done to recall lost interest, I decided to change the type of chart.

I had the drafting room draw up a long oval race track. This course is divided into lanes for each department in our plant and is marked off so that each lane has 52 spaces to complete one lap of the race. Black thumb tacks are used to represent the horses entered by each department in this race. The horse, for that department having no lost time accidents during the week, advances one space, while the horses of those departments which have a lost time accident remain on the space previously occupied. In other words it simply tabulates the accident free weeks of each department. By the same token the weeks in which an accident occurred can be counted by simply noting the number of spaces the departmental horse is behind the large group of leaders.

No prizes were offered, but the board attracted a great deal of interest. When the foremen and workers found out that there was no way for a horse to catch up with the leaders once it fell behind, all were anxious that their entry should not be a lagger.

I feel that this simple chart at least had some bearing on the fact that we had no lost time for the first seven weeks. If we can continue for the balance of this year with a frequency no higher than the cumulative frequency to date, we will finish with the lowest frequency since 1938.

Few of the ideas mentioned above are new or unique. The same problems have been faced by safety engineers many times before. Basically the methods of conquering them are the same, but considering each case individually, I guess the best idea that I ever had was the idea that I was going to do something about the problem.

## TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: ROLAND KASTELL, Assistant to Superintendent of Safety, U. S. Rubber Company

## Has the Safety Effort Lagged Since the War?

By FRANK SWANSON

Factory Manager, Detroit Plant, U. S. Rubber Co.

An analysis of the statistics showing accident rates in the rubber industry for the past 18 years indicates that the last four years of the '30's produced the best frequency rates in the 16 year period, and also the best severity rates. Commencing with the year 1940, both frequency and severity increased until a high spot in 1942 showed a frequency of 19 1/4 accidents per million hours worked, and a high spot in 1946 showed a severity of 9/16 days lost per thousand hours worked. I might call to your mind that it was during the 1940-1942 period that we were either getting ready for war or engaging in our first or second year of war production. Many things happened during that time which normally would contribute to an increase in the frequency of accidents.

To begin with, the industry lost many of its most experienced employees. They either were inducted into the armed services, or perhaps they shifted to the more essential industries. These people in many instances have been replaced by inexperienced workers and oftentimes by people who would not normally have been employed in industrial plants. Obviously, these conditions brought about a situation which was responsible for a bad accident record. I might also add that many jobs which had previously been done by male labor on the theory that they were too heavy to be done by women, or too complicated, were taken over and more or less successfully performed by women during this period. The anxiety exhibited by everybody to get the job done, so that the boys in the services might encounter no shortages, resulted in everyone's wanting to pitch in and do his utmost. It is my opinion, therefore, that the increase as noted during '40, '41 and '42 was low compared to what might have been expected.

The tremendous effort placed on the elimination of accidents, and the correction of accident hazards, that stemmed directly from

Washington in its various bureaus charged with the procurement of labor, and from the National Safety Council helped check this increase. An outstanding example, and one with which I am personally familiar, was the Safety and Security Branch of the U. S. Army.

The Army found, in many instances, that they themselves had to build the facilities for manufacturing articles, and either operate them or have them operated by private concerns. With the manpower situation as it existed, everything possible had to be done to instruct this manpower in safety so that there might be no interruption to production of goods, as well as to insure conservation of manpower and materials for the services. Therefore, with the foundation of the Safety and Security Branch, hundreds, and I believe, thousands of individuals, both civilian and military personnel, were trained and prepared in the engineering features which would enable them to recognize a hazard and take steps to effect its correction. They also aided in the preparation of text material which would enable plant operators to train their employees to work safely. Starting from scratch, this very rapidly developed into high gear, and I believe that the drop as shown in the frequency of accidents after 1942, can be attributed largely to this activity.

Everyone of us, who was either at a government-owned plant or at a privately owned plant doing war work, had experience with both civilian and commissioned personnel in the form of various fire or safety inspectors who, after inspection of our properties, were persistent in their efforts to eliminate fire and accident hazards. This persistence on their part should be commended, and the results they obtained speak for themselves.

The natural result from all of this activity, in connection with safety and fire protection and prevention, is an awakened consciousness on the part of all industry and all personnel connected with industry to the end

that this matter of safety actually is what some of the safety men had been trying to tell us for many years. Safety is just another factor in the over-all manufacturing picture, the same as quality and quantity of production, cost of operation, etc. The way to control it and make progress in connection with the elimination of its dreadful toll is by means of the same methods that are used in attacking the other factors in the production picture. As a result, we find throughout industry a definite stepping-up of safety activity all the way down the line from top management through supervision and to the man on the bench.

This was helped by the educational campaigns which stemmed from the government bureaus and from the National Safety Council. Hazards, which had formerly been taken for granted were, during these years, brought out into the open where everybody could look at them, and they were attacked with such concerted effort that marked improvements were obtained. I am thinking particularly of occupational disease hazards, the control of dust and toxic substances.

During the war we had to use many substitutes which were not as safe as the materials which had previously been available, and we were also called upon to use many new materials which in themselves were dangerous, but had to be used in order to attain required results for the implementation of the armed services. We learned to do these things safely as just another part of our regular day's work. This, I believe, is another reason that the increased safety activity during the war effort was successful. It demonstrates clearly that it is entirely practical to operate a plant in a safe manner, and that the approach to the problem is exactly the same as the approach to any other problem affecting the operation of the plant.

Up to now I have in a limited way given my interpretation of what occurred prior to and during the war, and now to get down to the real question "Has the Safety Effort Lagged Since the War?"

On page 96 of the National Safety Council's publication, "Accident Facts," 1947 edition there appears a table showing the changes in injury rates by industries 1930-1946. For the rubber industry, we find that by using 1930 as a base year with an index of 100, 1946 produced an index number of 91, 1945 came

up with 86 and 1946 resulted in an index of 77. Thus, we start with 1948-9 points better than the base year, and the experience in '46-14 points better than 1948. Severity, as depicted in the same table, does not show the same picture. In 1942, with an index of 94, we went backward and through 1945 we have increased to 117. This is an increase of approximately 25 per cent.

What do these figures indicate to you? To me they indicate that the effort towards the reduction of accidents, and the activity which was directed toward the correction of hazards, have gone forward, and, if anything, have been stepped up since the war effort was terminated. This, I think, is exemplified by the decrease in the frequency with which accidents have been occurring. The increased severity may be accounted for in part by increased compensation allowances in some states, and the fact that employees in general have been working steadily, and have a tendency to stay home and make compensation cases of some minor accidents. However, the increase in the severity rate would seem to indicate that special attention must be directed toward the class or type of accident that produces the greatest severity, in order that special pressure may be placed here with the expectation of better results.

The reasons for the decrease in the frequency of accidents in the rubber industry are many. In the plant where I am located, one thing which has been done to help us in our battle against accidents has been the institution of an orientation plan for all new employees. During the first day upon which the employee is identified with the plant a considerable portion of the time is devoted to both safety and fire protection, including an explanation of the hazards that are encountered in the type of a plant we operate, and especially to any hazards which may be encountered on the job to which the new employee is to be assigned. The safety features that have been provided for the protection of the employee are explained, and also the proper way in which to use these features. From the employees who go through this program, we get an excellent response with regard to its effectiveness, and from the foremen we get considerable praise for this new type of oriented employee.

A revitalized suggestion system has produced for us many well thought out sugges-

tions for the elimination of accident hazards.

Sometime ago an analysis was made of the accidents occurring at our plant, and it was determined that the operation of electric trucks and elevators contributed in no small measure towards our accident frequency. In order to correct this situation we first established rules and methods by which the job could be done safely. Our second move was to take an operator off the job and train him to be an instructor. This was done in a highly concentrated instructor training program of 10 hours. After this instructor had completed his training, he in turn started to train, first, all new operators as they were hired, and second, all old employees regardless of length of service.

Moreover after the new employees have been through this training course they must pass a written examination before they are considered as permanent employees on this type of job. The older employees are required to pass the same examination. In instances where old employees failed to pass, they were given some more highly concentrated instructions and took the examination the second time. A very few of the exceptionally efficient, careful, older employees whose records indicate that they hadn't had any accidents, were not required to take the examination at all.

This plan in its entirety was gone over with the union representatives before it was ever put into effect and was accepted by them wholeheartedly, and, as a result, employees, who haven't measured up to the standards required by these tests, have been removed from the job with full approval of the union representatives.

The safety record of the employee in the department is used as one of the factors in the merit rating of employees. An examination of the experience in the departments discloses that since this plan has been put into effect we have not only bettered our accident experience but we have also increased the efficiency of the people in the department

and reduced substantially the damage caused by careless operation of equipment.

Our success in the training of elevator operators and electric truck operators gave birth to the idea that the same method should be used for training employees in the mill and calendar departments. We, therefore, established a set up of rules, methods, instructions, etc. similar to those mentioned for the previous department, and then put the new and old employees through a six hour intensified safety course. Tests are given at the end of three hours of training and again at the end of the six hour course. I have sample copies of these rules which I will be very happy to have anyone look over if he cares to do so.

I believe that there is one further activity that has been carried on at our plant to a greater degree than before the war, which also has contributed substantially to our accident prevention picture. This is the self-improvement conferences for supervisors that has now been in effect for approximately two years. In general, we use principally the conference leader type of program but vary it occasionally with instructional type by a specialist in some particular field. We have found it to be good business to let supervisors themselves dictate to some extent subjects that they would like to have covered, and we have found our supervision to be more than anxious to get all the information they can with regard to how they might better our safety experience.

From the few facts that I have outlined with regard to experience and activity at our particular plant, and from my analysis of the experience in the rubber industry, I am happy to say that my answer to the question "Has the Safety Effort Lagged Since the War?" would be no, an emphatic no. In closing, I would like to caution everyone that, even though I believe this to be a fact, I still feel that instead of merely guarding against any laxity or lagging, we should drive for an acceleration of the effort.

### Comfort Standards Versus Toxicity Standards

By FREDERICK S. MALLETT  
Akron, Ohio

In recent years, several States have promulgated industrial health hazard codes which

contain provisions establishing maximum permissible concentrations for toxic dusts, gases,

vapors and fumes. These figures are, of course, familiar to all industrial hygiene personnel but, to the company not equipped with this service, these terms may be somewhat mystifying. A short review of their sources and purposes is therefore indicated.

Until the last 15 or 20 years, most of the work in the field of industrial toxicology was performed by German workers, so that much of the experimental data is to be found in their publications. *Toxicology and Hygiene of Industrial Solvents* by Lehman and Flury, translated by Smyth and King and published by Williams and Wilkins of Baltimore is a useful textbook for industries handling organic solvents. This provides information on the toxicity of many of the less common organic compounds for which there is no comparable information in American or English publications.

The field of industrial toxicology has advanced swiftly in the past 10 years in the United States. Many of the large chemical companies now maintain or support laboratories whose sole purpose is the investigation and determination of the toxicity of their raw materials and products. Among these are the Haskell Laboratory of Industrial Toxicology (DuPont Company), the Carbide and Carbon Company Fellowship at the Mellon Institute, the Kettering Laboratory at the University of Cincinnati, the Biochemical Research Laboratory of the Dow Chemical Company at Midland, Michigan, and privately supported research at various colleges and universities. American industry need no longer look abroad for technical information in this field.

Practically all of the German work is based upon animal experimentation. This has many advantages but also a few drawbacks. Animals are now being exposed to experimental concentrations of toxic chemicals on an extensive scale in this country and this is being supplemented by the careful exposure of human volunteers. These methods have the distinct advantage of being performed under controlled laboratory conditions.

In addition, there is valuable information to be gained from the accidental exposure of workers in industry. Perhaps the best contribution of this kind to be made is the early work done by the United States Public Health Service in the field of silica. Beginning some thirty years ago, morbidity and mortality figures and exposures to dusty, silica-

bearing materials in various industries were correlated by workers of this organization. This careful study resulted in the establishment of safe working limits for operations producing dust containing free silica. This work has aided greatly in lowering the incidence of silicosis.

For a few other industrial health hazards, data of this nature have been collected, but the exploration of this opportunity has not been fully utilized. Every chance should be seized to obtain valuable information regarding the effects of known concentrations of toxic elements upon workers in industry. This is not to say that workers should be transformed into human guinea pigs, but that full advantage should be taken of the results of accidental exposures to toxic chemicals and solvents.

The various codes and standards take many forms. Those most interesting to industry are the secondary state and municipal codes which have had their origin either in federal studies or in the publications issued by the American Standards Association. This latter source may eventually provide the last word on matters of this nature. A.S.A. committees composed of experts in the field of industrial medicine, safety, hygiene, and toxicology discuss and finally compromise upon the limit for the hazard in question. Acceptance of figures published by the American Standards Association is becoming widespread and is, as stated before, the source of many of the limits now promulgated by state and municipal units.

However, most of these limits are based upon levels above which physiologically damaging effects are produced. Many of them are based upon animal experimentation and have the limitations of that method. It is not always possible to carry over results from animal experiments to human application. For that reason a margin of safety is always provided. For example, in the establishment of the maximum permissible concentrations for acrylonitrile, a common constituent of one of the synthetic rubbers, the limit established is half of that which produced deleterious effects upon the most susceptible species, the dog. However, recent experience indicates that this figure may be unnecessarily low so far as human exposure is concerned.

In addition to the disadvantage of being based upon pathological effects, these standards do not always consider the production of

subjective symptoms, such as nausea, headache and other manifestations such as irritation of the mucous membranes. For this reason interest is being focused more and more upon the use of a *comfort* basis in the establishment of maximum permissible concentrations.

Instances of this kind are continually being observed in actual practice in industry, but very little in the form of published data has appeared. Some recent laboratory experiments along this line provide an indication of the type of information necessary for the establishment of truly practical standards.

In recent publications Silverman and his co-workers<sup>1</sup> have explored the possibility of testing for and determining comfort standards under laboratory controlled conditions. Essentially these experiments provided for the exposure within a test chamber of 15 persons to various known concentrations of organic solvent vapor. The observers were kept in ignorance of the character of the solvent to be tested, of the exact concentration of vapor, and whether the several concentrations were being increased or decreased. After a test period of 15 minutes, the observers classified the effect of the vapor upon the eyes, nose, and throat as "no reaction, slightly irritating, or very irritating." In addition, odor was classified as "absent, definite, moderate, strong, or over-powering." Furthermore, after the exposure was completed the test personnel were questioned as to the level of concentration which they felt would be bearable for an 8 hour day.

This method, of course, is not entirely without defect. For example, tolerance may develop which might mask the effect of higher concentrations. In the other direction, there is the possibility that hypersensitivity may develop which would increase the effects of the lower concentration. However, the method is very useful, and it will gain in value when

<sup>1</sup>Silverman et al., *Journal of Industrial Hygiene & Toxicology*, September 1943 and November 1946.

supplemented by actual plant observation.

The accompanying table, which has been modified from those appearing in Silverman's publications by the addition of available standards from various sources, illustrates the frequent divergence between the published standards and the concentrations which were found to be irritating or bearable by the laboratory methods. For instance, the bearable concentration of hexane is given as 500 parts per million. The only standard providing information for a comparable compound is that of 1000 p.p.m. for gasoline as given in most codes. Variation is also to be found in the results for Stoddard's solvent where 400 p.p.m. was found to produce irritation but could be borne for 8 hours, where again the gasoline standard of 1000 p.p.m. may be used for comparison.

For turpentine the concentration which the test personnel gave as bearable is only half that given in the standard. The same is true for xylene. Space will not permit a detailed discussion of each solvent but wartime usage of butanone (methyl ethyl ketone) will emphasize the occasional difference between industrial experience and code limits.

In the manufacture of self-sealing fuel cells, butanone was commonly used as a solvent for rubber cements and as a "wash" to produce tacky surfaces. Workers, particularly girls, complained of headache and nausea with concentrations well below 100 p.p.m. Exhaust control ventilation was installed to keep vapor levels as low as possible in order to prevent interference with badly needed production. Comfort limits in these cases were found to be about 50 p.p.m. as compared with the figure of 300 p.p.m. given in most codes.

Common sense will dictate that rigid application of limits based upon physiological damage cannot be adhered to in the face of practical difficulty caused by worker's discomfort. More information on comfort limits is needed and much of it can come from industrial experience.



TABLE  
COMPARISON OF COMFORT LIMITS AND MAXIMUM ALLOWABLE  
CONCENTRATIONS  
(Expressed in Parts Per Million)

| Solvent                       | Irritating<br>Concentration<br>(8 Hr. Exposure) |      | Irritating<br>Concentration |     | Suggested<br>M.A.C. |
|-------------------------------|-------------------------------------------------|------|-----------------------------|-----|---------------------|
|                               | Eyes                                            | Nose | Throat                      |     |                     |
| <b>HYDROCARBONS</b>           |                                                 |      |                             |     |                     |
| 1. Hexane                     | 500                                             |      |                             |     | 1000 (Gasoline);    |
| 2. Stoddard's Solvent         | 400                                             |      | 400                         | 400 | "                   |
| 3. Turpentine                 | 100                                             | 175  | 175                         | 175 | 200                 |
| 4. Toluene                    | 200                                             | 300  | —                           | 300 | 300                 |
| 5. Xylene                     | 100                                             | 200  | 200                         | 200 | 200                 |
| <b>ALCOHOLS</b>               |                                                 |      |                             |     |                     |
| 1. Isopropyl                  | 200                                             | 500  | 500                         | 500 |                     |
| 2. n-Butyl                    | 25                                              | 50   | 25                          | 25  | 100                 |
| 3. Amyl (150)                 | 100                                             | 150  | 150                         | 100 | 55                  |
| 4. Cyclohexanol               | 100                                             | 100  | 100                         | 100 | 100                 |
| 5. Methyl Isobutyl Carbinol   | 25                                              | 50   | 50                          | 50  |                     |
| 6. Diisobutyl Carbinol        | 5                                               | 5    | 10                          | 10  |                     |
| 7. Methyl Vinyl Carbinol      | 25                                              | 50   | 50                          | 50  |                     |
| 8. Methylene Glycol           | 50                                              | 50   | 50                          | 50  |                     |
| <b>KETONES</b>                |                                                 |      |                             |     |                     |
| 1. Acetone                    | 200                                             | 500  | 500                         | 500 | 500                 |
| 2. Butanone (Mex)             | 200                                             | 350  | 350                         | 350 | 300                 |
| 3. Cyclohexanone              | 25                                              | 75   | 75                          | 75  |                     |
| 4. Methyl Isobutyl Ketone     | 100                                             | 200  | 200                         | 200 | 200                 |
| 5. Diacetone Alcohol          | 50                                              | 100  | 100                         | 100 |                     |
| 6. Diisobutyl Ketone          | 25                                              | 50   | 50                          | 50  |                     |
| 7. Isobutone                  | 10                                              | 25   | 25                          | 25  | 25                  |
| 8. Mesityl Oxide              | 25                                              | 25   | 50                          | 50  | 50                  |
| <b>ESTERS</b>                 |                                                 |      |                             |     |                     |
| 1. Ethyl Acetate              | 100                                             | 400  | 400                         | 400 | 400                 |
| 2. Butyl Acetate              | 100                                             | 300  | 300                         | 300 | 400                 |
| 3. Amyl Acetate               | 100                                             | 300  | 300                         | 300 | 400                 |
| 4. Methyl Amyl Acetate        | 100                                             | 100  | 100                         | 100 |                     |
| 5. Isopropyl Acetate          | 100                                             | 200  | 200                         | 200 | 200                 |
| <b>ETHERS</b>                 |                                                 |      |                             |     |                     |
| 1. Ethyl Ether                | 100                                             |      | 200                         |     | 400                 |
| 2. n-Butyl Ether              | 100                                             | 200  | 200                         | 200 |                     |
| 3. Isopropyl Ether            | 300                                             | 300  | 300                         | 300 | 500                 |
| 4. Dioxane                    | 200                                             | 200  | 200                         | 200 | 500                 |
| <b>MISCELLANEOUS SOLVENTS</b> |                                                 |      |                             |     |                     |
| 1. Trichloropropane           | 50                                              | 100  | 100                         | 100 |                     |
| 2. n-Nitropropane             | 100                                             | 150  | 150                         | 150 |                     |
| 3. Acetaldehyde               | 50                                              | 50   | 200                         | 200 | 200                 |
| 4. Styrene                    |                                                 |      |                             |     | 400                 |

\*Adopted from Silverman et al., Jour. Ind. Hyg. & Toxicol., Sept. 1943 & Nov. 1945.

## Health Protection in the Rubber Industry: Engineering Control

By WILLIAM E. MCCORMICK  
Industrial Hygienist, The B. F. Goodrich Company

With very few exceptions, the industrial health hazards of greatest import to the rubber industry are those accruing from inhalation of toxic vapors, dusts, and fumes, and from skin effects of various compounds. We have learned much during the past few years with respect to the proper handling of these materials. It is not so much now the question of determining the "know how" for safely using these items, as it is to see to it that accepted control measures are being used.

From the standpoint of number of personnel, exposure to solvent vapors seems to constitute the largest health problem. Fortunately the bulk of the solvents used are of the less toxic type. The control measures which can be generally used are substitution, enclosure, and ventilation.

Substitution is the replacement of a toxic material with a less toxic one without loss of productivity. As an almost classic example the replacement of benzol by less toxic solvents—particularly petroleum distillates in the rubber industry—might be mentioned. There are very few cases where the use of benzol as a solvent is a "must." Usually less toxic ones can be found. Numerous other examples can be cited such as the use of trichloroethylene or perchloroethylene in place of more toxic carbon tetrachloride, tetrachloroethane, or ethylene dichloride; also, the use of ethyl in place of methyl alcohol. It should be remembered of course that the mere substitution of a less toxic compound for a more toxic one does not in every case solve the health hazard. Additional control measures may be required. However, it is the first method which should be investigated.

Very frequently enclosure or even complete isolation of a hazardous operation can be effectively used as a control measure. Mechanical ventilation or personal protective equipment may be required in addition. Recently my company had occasion to handle, on a pilot plant scale, one of the more toxic compounds. It was found that the construction of a small temporary building completely isolated from the remainder of the

plant, was the safest—and cheapest—method of using the material. The process was carried out in a closed system, but the isolation was necessary as a precaution in case of accidental leaks. Many chemical manufacturing operations, fortunately, can be completely enclosed. In many cases the use of elevated pressures makes this mandatory and, thus, to a large degree controls any health hazards.

The type of control one finds most frequently and I might say promiscuously practiced, is that of exhaust ventilation. Unfortunately it is often used incorrectly. Its use involves more than just locating a wall fan in the general area and moving a large volume of air. Each process involves individual study, and the type and amount of ventilation needed should be carefully determined. By this method the contaminant can be controlled at its source—a "must" in many instances. Even in those cases where general ventilation might be adaptable, the use of local exhaust ventilation is often indicated due to its utilizing a much lower quantity of air. The added initial cost is often cheaper in the long run due to lower heat losses and lower power consumption resulting from less air exhausted. Only a careful study of each individual process can determine this.

Any industrial health control measure should be instituted on the basis of certain basic industrial hygiene engineering principles.

1. It must control the hazard. This requires a thorough study of the process involved, including the raw materials, the products and by-products, quantitative measurements of atmospheric contaminants, and duration of exposure of working personnel. Our present knowledge of industrial hygiene enables us to say that any known health hazard can be controlled. It is a question of adapting the proper measures to the specific problem. No better proof of this than the manufacturing processes related to the atomic bomb is needed. No evidence of health injury to any employee of this vast project has been observed.

2. It must be economically practical. The

ideal method of instituting health control measures is in the initial design of the plant or process. However, one must frequently work with existing equipment. Redesign may not be economically possible. The writer recently had occasion to review a graduate engineer's paper dealing with the control of a health hazard. The proposed solution was theoretically excellent, except that the manufacturer would have been put out of business in order to effect the control measures proposed. Industrial health and safety still need to be sold. Every opportunity should be taken to indicate means of winning off the expenditures involved in lower compensation costs, lower absenteeism, better employee-employer relationships, less product contamination, etc.

3. It must not interfere with the employee's production. This is particularly true of those operations involving piece work wages. Little comment on this is necessary. The location of exhaust hoods and ventilating equipment must be such as not to interfere

with production. Personal protective equipment, particularly respiratory, should be used only as an adjunct to other control measures, or where other measures are wholly impractical. Notwithstanding the fact that many commercial respirators are efficient devices, working personnel resist wearing them and will do so only when actually compelled to. This, of course, is usually impractical and frequently impossible.

4. It must meet local and/or state codes. This is particularly true with respect to maximum allowable concentrations of atmospheric contaminants, ventilation codes, and the release of atmospheric contaminants out of doors. Little uniformity exists between different states and municipalities with respect to these codes. Some are only advisory; others are legal statutes. A thorough investigation should be made of any existing codes before an installation is made. Following the installation, the necessary measurements should be made to determine the effectiveness of the control.

### The Hygiene Survey in the Rubber Industry

By F. W. SANDS

Industrial Hygienist, U. S. Rubber Company

A recently-suggested definition<sup>1</sup> of industrial hygiene is as follows: "Industrial hygiene is the science and art of preserving health through the recognition, evaluation and control of environmental causes and sources of illness in industry." Included in the scope of this definition is the recognition, sampling, and analysis of atmospheric contamination, dusts, gases, fogs, mists, vapors, radiant energy, illumination, noise, temperature and humidity; interpretation of the results of analysis; and studies into the causes and control of dermatitis.

The plant health survey is the practical application through the actual study of plant conditions of all of the principles enumerated in the definition of industrial hygiene itself. The definition above speaks of recognition. Ability to recognize conditions affecting employee health is a prime requisite for performing a successful health survey.

The first plant visit necessarily involves the gathering of a great deal of general in-

formation, statistics, study of hospital records, etc. The industrial hygienist must obtain a general picture of the products manufactured, the operations involved, the raw materials being used, the number of employees, and a great many other factors. Rather than to go into this general type of information in detail, I prefer to call your attention to several forms<sup>2</sup> which were developed by the United States Public Health Service for use by its field representatives in industrial health. Copies of these forms are available to you here. I believe that it is very important that information of this general nature be obtained systematically. These forms assist greatly in avoiding the omission of important health factors.

Having obtained this information, the industrial hygienist is in a better position to make the trip through the plant itself. The importance of the actual plant visit cannot be over-emphasized. It is here that all the knowledge, training and experience of the

industrial hygienist is put to the test, and ability to recognize comes into play.

We have found it advisable in our company to set up raw materials control committees at all locations. The size of these committees varies with the size of the plants and the type of work being done. But the function of these committees is, in general, to review periodically all raw materials used in the plant, and to study any problems which may develop from the introduction of new chemicals. The scope of their work also involves a review of process changes which may affect employee health. The work of this committee provides a valuable source of information during the plant health survey.

A followup visit to the plant differs from the first visit only in that the preliminary general information obtained on the forms described above need not be repeated and it is necessary only to inquire whether any changes should be noted, and here again, the plant raw materials control committee can supply much valuable data.

Up to this point we have been dealing with general principles which I have been trying to apply specifically to the rubber industry for the past five years. However, I have found that the conditions I have been most concerned with have had nothing to do with rubber itself. I refer to such operations as laundry work, electroplating, asbestos cloth manufacture, plastics, chemicals and, during the war, even TNT. We, in the rubber industry, make use of hundreds of chemicals. It is the responsibility of the field hygienist in the rubber industry to familiarize himself with the available information on any health problem involving the use of rubber chemicals and their individual physiological characteristics. To perform an intelligent plant health survey, this information is basic.

It very often happens that during the course of a general health survey very specific questions are raised. It may be that the development department is planning the use of naphthoquinone in a certain operation, and they are anxious to know what health hazards are involved and what handling precautions are necessary. Or perhaps they are

considering the substitution of isobutylene for another solvent and the question is raised as to whether this involves a health hazard. It is advisable to check with the development department and the raw materials control committee on each visit. These plant surveys then offer a wonderful opportunity to study and to evaluate possible health conditions brought about through changes in processes.

Certain specific tools are available for the evaluation and analysis of various types of health exposures. Some of these tools are the direct reading instruments such as the benzol indicator, carbon monoxide indicator and the sampling instruments which require subsequent laboratory work such as the midge impinger, the chlorinated hydrocarbon sampling apparatus, etc. In many cases it will be found that standard methods for sampling and analysis of a given contaminant are not available and it is then necessary to carry out a certain amount of research to develop such methods. This is quite frequently the case in the rubber industry where we are dealing with a large number of complicated chemical compounds the exact physiological action of which is not clear.

The survey is not complete until a written report has been submitted. This report should contain not only the necessary recommendations for control but also an explanation of the reason for those control measures in simple and non-technical language. General knowledge of engineering control methods is necessary, although in most cases only general suggestions as to a method of control will suffice. Most plants have engineers equipped to handle the specific problems, if it is a question of ventilation. Methods other than engineering control should also be considered in the final report. It is extremely important that each recommendation be followed up for compliance, and it is our practice to request a reply by a certain date.

<sup>1</sup>F. A. Patty, *Industrial Hygiene Newsletter*, Vol. 7, No. 4, Oct., 1947.  
<sup>2</sup>J. J. Ruppel, *Industrial Hygiene Records: The Industrial Hygiene Survey*, Am. J. Pub. Health, Vol. 35, No. 5, p. 557, June, 1945.

## Health Protection in the Rubber Industry

By REX H. WILSON, M.D.

Medical Director, The R. F. Goodrich Company

When an employer engages an individual to work for him, he obligates himself to pay that individual a stipulated amount of money for a specified number of hours of satisfactory work performed. The individual in turn obligates himself, when he accepts the job, to perform the required work to the best of his ability for the specified period of time. The above bargain is the fundamental concept behind all employer-employee relationships. However, in modern industry the average employer does not feel that his obligation to his workers ends here. He further obligates himself to provide for them comfortable, safe working conditions and a healthy environment. Modern industry has become aware of the fact that the better the workman's environment is, the better his work performance is.

Medical departments in industry have been created to assist in the providing of comfortable, safe, healthy working conditions. The rubber industry has recognized the benefits to be derived from protecting the health of its workers. The medical departments of the industry are modern and adequate in all respects. The responsibilities of the medical department in the rubber industry are increasing, and the problems are becoming more complex because the industry is branching out into many new fields.

When the research division of the R. F. Goodrich Company introduced Ameripol general purpose rubber (also called synthetic rubber), they opened an entire new field of chemical research. The industry followed this lead and American-made rubber became a rival of natural rubber. Some of the chemicals used in the manufacture of synthetic rubber are butadiene (methyl-allene), styrene (vinyl benzene), and acrylonitrile (acrylonitrile-vinyl cyanide). To these are added various catalysts and modifying agents. The entire manufacturing process is carried out under pressure with exacting control. The chemical ingredients of American-made rubber are both flammable and toxic and must be handled cautiously. Thus the rubber industry has evolved to a large degree into a chemical industry.

Since textiles, metals of all kinds, wood,

and practically all materials known to man are being combined with rubber both natural and synthetic, the problems involved in the various manufacturing processes have become quite complicated. One result has been that without the constant vigilance of the rubber industry's medical and safety departments the worker's environment might have become increasingly hazardous. To aid in the recognition of and to cope with a potentially increasing hazardous environment in some manufacturing branches, it has been necessary to add industrial hygienists and trained toxicologists to the staffs of the industry's medical departments.

The medical department's prime duty is still to care for those injuries and illnesses resulting from work in the plants. The responsibility for maintaining a safe environment for the worker has been added to this prime duty and has necessitated an expansion of personnel and equipment. Management has come to realize that a safe non-hazardous place to work is necessary, and the medical department has been forced to keep pace by widening its fields of activity.

The worker has many contacts with the medical department. He comes in contact with the medical department as he enters into his new employment. He receives a complete physical examination. This includes a physical inspection and the performing of various laboratory examinations when indicated. If during his employment he becomes sick or is injured, he again comes in contact with the medical department, this time for medical care. To provide this medical care, the best physicians in the various specialties have been engaged either on a full or part time basis. To assist these physicians well-trained registered nurses and technicians are provided. When the ailment is severe enough, the worker is hospitalized in a modern hospital and the best medical talent is entrusted with his care. The worker also constantly comes in contact with the medical department since the environment into which he is placed is being constantly scrutinized for health hazards. He may receive at regular intervals, if his environment is considered to be hazardous, a physical check-up with in-

dedicated laboratory procedures. For example, workers exposed to solvents receive an "on the job" complete blood count every two months. This is in addition to the initial blood count which workers receive on entering into this type of employment. Any deviation from normal is the signal for the individual to be removed from this environment. He is treated by the medical department until his condition has been corrected. Individuals who have acquired an abnormal blood count in this manner are never permitted to work again in departments using solvents.

All workers engaged in the handling of volatile lead are subjected to scrutiny every three months, at which time a physical inspection is made and quantitative examinations are performed on the blood and urine. Again any deviation from normal is a sign for removal of the individual from this environment. A system of rotation has been worked out in departments in which lead is used so that a worker is not constantly exposed to lead over a long period of time.

Individuals working on an extremely dusty environment receive chest x-rays at least semi-monthly. Particular attention is paid to those workers handling silica and asbestos. Again any deviation from the normal is sufficient reason for transfer to a different type of work.

Whenever a hazardous situation is discovered, immediate steps are taken to remedy it. It is not enough to keep a constant medical check on workmen in hazardous jobs, but a constant effort must be made by the industrial hygienist and the engineer to prevent hazardous situations from occurring. Also once equipment is installed to remove the hazard, it must be constantly checked to see that it is kept working.

The services of a competent dermatologist are engaged to evaluate all dermatological problems. A competent allergist is retained to investigate problems having an allergic basis. A competent ophthalmologist handles all eye cases.

It is only natural for the workman to attribute any physical ailment that may arise to his work. The medical department must evaluate these claims carefully. The legitimate case should be properly treated, and if necessary, the workman removed from the causative agent. The workman, whose illness or injury is not due to his work, must be

referred to a private physician. At the same time it must be explained to him why his condition is not considered to be occupational in character. It is difficult to judge all of these cases. The usual rule is to give the employee the benefit of any doubt, and when his case is such that it could be due to his occupation to consider it as occupational in character.

The mass testing of workmen for syphilis or tuberculosis is not being done by most of the rubber industry's medical departments. In several plants some group chest x-ray have been taken and some blood serologies have been drawn. In general, it is felt that any type of examination of groups of people is a public health service to be performed by designated public health authorities for the public welfare. When performed by these authorities, proper care for the afflicted individual can be arranged and the necessary investigation of contacts can be pursued.

It must be realized that the medical activities of any industry can only be justified when the cost of operation of these activities does not become a burden to the industry. Also the results of the activities of the medical department must indicate the need of having a medical department. Thus it is mandatory that the only real jobs of the medical department are to protect the health of the worker while he is in the plant and to care for the illnesses and injuries arising from his work.

The worker is encouraged to consult with the staff of the medical department on his personal health problems. The medical department is always ready to recommend a course of action to pursue and can direct the individual to the several competent physicians in the community who are capable of assisting him. When it is necessary, money is made available to the employee for medical care. Hospitalization insurance is now available to all employees. For a very small amount of money which the worker can elect to have deducted from his pay, hospital care can be provided for himself and for his dependents. Most of these hospitalization plans either have or are contemplating increasing the benefits to include the cost of medical care.

The medical department should be composed of a group of professional people who, without any prejudices, engage in the purely professional practice of medicine. Non-professional activities are to be carefully avoided.

The medical department can best perform its mission when it acquires a reputation for the professional integrity of its decisions. In addition, all information that is received from a patient is to be kept in strictest confidence.

Because of the numerous chemical compounds introduced into rubber manufacture, the industry is engaged in an extensive research program. Many new chemicals, of which very little is known, are sent to the chemical department for toxicological evaluation. Usually these toxicological studies are referred to the laboratories of leading universities to be carried out. No new product is placed on the market until all of its toxicological properties are thoroughly investigated. The information learned from these investigations, not only to protect the customers who use the product, but also protect the health of the workers who are engaged in the manufacture of the product. This investigative type of work is most interesting as it permits the medical man to come in close contact with the various aspects of the manufacturing process and to assist in solving some of the manufacturing problems. These research problems also offer to the med-

ical department a worthwhile job in preventive medicine.

In summary, the rubber industry, under the direction of its various managements, is adequately providing for the protection of the health of its workers. The medical departments are justifying their existence in demonstrable ways. Competent medical care, under the direction of skilled physicians is made available to the unfortunate individual who acquires an occupational disease or injury. The industrial hygienist and the safety man are combining their talents to insure that the worker's environment is non-hazardous to him. Research workers are not only discovering new products, but are investigating old ones in respect to their toxicological properties so that proper steps can be taken to prevent both the worker and the consumer from suffering from ill effects.

All of these forces combined are more reasons why the rubber industry is an outstanding industry in this great industrial country of ours.

\*Wilson, Rex H.: Health Hazards Encountered in the Manufacture of Synthetic Rubber; Journal of the American Medical Association, Vol. 129, pp. 701-703; March 11, 1944.

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## Transactions

### 35TH NATIONAL SAFETY CONGRESS



VOLUME XXIII

TEXTILE SECTION

NATIONAL SAFETY COUNCIL, INC.  
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## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

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### Textile Section

#### TUESDAY AFTERNOON SESSION

October 7, 1947

General Chairman: E. G. PADGETT, Employers Mutual Liability Insurance Company

### Safety Factors Involved in Mechanical and Manual Materials Handling

By C. S. LINK, JR.  
Avondale Mills

This entire paper is based on the experience gained in connection with the safety programs and materials handling projects as is being carried on in Avondale Mills' eleven plants in Alabama.

In Avondale Mills, the matter of safety is on an equal footing with such items as production, quality and deliveries, and, most fortunately, is the fact that this interest in safety is spearheaded by top management.

It was top management's idea to set up the plan by which a group of people in each department and each plant were asked to serve for a month on a committee whose interests would lie in one of four directions—one group on safety, another group on good-housekeeping; another on thrift and still another on oiling. These groups are selected in alphabetical order from the payrolls and at the start of the program, half of them served for two months, the other for one month; thus we now have the half of the group with experience in the subject, breaking in the new half. Over a period of time, therefore, all employees will have served, at some time or other one or all of these groups.

These groups hold monthly inspections of the entire plant, then sit down and talk over their findings; a written report is made to the general office. All suggestions are acted on or rejected if not feasible, and prizes are given for worthwhile suggestions.

When a lost time accident occurs, the full details are reported to all superintendents as well as the main office; statements are taken from the injured as to how it occurred and the best possible safeguard suggested as to how to prevent a re-occurrence. Each such accident and report is then taken up at the monthly meeting of the safety group and thoroughly discussed, and notes made of their suggestions and criticisms.

When a minor accident occurs that does not involve lost-time, but which does involve

medical attention or first aid, the name of the injured, his explanation, the nature of the accident and the causes are carefully recorded and a monthly report filed with the main office. Here they are consolidated, and a frequency rate established and results are reported to the committee and occasionally published in our house organ, the Avondale Sun.

We own and operate our own hospital in Sylacauga, and thus the statistics presented will be a result of actual hospital cases as well as results obtained from the monthly reports.

Materials handling equipment must fulfill certain basic requirements: safety to operators and to other employees; prevent fatigue; increase productivity per employee; promote good-housekeeping and make a reasonable return on the investment. All of these are basic and fundamental.

In two plants we have installed low-level dump chutes for dollers, so that when a frame is doffed there is no need to lift 150 pounds four feet to dump the yarn into a larger box. The yarn is dumped into the proper chute which leads to a large hopper which holds from 1500 to 1700 bobbins—six or seven dollers.

In one of these plants, before this installation, we had a hospital record of four to five cases a day of lost-time due to strained back. Since this installation has been in use there hasn't been a single case.

In another plant a system was installed to return empty bobbins to a conveniently located station, near the center of the spinning room, as fast as they were emptied at the winders. This eliminated a large part of lifting with doll boxes, kept large supply boxes off the floor, utilized space under the mill and along the ceiling with savings on all these points.

In the weaving mill the cloth dollers took their rolls of cloth great distances, hoisting

the heavy rolls on their shoulders, placing them on a large truck which when filled, was pushed to the cloth room, a distance of 550 feet. There was the ever-present danger of pushing this piled-high truck into wraps, or into operators, or from being suddenly stopped by a quill on the floor causing injury to the employee himself. This has been eliminated by installing a belt carrier overhead down a large alley, together with three air hoists which raise the cloth rolls up to the carrier. On the second floor, drop chutes through the floor permit the cloth doffer to drop the rolls onto the belt. The belt carries this cloth directly into the cloth department.

That for accidents to occur, many factors are required. In the yarn plant, the factors are:

1. The heavy rolls on their shoulders, placing them on a large truck which when filled, was pushed to the cloth room, a distance of 550 feet. There was the ever-present danger of pushing this piled-high truck into wraps, or into operators, or from being suddenly stopped by a quill on the floor causing injury to the employee himself. This has been eliminated by installing a belt carrier overhead down a large alley, together with three air hoists which raise the cloth rolls up to the carrier. On the second floor, drop chutes through the floor permit the cloth doffer to drop the rolls onto the belt. The belt carries this cloth directly into the cloth department.

In the yarn mill, two elderly men per shift were used to roll big supply boxes of yarn to the winders and there, by hand, place the bobbins, a few at a time, into the supply shelf at the top of the winder. Here again fatigue was proving a safety hazard. This

problem was solved by providing an electric hoist that raised the doll box into the conditioning unit, the yarn then traveled up a belt equipped with cleats, to a cross belt over the end of the winder, through automatic closing or opening gates. At the proper winder, the yarn would be deposited into a large hopper, sufficient to hold a sixteen hour supply. From the hopper a belt replaced the yarn storage shelves along the top of the winder. When yarn was needed, the operator pushed a button and this belt brought the yarn out of the hopper into position for the winder hand.

It will be noted that these installations cut out four to six men per shift in quill handling and one man per shift in laying yarn on winders. This represents a reduction in man power required and an increase in production per man. There is also another factor in the weave room organization. The men have to wait to be taken to the loom, but is sent there the moment he is called. In the yarn plant, the men have to walk to their supply of yarn, which is only one half the distance walked. Thus again a gain in production per employee. Other gains

in production which had been made in the past, many that are still being made, have utilized space not heretofore used as costing money, but which is now being used. We have used space in the loom room, under the floor, along the walls, under the floor, along the walls, and above the lines of traffic. We have eliminated numerous boxes used for yarn storage, and we have minimized the pushing of boxes in work spaces.

In one plant there is being installed a system of handling and storing picker laps, directly from the pickers and automatically placed at the back of the cards with provision for handling and selection of four different laps, if necessary. This will eliminate such things as loose cotton, broken laps, damaged machinery, loading and unloading a lap truck, pushing it to a card, unloading and placing in the supply rack, and damage to the lap when dumped on its end after doffing. With this system, the laps will travel out of the line of traffic, at the back of the cards.

The cost of these various installations are carefully computed, contracts for installation,

or our own costs carefully scrutinized before installation is made. Elimination of help and increased production is taken into consideration. The installation of materials handling equipment in itself does not necessarily mean the reduction in a labor force—sometimes it may even increase it. So all factors should be carefully analyzed, perhaps models actually constructed, or limited installations made before a complete analysis of the return on investment can be made.

### Labor's Responsibility

By FORRESTER

Commissioner, State Department

Since it is estimated that 85 per cent of accidents are caused by "human failure" and since "human failure" can be eliminated only by the worker, it would seem that the worker is primarily responsible for the effectiveness of any safety program and needs only to be taught all safety rules and regulations; use all protective equipment provided; and never permit a careless act in order to solve the safety program. Unfortunately it is not this simple. Safety is the joint responsibility of management and labor. Safety is indivisible. In actual practice many of the responsibilities for an effective safety program are joint responsibilities of management and labor. The wholehearted efforts of both are essential to the development of a sound safety program. Without this cooperation we will continue to have millions of industrial accidents annually which could otherwise be prevented.

For many years industrial safety has been regarded as management's prerogative. Practically all national and state safety meetings, and meetings in plants where planned safety programs are initiated, have been attended, participated in, and handled exclusively by management. Only in exceptional cases has management given labor—either as organized units or as individual workmen—a responsible part in the development of a safety program.

Despite the fact that no accident prevention program ever devised has been able to cope with the situation without at least a moderate amount of cooperation and participation of workers, it has never dawned upon most of us that the cooperation of labor can be secured. It can be secured, but only

Only a few of the installations we have made at Avondale plants were considered here. Our program includes such projects as handling cotton from cars and trucks into the proper warehouses; handling cloth from warehouses into cars or trucks; handling waste from bins into presses and to storage; supplies and several other materials handling projects. Avondale plants are interested in these projects for the benefit of themselves.

Why do workers fail to cooperate? Do they understand fully what complete cooperation means to them? With whose program do they fail to cooperate? If you say "management's safety program," then you have in that phrase the explanation of failure. Until management and labor realize that industrial safety is dependent upon the teamwork of both groups, and begin to act in accordance with that fact, then labor will not and cannot carry out its responsibility. The worker should realize that he has a

the heavy rolls on their shoulders, placing them on a large truck which when filled, was pushed to the cloth room, a distance of 300 feet. There was the ever-present danger of pushing this piled-high truck into wraps, or into operators, or from being suddenly stopped by a quill on the floor causing injury to the employee himself. This has been eliminated by installing a belt carrier overhead down a large alley, together with three air hoists which raise the cloth rolls up to the carrier. On the second floor, drop chutes through the floor permit the cloth doffer to drop the rolls onto the belt. The belt carries this cloth directly into the finishing department.

That fatigue is an important source of accident is a recognized fact. Some mills employ elderly men on jobs that do not require skill, but rather manual labor and a minimum of physical strength. These men tire more quickly than younger men, and are thus a potential source of accidents.

In one plant, the filling yarns last only so seconds in the shuttle. The use of a quill stripper was impractical, and all stripping was done by hand. Four to six elderly men were used on stripping these quills by hand each shift. The work required that they bend down into a large box to grasp loose ends of yarn on the quills and pull it off. At times as many as two hundred bobbins would be involved—a big load for a man, and the constant bending, pulling and twisting was very fatiguing with the result that there was frequent absenteeism. The reason usually given was "I'm just wore out." A line of conveyor belts was installed under the floor and under each line of looms. Holes were cut in the quill cans and through the floor, so that when the loom ejected a bobbin, it fell directly onto this belt which carried it to a cross belt, which in turn deposited the quill at a work table. Here one man, sorted the quills that could be put back into the looms from those that could not, dropped the quills into the hopper at his side from which a belt with cleats carried the empty quills back up stairs to a central point in the spinning room.

In the yarn mill, two elderly men per shift were used to roll big supply boxes of yarn to the winders and there, by hand, place the bobbins, a few at a time, into the supply shelf at the top of the winder. Here again fatigue was proving a safety hazard. This

problem was solved by providing an electric hoist that raised the doff box into the conditioning unit, the yarn then traveled up a belt equipped with cleats, to a cross belt over the end of the winders, through automatic closing or opening gates. At the proper winder, the yarn would be deposited into a large hopper, sufficient to hold a sixteen hour supply. From the hopper a belt replaced the yarn storage shelves along the top of the winder. When yarn was needed, the operator pushed a button and this belt brought the yarn out of the hopper into position for the winder hand.

It will be noted that these installations cut out four to six men per shift in quill handling and one man per shift in tying up yarn on winders. This represents a reduction of men required and an increase in productivity per man. There is also another saving in the weave room organization. The cloth does not have to wait to be taken to the cloth room but is sent there the moment it is doffed from the loom. In the yarn plant the doffers have to walk to their supply of bobbins at a maximum of only one half the distance formerly walked. Thus again a gain in productivity per employee. Other gains are still possible.

In every installation which had been made so far and the many that are still being planned, we have utilized space not heretofore considered as costing money, but which in reality does. We have used space in the businesses, under the floor, along the walls, near the ceiling and above the lines of traffic. We have eliminated numerous boxes used for temporary storage, and we have minimized the pushing of boxes in work spaces.

In one plant there is being installed a system of handling and storing picker laps, directly from the pickers and automatically placed at the back of the cards with provision for handling and selection of four different laps, if necessary. This will eliminate such things as loose cotton, broken laps, damaged machinery, loading and unloading a lap track, pushing it to a card, unloading and placing in the supply rack, and damage to the lap when dumped on its end after doffing. With this system, the laps will travel, out of the line of traffic, at the back of the cards.

The cost of these various installations are carefully computed, contracts for installation,

or our own costs carefully scrutinized before installation is made. Elimination of help and increased production is taken into consideration. The installation of materials handling equipment in itself does not necessarily mean the reduction in a labor force—sometimes it may even increase it. So all factors should be carefully analyzed, perhaps models actually constructed, or limited installations made before a complete analysis of the return on investment can be made.

Only a few of the installations we have made at Avondale plants were considered here. Our program includes such projects as handling cotton from cars and trucks into the proper warehouses; handling cloth from warehouses into cars or trucks; handling waste from bins into presses and to storage; supplies and several other materials handling projects. Avondale invites any who are interested to visit the installations and see for themselves.

### Labor's Responsibility in a Safety Program

By FORREST H. SHUFORD

Commissioner, State Department of Labor, North Carolina

Since it is estimated that 88 per cent of all accidents are caused by "human failure," and since "human failure" can be eliminated only by the worker, it would seem that labor is primarily responsible for the effectiveness of any safety program and needs only to obey all safety rules and regulations; use all protective equipment provided; and never permit a careless act in order to solve the safety program. Unfortunately it is not this simple. Safety is the joint responsibility of management and labor. Safety is indivisible. In actual practice many of the responsibilities for an effective safety program are joint responsibilities of management and labor. The wholehearted efforts of both are essential to the development of a sound safety program. Without this cooperation we will continue to have millions of industrial accidents annually which could otherwise be prevented.

For many years industrial safety has been regarded as management's prerogative. Practically all national and state safety meetings, and meetings in plants where planned safety programs are initiated, have been attended, participated in, and headed exclusively by management. Only in exceptional cases has management given labor—either as organized units or as individual workmen—a responsible part in the development of a safety program.

Despite the fact that no accident prevention program ever devised has been able to cope with the situation without at least a moderate amount of cooperation and participation of workers, it has never dawned upon most of us that the cooperation of labor can be secured. It can be secured, but only

by good leadership which recognizes the necessity of active participation by workers in both the development and operation of a safety program.

Enlightened management has realized that the best in the field of production results cannot be secured from employees simply by ordering them to move in a certain direction and expecting blind obedience. Likewise the citadel of accident prevention cannot be captured by military discipline; yet in many instances safety programs have been devised by management and thrown at workers. Where such an approach has been used, safety programs always have failed. This failure usually is followed by the complaint that a lack of cooperation by the workers and their failure to assume their proper responsibility were the reasons for the program's poor results. In the vast majority of such cases, it will be found that the failure is the logical result of management's mistaken approach to the problem. A safety program is doomed from its inception if the approach is one of orders and discipline alone.

Why do workers fail to cooperate? Do they understand fully what complete cooperation means to them? With whose program do they fail to cooperate? If you say "management's safety program," then you have in that phrase the explanation of failure. Until management and labor realize that industrial safety is dependent upon the teamwork of both groups, and begin to act in accordance with that fact, then labor will not and cannot carry out its responsibility.

The worker should realize that he has a



greater direct and personal interest in safety than anyone else. To him it means a longer life and a whole body, an unimpaired earning capacity and a full pay envelope. He is the primary victim of industrial accidents and the primary beneficiary of industrial safety. When he fails to cooperate wholeheartedly in an accident prevention program, it is because he is uninformed, or because management is expecting blind obedience and has not developed a program of cooperation and joint responsibility.

Despite the worker's direct and personal stake in safety, there is no getting around the fact that the primary responsibility in developing a safety program belongs to management. Management must furnish the mechanical safeguards, the protective equipment, and the other physical elements which are essential to a safe and healthful place to work. Management has the authority to make safety rules and regulations for the guidance of employees in working practices and in the use of safety equipment. Likewise, management has the responsibility of selecting a well-trained safety director and otherwise exercising the leadership which is necessary in the development of a safety program. It is after these responsibilities have been met by management that the responsibilities of the workers come into play.

Once a safety program has been initiated by management, the cooperative efforts of labor in working out the practical details of the program become necessary. In so far as organized workers are concerned, the local leaders of a labor union have great difficulty in assuming responsibility for a safety program on behalf of its membership unless they are given some opportunity by management to participate in the program.

As safety directors, you men know that in establishments composed of many departments in each of which a superintendent, overseer, or other supervisory person is in charge, you are unable to carry out your responsibility in developing an effective safety program unless you are given some authority along with your responsibility. Likewise, the selected local leadership of a labor union can assume little responsibility for accident prevention unless it is given some voice in the development and application of the program.

Frequently, in organized plants in which the relationship between management and

unions is on a friendly basis and where contracts governing wages, hours and other points which normally enter into these contracts are mutually satisfactory, we find that the development of a safety program is regarded as a duty from which the union and its leadership in the plant should be excluded.

The participation of labor, whether organized or unorganized, is essential in all aspects of a safety program where the human element is involved. The safety committee in charge of developing specific rules and regulations, for example, should include worker representatives who are selected by the workers themselves. These representatives should be leaders among the workers; people to whom the other workers will listen and by whose advice and suggestions they will be guided.

When committee meetings are held, the local worker representatives should be encouraged to present the point of view of the workers concerning each regulation, each item of safety equipment, and each new machine guard. The worker who operates a machine is the person most likely to know whether a particular type of guard serves its intended purpose; whether it is practical; whether it will give the needed protection; and whether it will interfere with production. He knows whether a particular item of personal protective equipment is cumbersome or uncomfortable, and the extent to which it actually protects him from injury. The same criterion applies to rules and regulations. The worker is usually able to tell whether a regulation will contribute to safety and the extent to which it may interfere with production.

With respect to individual workers' responsibilities in the use of safety protective equipment, we are aware of the frequent complaints from management that labor will not cooperate in the use of such equipment. In too many cases, however, equipment is selected without consulting the workers who use it, and in many more cases without a thorough investigation of the use for which it is intended.

The primary responsibility in this matter is upon management, with the secondary responsibility being that of the worker. If management carries through in an intelligent manner, furnishing the necessary leadership and education, enlisting the cooperation

of the workers by giving them an opportunity to participate in the program, and insisting upon firm discipline in the case of recalcitrant employees, in almost every case, the individual worker will assume the responsibility which is his part of the accident prevention job. When the worker feels that he is being accorded the responsibility which is rightfully his, he will respond by carrying out his part of the bargain. When disciplinary action is necessary in the case of a recalcitrant employee, the bulk of the workers will respond by backing up the safety department in its action.

I recall an experience which was related to me by the manager of a small stone-cutting plant during the early '90's, in the midst of the depression. In this establishment, goggles were provided for all employees and regulations were posted requiring their use. However, very little effort was made by the management to instruct the workers in the necessity for using these goggles and the danger incurred by the worker who failed to use them. Neither was any particular effort made to enforce the regulations which required the use of these goggles. The workers were not asked to participate in the formulation of the safety regulations and did not realize that they had any special part in them.

Although eye injuries occurred from time to time as a result of flying particles, no one had ever lost an eye in this small plant, and whatever cost resulted from the eye injuries which did occur was always paid by the insurance carrier. From a financial standpoint, therefore, the management failed to realize that it had a stake in preventing these accidents.

One day a flying particle hit a worker in the eye and the eye was lost. About the same time the insurance company went bankrupt — (you will remember that I stated this was in the midst of the depression when so many businesses were failing). The employer had to assume the financial responsibility of payment as required by the Workmen's Compensation Law. During ordinary times the cost would not have been a heavy burden, but during the depression days when the employer was struggling to meet his small payroll and other overhead expenses, a two or three-thousand dollar liability, such as this accident involved, was like a millstone around his neck.

After this unfortunate experience he de-

cided that this kind of accident imposed too heavy a financial burden upon the company. Likewise, he realized that it placed the worker under an even greater financial handicap by impairing his earning capacity for life. He sought the cooperation and assistance of his workers in an improved accident prevention program. The workers were asked to participate in the development of certain safety rules and regulations which would protect them from the more common hazards of stone cutting. Disciplinary action was taken with any recalcitrant employee who failed to observe these regulations, and this action met with the approval of the workers generally.

After this revised safety program had been in operation for a short time it was noted that the number of minor accidents which previously had been accepted as unavoidable decreased greatly, so that the possibility of more serious accidents became much more remote. The employer saved money on his insurance premiums through an improved experience rating. He saved money through the productive use of working time which would have been lost as the result of minor accidents. He increased both his production and earnings through the increased efficiency of his workers.

The economic position of the workers in this plant likewise was improved. Less working time was lost from minor accidents—and to the worker, the loss of time is the loss of money. As it turns out in most cases, the use of protective safety equipment increased rather than decreased production. With the increase in production, better wages were paid, and the workers profited from the increased wage scale.

For two reasons the goggles were found to be less objectionable than they had been previously. In the first place, much of the objection which these workers had to goggles was imaginary. In the second place, through the participation of the employees in the plant safety program, a better type of goggles was secured upon the recommendation of the workers. This removed much of the real as well as the imaginary objection to the use of goggles.

I believe that this account of how a safety program in a small plant was made to work furnishes an illustration of the importance of the human element in carrying out all accident prevention programs. So long as the program was handed down from management

without consulting the workers, it was a failure. When events forced the employer to revise his ideas and enlist the cooperation of the workers in a mutually planned program, it was a success. I believe that in many, many cases of failure, the problem is just as simple as that.

Encourage full participation of worker members at safety committee meetings; encourage labor to participate in the safety

education of the workers; encourage workers to make safety suggestions which will be evaluated fairly, and for which recognition will be given where due; and encourage workers to become a working part of all planning for safety. If these things are done, labor, in nearly every case, will assume its responsibility in a safety program, and the effectiveness of such programs will be improved beyond expectation.

### New Ideas for Mechanical Interlocks in the Textile Industry

By R. W. LAUGHLIN

Supervisor, Loss Prevention Department, Liberty Mutual Insurance Company

The only new idea for interlocks in the textile industry is the growing acceptance or willingness of mills to provide this type of machine guarding. The basic features of interlocked guards have been known for years, but have not been applied widely.

Before going into a review of some of the basic principles of interlocking it might be well to present a reason for the increased inventiveness and ingenuity required to devise new applications of old ideas.

Much is still being said about textile mill accidents, but too little thought is yet given to the true definition of an accident. "An accident is an unforeseen or unexpected event" and yet I will venture to say that every safety man in this room can give the expected number of injuries that will be caused by the operation of machines in his mill during the coming year. What is more, each one can predict with reasonable certainty the number of cases that will occur as the result of the operation of certain types of machines. Yet we still refer to these injuries as accidents and talk about the need for increasing our accident prevention efforts.

Years ago when safety efforts were in their infancy a great deal of stress was put on machine guarding as the first step in a basic safety program.

Then came the three E's—Engineering, Education and Enforcement. A fourth E—Enthusiasm was added by some safety men. We then passed through the cycle of training programs instead of educational procedures and have more recently considered psychology and human engineering as a solution of many

of our problems. But the percentage of accidents resulting from the operation of cards, pickers, wash rolls, shears and the innumerable types of rolls of various types still continues to be the same.

It is true that many mills that have done a better job of guarding may have cut their percentage somewhat as compared with mills that have made no further attempt to guard such hazards as exist on many of the machines mentioned. Isn't it time to explore the possibilities of new guarding applications on machines which continue to produce these injuries?

Some mills are beginning to develop interlocks on guards for the hazardous points of machines that heretofore have not been so guarded.

Let us consider the definition of an interlock. An interlock is a device that prevents a guard or enclosure of a hazardous machine part being raised or opened until the machine has stopped and also prevents the machine being started while such guard or enclosure is open or raised.

Guards provided with interlocks must be attached to the machine. They are or can be so arranged, however, that cleaning and repairing can be done without removing the guard. This is not true of the usual type of fixed guard. Fixed guards sometimes must frequently be removed and too often someone forgets or gets just plain indifferent and the guard is not replaced.

You all no doubt are familiar with the rotating slotted disc and slide type of interlock that has been used for years to protect

against the hazards of cotton picker beaters. That is type number one. But before discussing guarding or mechanical interlocking further the thought occurs that no matter how much inventiveness or ingenuity may be displayed by someone in devising a new type of guard or interlock, the workman on the particular type of machine should be brought into the picture early in the development.

This procedure is a deviation from the mechanical aspects of the subject of this talk, but the human relations angles can also be pictured as a means of interlocking human interest. Sometimes the hand clasp or sincere put on the back is the link that makes the development of a guard possible. Quite frequently that operator, fixer or floor worker will come up with an idea that is more practical and inexpensive than that designed by an engineer.

The next type of interlock was developed through the coordination of the thoughts of a number of people. It is a gravity V type shipper interlock developed for use on one type of dye kettle. The operation was such that in case of a power failure, the kettles could be cranked by hand, to prevent spoilage of the material being dyed.

One day a power failure due to a thunder storm occurred. The operator of one of the kettles forgot to ship the shipper in the off position. The power suddenly returned and the hand crank struck the man a glancing blow on the head. Fortunately no serious injury resulted, but it was apparent that a serious case could happen from this cause.

An investigation of a means of prevention was started. It was comparatively easy to devise an electrical means of control that would be quite expensive to install on the fifty kettles and that might well be expected under wet dye house conditions to require a lot of time and maintenance expense.

An estimate of the cost per unit was approximately \$600 for the first installation alone. It was thought that a further attempt should be made to devise a mechanical gadget. An engineer spent a whole day sketching up an idea that would work and cost only \$250 to make. The overseer and department second hand, reviewed the sketches and had improvements to suggest.

The mechanic had an even better idea and made the device at a cost of only \$1.50.

The shaft on which the hand crank is used

was protected with a can type guard to prevent a person getting caught while the machine was power operated. A ring was welded to the can guard and a V-shaped piece of iron was pivoted on bracket attached to the frame of the machine in such a manner that the V section enclosed the shipper rod.

A sleeve was fastened over the shipper rod at a point such that the V iron could not be raised to permit the can to be removed unless it was shipped into the off position. When the can was removed the V bar fell by gravity against the crank shaft and the other side of the V locked the sleeve on the shipper rod so the shipper could not again be moved to the operating position.

This type of interlock might possibly be adapted to some other types of machines, but the point that is most important is that this will recognize a hazard, found that the particular source of hazard had never been guarded elsewhere, so they spent considerable time and effort to devise an adequate safety device.

It is frequently much easier to develop an expensive elaborate device than to develop a simple practical device that works well and requires no maintenance cost.

A third type of interlock is the governor or centrifugal type such as the type developed for use on centrifugal extractors. Such devices can be applied to many machines, but would be relatively expensive to build and install.

You all no doubt know something about electrical interlocks such as are applied to modern ribbon lappers and elevators. While these are not strictly mechanical interlocks, they do have mechanical features and latches necessary for proper application.

One woolen mill has provided electric interlocks on their guards. Electrical knock-outs on wash rolls, decating machines and other similar machines are being applied in many mills on individual motor driven units. Although in a strict sense many of these applications are not interlocks they do provide an increased measure of safety and prevent serious injuries.

Some mills thus far are experimenting with electronic stop motion devices to minimize production losses. Shouldn't such experimentation also be extended to minimize human losses?

One other type of interlock has been developed in the food industry, a pressure in-

terlock. This is a device that prevents the cover of a pressure retort being removed while steam pressure is present in the vessel. Possibly such devices can be developed for use on kiers, pressure dyeing kettles or process machines and other pressure vessels in the textile industry.

Let us now see how some of these types of interlocks have been applied to machines in the wool and worsted branch of the industry, keeping in mind that the principle involved rather than the specific application, is the essential feature. (Demonstration of models.)

On a rag or shoddy picker the slotted disc and slide principle used for years on cotton pickers are applied. In some cases where the cylinder or rotating part is very heavy, it has been necessary to provide spanner wrenches to turn the beater so the slide can be operated into the slot in the disc.

Two types of shipper interlocks illustrate how this type of interlocking can be used, irrespective of the direction of the shipper travel. In one case the shipper travel is "up and down," in the other "in and out."

In both cases the follow device prevents the shipper operation unless the opening is completely closed. This is a very important feature on this type of interlock. By changing the cover, the interlocking principle can be used on Farnmough or mixing pickers.

If a chain is attached to the cover of a

clean out opening, unless the cylinder cover is opened, the cleanout cover cannot be moved; and the cylinder cover cannot be opened until the machine is stopped and locked. In a similar manner one interlock can be attached to one part of a machine and the guards or covers over the hazardous parts can be latched or connected with the one device to effect a succession of protection.

On a dolly washer of the clutch operated line shaft driven type, a gate remote from the point of operation can be interlocked with the shipper. When the gate is opened, the shipper cannot be operated. When the machine is operating, the gate cannot be operated without shipping off the machine. It is possible to provide a device that will prevent the raising of the gate until the shipper is in the off position.

Another guarding principle is involved in the remote gate type guard, the principle of increased opening in proportion to remoteness of barrier from the point of operation.

Let us all remember that the possibilities of providing interlocks on textile machines are still practically unlimited. Ingenuity and inventiveness plus a knowledge of fundamental principles are the tools with which such applications can be made. The need for further application is particularly essential if we wish to reduce the machine injuries, not accidents, that are recurring with monotonous regularity in the textile industry.

#### THURSDAY AFTERNOON SESSION

October 9, 1947

Presiding: E. G. PADGETT, Employers Mutual Liability Insurance Company

#### What the American Standards Association Textile Code Will Mean to Your Program

By E. A. ROBERTS

Eastern Division Engineering Manager, American Mutual Liability Insurance Company

Successful management is understandably reluctant to spend money upon the advice of people outside their own organization before they have a complete understanding of and confidence in the credibility of such ad-

vice. Therefore, before discussing the assistance which the revised ASA Textile Code will afford your plant programs, it would seem desirable to outline something of the history of the American Standards Association

tion in which ASA Codes are developed, and the manner in which it functions.

The American Standards Association was organized in 1918 to serve as a clearing house for industrial, technical and governmental groups to develop and coordinate their standardization programs. The ASA is a federation of approximately 100 national organizations and some 2,000 company members.

The chief function of the Association is to provide systematic means for the establishment of American standards. To do this it brings together manufacturers, distributors, consumers, technical specialists and others directly concerned; ascertains whether the majority of these interests desires a national standard on the subject; and provides for the organization of a balanced committee consisting of official representatives of the bodies directly interested to work out the standard.

The basic principle underlying all ASA work is that a consensus of those having a substantial interest in the scope and provisions of a proposed standard must be reached. Any group having such a substantial interest has the inherent right of representation on the committee dealing with the subject matter of the standard.

The Association provides the machinery through which the groups themselves arrive at decisions. It takes up a new project only upon request of a responsible organization or group. The project may deal with an existing standard already in general use, or one which it is proposed shall be generally accepted, or it may involve the development of an entirely new standard. Its activities embrace the widest variety of types of interest covering the field from a definition of technical terms to the development of a code covering physical safeguarding, such as is embraced in the revised Textile Code.

That group of people gathered together for the purpose of formulating or revising a standard or a group of standards is designated as an ASA Sectional Committee. Each committee is a cross section through the principle of representation of the groups having a substantial interest in the subject matter being considered.

Any responsible body may request the initiation of a project. However, the Standards Council or its designated agency must approve the initiation of a new project and does so only after investigation has shown

that the proposal commands sufficient support to make a successful outcome likely. If the results of this investigation are satisfactory, the initiation is approved and the organization of a committee is authorized.

The committee is organized by the sponsor in cooperation with the Association or by the Association on behalf of the sponsor if the sponsor so desires.

The personnel of the committee when completed must be approved by the Standards Council or its designated agency. This approval is based upon the following considerations:

1. That the membership is competent and authoritative in its field.
2. That it is adequately representative of those substantially concerned with the proposed standard or standards, and that the individual members officially represent the bodies appointing them.
3. That an adequate balance exists between the general classification of its members. (Each member is classified according to his business affiliation, or, if the appointing organization so indicates, according to the relation of that organization to the project in question.)

Members of committees dealing with safety codes are classified as representing manufacturers, employers, employees, governmental bodies having regulatory power over the field in question, independent specialists and insurance representatives.

The officers of a committee are usually a chairman, a vice-chairman, and a secretary, or in the case of small committees, a chairman and a secretary only.

The chairman and vice-chairman are usually elected by the committee, although the sponsor sometimes appoints these officers.

It is the purpose of the ASA to provide a staff member to serve as committee secretary, and to furnish the necessary editorial and publication facilities to the committee when desired.

Most committees have found it best to assign the responsibilities arising during the early development stages of standards to subcommittees. ASA methods provide for flexibility in subcommittee organization.

Early in the development of a set of standards it may be found desirable to employ the facilities of some one of the autonomous committees of the ASA which are operated for the benefit of other safety code sectional

committees, thereby bringing into the development of their own standard the expert knowledge of some committee which has for years been investigating one or more specific phases of the principal problems.

In a sectional committee preliminary action on drafts may be on an informal basis. At all stages negative votes are accompanied by a statement of reasons as this facilitates agreement by bringing about a mutual understanding of divergent points of view. Usually a number of drafts is necessary in order to reach a solution which represents a consensus as nearly unanimous as is possible.

When complete unanimity is reached, or when the proposed standard is supported by a majority so substantial that it may properly be considered that a consensus has been reached, a report giving a detailed record of the vote is made to the sponsor or, in case the committee is autonomous, to ASA headquarters. Final action of the committee on a proposed standard is by written ballot or by an equivalent formal record sent out by the sponsor or by the ASA.

It is the intention of the Standards Council not to approve conflicting standards. Hence, it is necessary that ASA committees and their subcommittees use care to keep the provisions of the standards they are developing consistent with those of other American Standards. In case the committee is of the opinion that provisions in other standards should be changed, arrangement can be made for a discussion of the points in question with the committees in charge of the other standards. There are cases where discrepancies are apparent rather than real. In such cases the apparent discrepancies should be explained in the report. In working out specific standards, effort is made to use general American standards and also international standards wherever they apply. The American Standards Association serves as the channel through which American business cooperates with other countries in standardization matters. All the industrial countries have found it necessary to set up national standardizing bodies like the ASA. The ASA maintains co-operative relations with all of these and carries complete files of their standards.

When references to other American Standards or parts of such standards are included in the standards submitted for approval and are in the form of mandatory requirements, such references are specific and refer to the

current improved edition with date, ASA symbol, and section or paragraph number. The references are followed by the statement "or any subsequent revision thereof," if it is desired that the references cover revisions of the standard referred to. Such specific references serve to shorten considerably the text of the standard being developed where it is of such a nature that the activities embraced are well covered by general standards previously published.

Summarizing the administrative steps involved in the development of a set of standards:

1. The committee meets, plans its work, and appoints subcommittees to draft the various sections of the proposed standard.
2. Each subcommittee obtains suggestions:
  - (a) From its own members
  - (b) From members of the committee
  - (c) From outside sources, such as existing standards, research papers, etc.
3. Draft prepared and circulated to subcommittee members.
4. Discussion by correspondence or in meeting until agreement is reached on draft in subcommittee.
5. Draft circulated to committee and in some cases to a selected list of organizations and individuals not on the committee.
6. Draft discussed and acted upon by committee by correspondence and in meetings.
  - (a) Coordinated with other subcommittee reports, or
  - (b) Amended by committee, or
  - (c) Referred back to subcommittee for amendment.
7. Process continued until agreement on draft standard is reached by the committee.
8. Draft standard published for criticism in one or more trade or technical journals, or circulated to industrial and technical groups. (This procedure is optional.)
9. Criticism sifted by committee (usually in meeting) and final draft standard agreed upon.
10. Final letter ballot of the committee taken on the proposed standard.
11. Proposed standard, together with a record of the vote of each member of

the committee, submitted by the chairman of the committee to the sponsor for approval and submission to ASA.

12. Proposed standard submitted by the sponsor to the ASA for approval.
13. Standard approved by the Standards Council of the ASA or its designated agency as an American Standard (after review of procedure and status by a committee advisory to the Council).
14. Standard published by the ASA, or by the sponsor.

This last step, as far as the revised Textile Code is concerned, has now been accomplished. Through the courtesy of the ASA we have a supply of the new code in its final form.

Turning from the work of the ASA code committees in general to the specific code in which we are interested, it seems appropriate to inform you concerning the making of the committee which worked on the revised Textile Code between June 1945 and January of this year when the final vote was taken on the draft as it has now been published.

The code revision was sponsored by the National Safety Council and the committee opened under the chairmanship of W. B. Weaver representing the National Safety Council; Stewart J. Owen, Jr. of the National Bureau of Standards was the secretary. In addition to Mr. Weaver, the National Safety Council was represented by A. M. Ralston who, at the time the work was started, was staff representative in the Textile Section, and myself. D. F. Hayes of the ASA has served as staff consultant, and has given invaluable service in keeping the committee on the right path. His knowledge of the other codes has saved much time in developing adequate references.

In addition to the National Safety Council and the National Bureau of Standards, ten other national organizations and representatives of two machinery manufacturers participated actively in the revision of the Textile Code.

There is one other point in connection with this revision of the Textile Code which should be of interest and that is the consistent endeavor of the committee to refrain from incorporating in the code any safe operating rules—this on the basis that safety codes may become regulations enforced by

State Inspection Bureaus. In fact such an adoption of ASA codes as a part of state regulations has already occurred in several states. Regulations concerning the provision of safety devices are clearly enforceable because the owner of the plant is responsible, under the law, for the provisions in the plant. The enforcement of safe operating rules by authorities is quite another matter. The employee's responsibility is to his employer, and there is often interposed a considerable chain of supervisory responsibility. The legal responsibility of such supervisors to their superiors to get compliance with operating rules and their responsibility to their subordinates to enforce operating rules is not well defined. In the United States punitive application of safety regulations is seldom resorted to by a regulatory authority.

Unless the Sectional Committee which developed this revision of the code has erred in its intent, it is my opinion that you will find that the provisions of the code have been restricted to physical safeguards concerning which the presence or absence is a demonstrable fact.

Just what this revised Textile Code will mean to your individual safety program is extremely difficult for me to determine. A constructive answer would necessarily require a personal knowledge of each program. From my past experiences with a large number of textile plants, I can perhaps visualize half a dozen general patterns which would be descriptive of any one of the individual activities. I would suggest, however, that we do not allow the fact that this code covers physical safeguarding only confuse us as to its application even in those programs where the weight of effort is to be on educational methods. As safety engineers many of us are prone to emphasize the value of safe operating practices and careful supervision—this on the basis that statistics seem to prove that only a small percentage of accidents involve deficient physical safeguarding. Personally I support the theory that even though this be true statistically, careful investigation of each and every accident frequently reveals that though we have placed the accident in the non-mechanical type, the occurrence of the accident and severity of the injury trace back to the presence of a piece of equipment sometimes not properly safeguarded. Take the simple and relatively frequent occurrence of an accident described as "slipped on oily

floor" which accident not infrequently results in serious injury to the individual concerned by reason of his falling into or against a machine. In the first place the presence of the oil on the floor frequently has resulted from the need for oiling a machine, and the seriousness of the injury is frequently intensified by reason of the individual, as he falls, getting a hand or a foot into some unguarded part of an adjacent machine. Belt guards and gear guards certainly have a bearing on the severity of that accident even though they are not directly concerned as a cause.

From the standpoint of accident severity, it seems appropriate to give considerable attention to the weight of the 20 per cent or 25 per cent of total accident occurrence which can be classified as being of the mechanical type. I make this statement for the reason that again statistics indicate that the 20 per cent of mechanical accidents frequently produce as many lost days as the 80 per cent classified as non-mechanical. Therefore, if you, in designing the safety program for your own plant, accept this premise as worthy

of consideration, you would certainly want to look into the character of physical safeguarding which presently exists in your plant or which you would like to accomplish. Having come to this point of view, the value of the Textile Code becomes important. This code in its various sections relating to all types of specialized textile equipment and such equipment as may find usefulness in a textile plant, even though it is also used in many others, provides management with the consensus of opinion as to the best way to eliminate physical hazards, and for management of plants located in states where governmental regulation supports other accident prevention activities, there is assurance that a machine which is guarded in accordance with the specifications of the ASA code will, in most instances, gain commendation from the state inspectors. A careful study of this Textile Code will reveal that in many instances there is set forth for the first time definite specifications for guidance in the solution of problems which have been subjects of controversial debate for a good many years.

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## Transactions

### 35TH NATIONAL SAFETY CONGRESS



VOLUME XXIV

TRAFFIC SECTION

NATIONAL SAFETY COUNCIL, INC.  
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## Foreword

**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

**THE NATIONAL SAFETY COUNCIL**  
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## MONDAY AFTERNOON SESSION

October 6, 1947

## General Session

Presiding: PAUL J. PRICE, Capt. Commanding Traffic, Police Dept., Dayton, Ohio; General Chairman, Traffic Section, N.S.C.

## At the State Level

By RALPH GATES  
Governor of Indiana

A sound safety program is good business and good politics and a necessary part of good government.

Commercial exploitation, political maneuvering or personal selfishness has no place in such a program. State officials, as the elected or appointed representatives of the people, have absolute responsibility for furnishing the leadership and securing the assistance and cooperation of local officials in the creation of an official traffic safety program and in making that program work.

Individually, state officials are responsible for a careful inventory and analysis of state statutes, especially as they may relate to their activities. The uniform motor vehicle code, administrative practices and procedures, standards for employing and training personnel are typical examples. And, state officials are responsible for the dissemination of proper information to the public as to laws, regulations and safe practices.

Before you can put the Action Program to work, an official state traffic safety program must be developed. First, state officials must accept the responsibility for making such changes and improvements in their individual departments as are possible under existing laws and with available budgets and personnel. They must recognize the needs that cannot be met immediately, and make sound recommendations for future action to meet them. They must also provide, through properly constituted committees, the structure for full discussion of their present situations and future needs. Through coordination and cooperation, they must furnish mutual assistance in meeting them, and, in the process, all overlapping, duplication and sources of friction must be eliminated.

Based on information supplied by these discussions, state officials must prepare a sound over-all traffic safety program for the state, in cooperation with civic leaders and local officials. More—they have the responsibility of keeping the legislators and the public fully informed about this traffic safety program; they must furnish the stimulus for organized public support of the program, and, in putting it to work, must give local officials the same kind of assistance and cooperation at the local level as was needed to accomplish these objectives at the state level.

That's a large order, isn't it? You might ask, "What have you done in your home state of Indiana to live up to these responsibilities?"

Briefly, there were eight steps which highlighted the state program which has cut the mileage death rate in Indiana from 12.5 to 9.1, they include:

1. The legislature gave the Traffic Commission statutory status, permitting the commission to accept private funds to supplement state budgets, and setting up a public advisory committee to the commission.

2. Accident records procedure was stepped up with modern equipment and methods.

3. Changes in the state code were enacted to bring it into conformity with the uniform vehicle code.

4. A bill was passed to create a strong Bureau of Motor Vehicles dealing with various aspects of driver control through licensing, driver improvement and financial responsibility.

5. Traffic engineers were increased from five to 18.

6. Some changes in the State Police were

made and the training and retraining program was stepped up.

7. Driver training in schools is being pushed.

8. Technical assistance in traffic engineering and installation of accident records bureaus is being offered cities.

These are some of the results and this is how they were accomplished:

During 1944, while traveling the highways campaigning for the office of governor, the traffic hazards, tragedies and near tragedies on our highways caused me considerable concern. I realized that in campaigning for high office, I was asking the people to give me the responsibility for leadership in doing something about this situation, and I was determined, if elected, to do it. Shortly after assuming office, I called the various officials together, with the determination to participate actively in this program and to furnish such leadership as my position required. I fully expressed my own opinions, and found the others were in accord, not because I was governor, but because every one of them was as determined as I to whip this problem. This group formed a committee known as the Indiana Traffic Safety Commission.

We called upon representatives of the Indiana Traffic Safety Council, which has been functioning for ten years, for assistance and advice.

We immediately asked for and received an analysis of our report to the National Traffic Safety Contest for states. I want to make it very clear that I believe every state and city should take advantage of this service. It furnishes an objective annual inventory and program report of what your state or city is doing and how it compares to the existing standards and the accomplishments of other states and cities. We in Indiana look forward to the presentation of this analysis each year.

I then appointed a committee composed of three representatives from the traffic commission and the Council, with instructions to bring in a realistic report as to Indiana's present status and its needs.

This report was somewhat unusual. It was the frankest report I have ever read. It was as free in criticism of the Council representatives' shortcomings in providing public support as of ours in our respective official areas. I realized that this committee had done an outstanding job, and that a new era was un-

folding in Indiana in dealing with problems of traffic safety.

The report referred to the responsibility which the public has toward this problem, and challenged the Indiana Traffic Safety Council to provide the base for giving the commission full and aggressive support in activating the program and in securing the support of the legislature where needed.

Fortunately for us, we have had in our state for ten years the Indiana Traffic Safety Council, composed of more than 80 organizations representing all interested state-wide organizations, official and private, community safety councils, and outstanding civic leaders.

During the period in which our program was being formulated, the President's Highway Safety Conference had been called. The action program was born, and it gave us particular satisfaction to realize that every step we had taken, every recommendation in our program, was in complete accord with the action program, which is now the national blueprint for traffic safety.

Following the President's conference, I called a statewide conference in Indiana, where our proposed program and the action program were discussed. The program was approved, and it is now the official action program of the state of Indiana.

Our 1947 legislature gave our traffic commission statutory status. In doing this, it took two very progressive steps.

First, the executive committee of the Indiana Traffic Safety Council, which is elected by its members, was made the advisory committee to the Traffic Safety Commission. This provides a continuing group representing the public that carries through year by year, irrespective of changes in political administration. As the representatives of public opinion, they will be available to new officials and provide the base for consistent policies and uninterrupted progress.

As previously noted, the bill provided that the commission could accept funds from private sources for carrying out its objectives. These funds supplement legislative budgets and provide financing for activities which could not otherwise be carried out. We believe it represents the ideal manner through which to put into effect the recommendations of the action program.

Based on a survey made by the commission with the assistance of the uniform laws di-



vision of the Automotive Safety Foundation, whose valuable service I recommend to every state, important changes in our basic code were enacted to bring it into conformity with the uniform code.

The bill passed to create a strong bureau of motor vehicles dealing with various aspects of driver control through licensing, driver improvement, and financial responsibility, also centralizes driver licensing procedures and driver records through reorganization and installation of modern equipment and procedures, at a cost of nearly one-half million dollars. This will be in effect January 1, 1948.

Through the commission staff, the Indiana Traffic Safety Council and the National Safety Council, we will offer to the cities and communities presentation of the analyses of their reports in the national and intrastate traffic safety contests for cities, and assistance in organization of public support.

Through the cooperative efforts of the Safety Institute of Purdue University, the Indiana

state police, the state highway department and Indiana Traffic Safety Council, we offer technical assistance in traffic engineering and installation of accident record bureaus.

On the basis of the drop in the mileage rate from 12.5 to 9.4 in 1947 alone, we saved 310 lives, avoided 6,800 injuries, and saved \$20,337,400 in economic loss. Certainly a wonderful return on the efforts and money expended. And we are just starting.

We are trying, we shall continue to try, to reach that irreducible minimum, if there is one. But we want help and advice from every official, every organization, and every experienced civic leader on how to improve and expand our efforts, and we offer our help to any who desire it.

Traffic safety is one of the greatest responsibilities state government faces, and also one of the greatest opportunities to contribute to the happiness and economic life of the citizenry and to assist in the development of safe, efficient and pleasant highway transportation so vital to the future of our country.

### At the City Level By WILLIAM F. DEVIN Mayor of Seattle

One murderer or one fire maniac in a city can cause far more consternation than many times that number of traffic maniacs.

Why is it that we—city officials and citizens alike—are not more aroused about this traffic problem? I think there are two basic reasons. First, because there is seldom, if ever, any animus or malice connected with a traffic loss—most people regard the injury as accidental and, therefore, feel that nothing can be done about it. Second, because most of us see ourselves as possible offenders and, naturally, are reluctant to face the stern realities of being at fault. But neither the public nor the public official is hesitant about sounding the tocsin in the face of a serious fire or criminal situation or, in the field of public health, when epidemic strikes.

When smallpox broke out in Seattle, Wash., in the spring of 1946, the entire resources of our community were rapidly mobilized and tireless workers in the city vaccinated 350,000 persons in the effort to check the plague that totalled 28 cases and caused eight deaths.

This presents a strange situation. Last year,

when we had 28 cases of smallpox and eight deaths, the entire citizenry was alarmed; 350,000 persons were inoculated immediately as health officials worked feverishly to check this public enemy which already had claimed eight lives. Fortunately, the epidemic was halted and the city again relaxed.

This year in the same city—the same people—we killed 28 people in traffic during the first eight months, but, instead of being alarmed, we are actually hoping to win an award because that number is only half as many as were killed last year and a great deal fewer than were killed in the same period in comparable cities in the United States. Instead of being alarmed about the 28 who were killed, we are patting ourselves on the back for a job well done.

Would that we could inoculate 350,000 people against death or injury by motor vehicle. Scientists have found the solution in the field of medicine. It is our job to find it in the field of traffic. That's why every city must inaugurate a vigorous traffic safety program and keep it alive!

The #4 question is: How can we protect our people against their own acts without unduly restricting their cherished liberties? Far better qualified men than I long ago laid down the basic prescription to cure this municipal malady: That prescription is still good if it only will be filled and then taken as ordered.

It is simply this: "Education, Engineering, and Enforcement. *Shake well before using.*" The last is important for if the ingredients are permitted to become separated the effectiveness of the formula is destroyed. Let us look at the specific ingredients of this prescription as each applies to cities.

Although the responsibility for the execution of a safety program rests in the official agencies of local government, that program never will be successful without the full support and cooperation of the citizens. The drivers and pedestrians must understand the program and want it.

Traffic laws are not made to be enforced—they are made to be observed. Unless the majority of our people understand our traffic regulations and want them, we cannot hire enough police officers to enforce them.

While the technique and physical work of enforcement and engineering must be done by public agencies, the educational and psychological work must be performed by civic bodies, working closely with public officials and agencies. The natural liaison between the official agencies who say, "thou shalt and thou shalt not," and the car drivers and pedestrians who say, "why can't I," is the local safety council.

Such a body, composed of leading citizens in the city, can say to Mr. Citizen, "Look, these traffic laws are not made so the Police Department can annoy you. They are made to derive revenue. They are made for your own protection, so you can motor to and from your home and your place of business more quickly and safely."

The local safety council, armed with facts, can give the various civic organizations specific jobs to do, and with the cooperation of the radio and the press, will be able to sell an effective safety program to the community.

We should inform our people of the necessity for traffic laws. If we could give them the reasons for pedestrian protection campaigns, for selective enforcement programs, for traffic violator schools; if we could better educate our youth through traffic courses in

the elementary schools and through driver training courses in the high schools; then we would shift responsibility for safe driving from the shoulders of the public officials to the shoulders of the citizens/drivers where it properly belongs. This, indeed would be a program of which every public official dreams—a program for the benefit of his people, cooperated in and carried out by his people.

Traffic is where you find people and cars—in the cities and on the main highways. That is where engineering and enforcement must be applied. In every city there should be a full-time traffic engineer, one who lives, breathes and sleeps traffic, one upon whom the responsibility for traffic can be squarely placed and who cannot pass the buck.

The first thing which must be done is to determine the facts. This study of facts cannot be made once and forgotten. It must be continuously made, checked and altered in order to meet the ever changing needs of the moving public.

The third ingredient in our formula is *Enforcement*. Here again, as in *Engineering*, we must start with the facts. To learn these, the police department must keep complete, accurate, and centralized records of all traffic collisions and losses. These, in our city, are analyzed and charted on spot maps daily. Once it is determined where traffic losses are occurring and why, the solution becomes obvious.

The determination of the facts is more or less of an exact science. After that we are faced with the more complex problem of enforcement through human agencies. Enforcement must be according to principle and not according to personality or pressure. This is difficult, but not impossible of attainment, and once the principle is established the execution of the program becomes easier and far more effective.

The traffic courts must play an important part in the enforcement program. Unless the judges stand behind the program with a consistent policy of penalties for the guilty and an equally ardent fervor to protect the innocent against false accusations, the program cannot be fully effective. All of these agencies—the police department—the violations bureau—and the courts—must speak the same language, must be working for the same objectives, and must have a thorough understanding of each other's problems and

goals. Only through such a united program of the enforcement agencies can the people of a city know what to expect or what the policies of enforcement are to be.

In our prescription of Education, Engineering and Enforcement, I have added the words "shake well before using." Even though each department may do an excellent job in its own field, there is a strong tendency to isolate its own activities from those of all other city departments. Unless this tendency is watched and corrected, it will result in a complete lack of coordination—again that our formula is not being well mixed. If we are to obtain the full benefits of our safety program, all departments of city government which have any connection with traffic must work together as a team. The police, the engineering, and light departments, the transit company, the courts, the schools, the press, and the public are all members of this team. No one can do the job alone, but all, working together in accordance with one plan and one set of rules, can accomplish real gains.

When we developed this kind of teamwork in Seattle, the results were terrific. In the first eight months of 1946 there were 19,000

arrests for moving violations; during the same period this year, there were 30,000—an increase of 58 per cent. Our enforcement index for the first eight months last year was 11.2; this year, for the same period, it was 20.7. As we noted earlier, our fatalities were reduced almost 50 per cent—110 deaths from traffic in 1945, reduced to 79 in 1946, and all in the first eight months this year compared with 55 for the same period of 1945.

We doubled the number of men on motorcycles, planned our work and worked our plan, and accidents were reduced 14.5 per cent and injuries dropped 15.9 per cent for the first eight months of 1947.

These savings in lives and property can be made through team work—the team work of the police, the engineer, the courts, the press, the radio, the safety councils, and the public. No one of these alone can make a safety program a success, but any one of these team mates can cause the program to fail.

We must use the original prescription, the three E's of traffic safety—education, enforcement and engineering—but don't forget to shake well before using.

### State-City Relationships

By RUDOLPH F. KING

Registrar of Motor Vehicles, Commonwealth of Massachusetts

The success of America's traffic safety program and the future development of highway transportation depends largely upon a broadening and improvement of the relationship between the public officials of each state and its cities and communities.

The elements of the traffic safety program in which this improved relationship should exist cover practically every phase of vital importance. Accident reporting, driver licensing, enforcement, traffic engineering, driver education and training, public information and organized public support are some of the most important.

Every official and citizen, familiar with the fundamentals of a traffic safety program, knows that the collection, tabulation, analysis and use of information secured from accident reports is the keystone to sound accident prevention activities at any level. Without

the full co-operation of local officials in setting up accident record bureaus, investigating accidents with trained personnel to the greatest extent possible, furnishing copies of the reports of investigation to the proper state agencies for correlation at that level, and making use of such information in local enforcement activities, no state or city can have a good, well rounded accident prevention program.

In all instances there must exist a cooperative relationship; the state must furnish the communities all information of value to them. Conditions in many cities of smaller size are such that they need assistance in the establishment of accident records bureaus, the training of key personnel, and further counselling and advice as the project is developed. In my opinion the state is obligated to provide this service.

But, how can a community reasonably and

adequately determine its needs in this, or any other traffic safety activity?

There is now in operation a program of national scope which can be utilized to provide this information, and to help clarify the respective responsibilities of the state and the community in accident prevention activities, with the creation of cooperative relationships a natural outgrowth of participation.

This program, the National Traffic Safety Contest of the National Safety Council, is open to all states, and to communities of 10,000 or more population, requiring the participants to submit factual reports of their traffic activities.

Of course, to win a first place plaque, or even an honorable mention certificate, is very gratifying; but, the most important issue in the contest is the accurate and honest reporting of inventoried performances.

At the close of the contest, community officials may file a request with the contest secretary for a complete analysis of the annual report which not only evaluates the community program, but furnishes comparisons with "standards," programs and results of communities of similar size and problems over the nation, and activities of cities and towns adjudged to have the best traffic records. The magnitude of the benefits to individual states, communities, and their citizens will be in proportion to the extent of care expended in the preparation of complete and accurate reports.

State traffic officials should give active support to this program by coordinating community reports and presenting the analyses after they are made, thus offering both state and city officials a broader interpretation of mutual problems and a more complete understanding of needs and solutions.

Some of us are told that this program will probably be expanded to provide the basic material for "Progress Reports" from states and cities for the President's Highway Conference Action Program. This will be a very practical step forward in the traffic accident prevention movement.

Now, we must consider some of the other elements of the project. While driver licensing is primarily a state responsibility, it is only with the cooperation of the courts, prosecutors and local enforcement officers that it can function successfully. Vigorous prosecution of cases, recommendations concerning sus-

pension and revocation of operators' licenses, and, in many states, the action of the courts, is most vital.

The need for closer cooperation between state and city enforcement officials is so evident that it hardly needs mention, yet, continued contact is necessary to keep this relationship intact as, frequently, problems arise calling for speedy solutions. Provision of training facilities for personnel, the installation and maintenance of accident report bureaus by state departments, and the establishment of channels for the expedient interchange of information are equally vital to program success.

Traffic engineering also needs this closer affiliation of agencies. Highway transportation facilities are a part of our daily life, and their use with greater safety is most important. Many cities suffer from a lack of finances, precluding such traffic engineering work as should be done for general, as well as local, benefit. In such instance, the state should assume this definite responsibility of providing assistance and the cooperation necessary to do the job.

Thus, we could go through the list of activities recommended. We must agree that safety is such an important factor in our lives, that, in those cities where traffic problems warrant it, and where industry, business, and the public can finance a full time staff, there should be a safety organization. It is probable that in communities with a population of 50,000, or less, this course might be impractical, if not entirely impossible. There ought to be a public support committee in such cities and the state should assist in organizing and servicing them with official staffs until each functions satisfactorily in self-sufficiency.

Now, what about our stepped-up program in Massachusetts?

We held our Governor's Highway Safety Conference in May, 1947, which was attended by more than 1,500 persons. In 1946, the Registry of Motor Vehicles was set up as a separate division having equal status with all other state departments. An accident records bureau has been established and we are planning for even more up-to-date equipment and for complete mechanical tabulation.

Through the cooperation of the Legislature, we have trained and assigned 40 new inspectors. We have set aside April and October as the months in which it is manda-

tory for every motorist to have his car inspected.

The Traffic Engineering Division is constantly engaged in giving advice to cities and towns on such matters as surveys and other pertinent activities.

The State Police have been brought up to full strength of 300 men.

Massachusetts has placed heavy emphasis on driver education and training, as well as other activities for both children and adults. Up to September 1, 1947, more than 98,000 children and 44,000 adults attended meetings we conducted.

I wish to thank the chiefs of police and other officials in the 78 Massachusetts cities and towns of more than 10,000 population which submitted reports in the 1946 National Traffic Safety Contest for 100 per cent cooperation they gave the Registry of Motor Vehicles. Their efforts assisted in making it possible for Massachusetts to place third in the nation, only four-tenths of 1 per cent behind the second-place state.

What about the small scattered communities and their smaller rural areas?

They, too, are an important part of this entire program, despite the fact that they are sometimes overlooked because they may be difficult to reach.

In most states, coordination could probably be effected on a "county" basis. The Traffic Safety Contest might be broadened at the state level by holding an intrastate contest in conjunction with the national contest, thus providing for analysis reports and assistance in technical matters, as well as or-

ganizing public support groups in small cities. This plan is being developed in some states but it's needed in every state.

From all these coordinated activities will come a united front to make control of traffic accidents a certainty.

More than 90,000 dead, more than 1,000,000 injured on highways in the United States in a year must be considered as war conditions.

Neither legislation, nor the thinking of the public and of public officials as a whole, have kept pace with the tremendous increase in motor vehicle problems. It is later than we think. Too little, too late, will be said of us as state and community officials, educators, directors, and of our safety organizations unless we supplement our programs with positive, affirmative action.

As state, city, town and organization leaders let us ask ourselves, "Do we really think highway safety is our business? Are we sincere in our efforts, do we sincerely want to do something about it?" If the answer is yes, then let us take off our coats, roll up our sleeves, and substitute action for lip service. Let us remove from our minds the thought that someone will wave a magic wand, and, lo and behold, the traffic problem will be solved.

We can help by doing our part to provide good state, city, town and organization relationships, backed by more intelligent thinking and planning, and constructive action. To this let us add the perspiration that comes from honest, sincere labor, and we will reduce accidents and deaths on our highways.

## TUESDAY MORNING SESSION

October 7, 1947

### Group Session for Police

Presiding: COL. HOMER GARRISON, JR., Director, Texas Dept. of Public Safety.

#### Police Tactics in Traffic Patrol and Enforcement (Panel Discussion)

Discussion Leader—A. R. FORSTER, Dir. of Training Div., Northwestern University Traffic Institute  
Participants:

Departmental Procedures  
City—HOWARD W. HOYT, Chief of Police, Kalamazoo, Mich.  
State—COL. HOWARD H. WAGGONER, Sup't., Mis-

souri State Highway Patrol  
Patrolling Techniques

City—ARTHUR E. MILLER, Traffic Inspector, Metropolitan Police Dept., Washington, D. C.

State—CAPT. RALPH J. BUCKLEY, Connecticut State Police

CHAIRMAN FORSTER: I would like to tell you what we believe is the scope of this panel discussion.

We have broken down our discussion into two general groups of practical and technical issues: first, matters of departmental policy and procedure, under which we want to talk about such issues as whether traffic patrol should be one man or two men; what are the relative merits of automobiles and motorcycles for traffic control; what about the conspicuousness of vehicle markings for traffic control; and finally, what about mechanical speed checking devices. In other words, under that general heading there are matters for departmental decision to guide the activity of all the men.

After that, we are going to move down to the patrolman's level and talk about the man on patrol, on the city street or rural highway, and the practical down-to-earth techniques for his employment, taking up the question of open patrolling on a highway as opposed to the practice of semi-concealed supervision; observation techniques on patrol; speed, mileage on patrol; the uses and values of spot check and of traffic blockade techniques; speed checking methods and technique of apprehension and approach to the violator.

The first thing that we want to talk about, then, is departmental procedures in traffic patrol, and I would like to open that with a question to Superintendent Waggoner, from the state point of view, concerning the matter of one man or two men in a traffic patrol car. I would like to get the opinions of our panel, here, both the city and state side, on that question.

COLONEL WAGGONER: Our experience in Missouri with one man patrol cars has been an unhappy one. We feel that from the standpoint of efficiency and protection of the officers, it is a must that we have two men in our patrol cars. At the same time, we operate with a depleted personnel, and have had to revise and arrange our schedules, where it is necessary, having one man in the car in the daytime and two men at night,

and two men in patrol cars around the metropolitan centers.

It has been our experience that one officer cannot handle serious accidents, control traffic, take care of injured people, and we have lost the lives of officers because of the depleted condition of our personnel, in that we could not put two men in the patrol cars. We feel that it is a must to have two men in the patrol cars in our state.

CHAIRMAN FORSTER: Did you say, Colonel, you have two men in all the cars, or you have some patrols where you put one man?

COLONEL WAGGONER: We have one man generally throughout the state in the daytime, except around the metropolitan centers, like St. Louis and Kansas City, where we have two men in patrol cars; and two men at night all over the state.

CHAIRMAN FORSTER: In other words, your policy is one of putting the number of men out that experience proves to be necessary, putting two wherever there is any doubt as to the adequacy of one.

COLONEL WAGGONER: That's right. And we always double up on Saturdays and Sundays, week-ends.

CHAIRMAN FORSTER: What about that from the city point of view? What is your opinion on that, Chief Hoyt?

CHIEF HOYT: I can only speak, of course, as a chief of a small city. Kalamazoo is a town of about 55-60 thousand, and our strength isn't great. Our criminal problem isn't too heavy. Our traffic problem is.

If I had the choice of having six cars out with two men in the cars, or twelve cars out, with the districts cut down to one-half the size, I would choose the latter in our city. The safety of the officers, I feel, is just as good with the twelve cars out as it is with the two men in the car. Our experience has shown that the few times there have been officers injured in police work, there have been two men together.

I know that certainly does not apply in some heavy metropolitan areas. It does not apply even in our town under certain conditions and in certain sections of the city. But generally, that would be our preference, I believe.

From the traffic viewpoint we have had no difficulty with one man in the car.

I might say the way we are operating now is one man in the car sixteen hours a day,

From eight p.m. until four a.m. we have two men in the car. The second man in the car is usually one of the newer men who is getting his practical training with the older officers, and at the same time we are having the benefit of the two man car.

**CAPTAIN BUCKLEY:** We use one man in the car almost all the time. However, we have this advantage, that our area is small and that we have good communication, so instead of two men in one car, we have two men within minutes of one another in two cars, and it works out very well. We haven't lost any men yet.

**CHAIRMAN FORSTER:** There is a lot of difference of opinion in police departments, and we want to hear from you out on the floor on it later.

So far, we have seen some different viewpoints here which seem to relate very substantially to the amount of work and the kind of work the man has to do, the communications he has, the area. In other words, the things which influence his safety seem to me to be the determining factor.

Let's take up our second point. What about this question of motor vehicle equipment? There has been a lot of discussion and experimentation on this. Here, I don't think it is a question of cars versus motorcycles, but a question of some relative merits to be considered.

Colonel Waggoner, would you mind saying what your feeling is, in state police highway patrol work, as to the relative merits of the two kinds of equipment, primarily from the traffic point of view.

**COLONEL WAGGONER:** The motorcycle, as far as our experience in Missouri is concerned, has very little value to us in patrolling the rural highways of the state. We had 40 motorcycles several years ago, and we have had about 40 men injured as a result of these motorcycles on the highways, so we have cut the motorcycle operation down to ten. We don't use them in rural highways. We use them around the metropolitan centers and congested areas, large gatherings, county and state fairs, escort duty, but experience has proven to us that they are of very little value out in the open highway for the state officer.

We feel that the car equipped with radio and the equipment that you can carry in the automobile serves our purpose better.

**CHIEF HOYT:** I think the city is very

much the same way, perhaps depending upon the part of the country we are in. In Michigan there are four or five months out of the year when a motorcycle is useless as solo equipment. A side car can be put on and be put to use. The man's feelings in the matter, though, of having to ride in it in the uncomfortable weather, being exposed, and so on, lessens his efficiency considerably.

Motorcycles are very valuable, however, on special occasions—parades, certain escort duties and the like. I don't believe they will ever drop out of the picture from a municipal police department viewpoint.

**INSPECTOR MILLER:** We use patrol cars and also motorcycles. We have around 75 motorcycle men, and we think in our city they are very, very valuable. We don't think we could possibly do without motorcycles. In fact, we want to increase them instead of decreasing them.

During the winter-time, of course, there are periods when a motorcycle man can't ride solo. Our men operate with their side cars around three months of the year. But the motorcycle man, particularly the solo man, can maneuver so easily that he is good for escort work, catching speeders, and so on. We are sort of sold on the motorcycle, and I would like to see them increased instead of decreased.

Of course, for the protection of the officer, the automobile is much better. I can understand that from the state standpoint the automobile probably would be better. But from the city standpoint, I believe by and large the motorcycle is the most valuable piece of equipment we have.

**CHAIRMAN FORSTER:** Then we seem to be in some disagreement here, but really not, in that it is a matter of the different requirements of motor equipment in the states and most of the cities, the type of roads, weather, equipment to be carried, and so on, which makes the automobile more useful to the state whereas the mobility and flexibility of the motorcycle, in heavier traffic has specialized value.

Have any of you men made any cost estimates that would indicate relative operating and maintenance costs?

**CAPTAIN BUCKLEY:** I haven't, because we got rid of the motorcycles almost entirely in recent years. We found that all the men that had been killed in our department in the last ten years were killed because of

motorcycle accidents. There were a number of injuries in which men were laid up four to six months. Also the weather factor entered into it. Our experience has been the same as in Missouri. We use about 25 motorcycles now.

Did you ever try to bring a drunken driver in on a motorcycle?

**CHAIRMAN FORSTER:** That's a good question.

I think it clearly indicates that from a general point of view the car would seem to have superior merits, whereas in municipal work there is a greater field for the use of the motorcycle because of its flexibility in traffic, and because its demerits are not so important in the more specialized city job.

**CHAIRMAN FORSTER:** Let's take up the subject of police vehicle markings. There has been an awful lot of discussion and we have a thousand and one different practices in state, city and county departments on vehicle markings. We are speaking from the standpoint of traffic merits and demerits on vehicle markings. We have everything from plain black to all white cars. I think this is probably our most debated issue on traffic tactics.

Captain Buckley, will you take this the first time, and say your say? Your department uses both kinds, I believe. What is your feeling on the matter of markings?

**CAPTAIN BUCKLEY:** At the present time we have all colors. During the war we bought the vehicles that we could get and color wasn't brought into consideration. I would say about 20 per cent are plainly marked. By plainly marked, I mean white or all white. About 80 per cent are not marked.

If you have enough vehicles on the highway so that the motorist is never out of sight of one, you don't need unmarked cars. But nobody will ever reach that saturation point, and because of that, you have to have cars that are not marked in order to apprehend violators.

**CHAIRMAN FORSTER:** When you say "marked," do you mean very conspicuously?

**CAPTAIN BUCKLEY:** Yes, very conspicuously. All of our cars are marked to some degree, but when I say "marked," I mean, for example, painted all white.

**CHAIRMAN FORSTER:** What is your reaction on that, Colonel? Your practice?

**COLONEL WAGGONER:** We have a few cars that are unmarked, plain automobiles. Then we have 99 per cent of our cars well-

marked on the sides and front and rear. We feel that an ounce of prevention is worth a pound of cure, and motorists passing through the state, or our local people, seeing our cars know that the officers are out there for a certain purpose. We feel that the fact that the cars are marked properly reminds the public that the officer is on the road.

We have heard it ringing out in the halls of our legislature too many times that people travel across our state and never see a state highway patrol car, and as a result of that we have decided that the officers see these people, but the people don't see the officers, so we have marked our cars in Missouri, and we intend to keep on marking them to the point where people will see these cars and it will be a constant reminder that the cars are out there for their protection.

**CHAIRMAN FORSTER:** We have a slight divergence of opinion from the state point of view, one thinking primarily in terms of public consciousness of supervision, and slightly opposed to that, not quite in line with it, the other opinion that in order to create the proper effect and do a good enforcement job, a split group is desirable.

What about the cities? Chief Hoyt, how do you feel on that from the city point of view?

**CHIEF HOYT:** Our city has marked cars, black and white combination, with our seal on the door, the number of the car. The seal and the number painting is now done with this new Scotchlite material that shows up very well at night, which I understand some of the state men are using as well. Generally speaking, any uniformed man, any man who works in uniform is in a uniform car. A plain clothes man is in a "plain clothes" car, and we try never to mix that, for the same reasons as discussed by the two other men on the panel.

I think, though, that we in police work are going to have to become uniform. We have clamored for years for uniform laws throughout the states; we have clamored for uniform signs and signals. I think we are going to have to start doing things uniformly ourselves, because to the driving public the police officer is the law, and his method of interpretation of the law and his approach to the violator is the answer to the average citizen. So I think it is high time that we adopted a uniform colored car for police work, so that this man driving across the

state of Missouri will recognize a police car because in his state the colors are the same.

The same would be true across our state of Michigan. As one drives across, he would see cars painted a uniform color. They might be city police, state police, or county police, but the only difference would be the insignia and the lettering.

**CHAIRMAN FORSTER:** We have one more question I would like to bring up, passing on from cars and getting into the matter of speed checking, in which tactics are very important because it is one of the most difficult of all enforcement techniques to effectively use.

I would like to open that by asking Inspector Miller to comment on what he thinks the problem is, and some of the relative merits of different ways of detecting speed violators, and then pass back to Captain Buckley here and have him tell you about some interesting experiences they have had in Connecticut on the use of radar speed checking devices.

**INSPECTOR MILLER:** In Washington we have used only the pacing methods, and have never used mechanical methods in actual prosecution. We pace them with the automobile and the motorcycle. We think that is quite an art, and the officers must be very considerate and very fair. We think there should be a reasonable tolerance, and we think in so far as possible that the pace should be two blocks, or probably more.

We caution our officers not to say, anything such as "I had to run fifty miles an hour to catch you." We always instruct our officers to tell violators approximately how far they were paced and approximately how fast, and give them a little tolerance for errors in the speedometer, judgment of the officer, and so on.

We have never used any mechanical devices.

I might add that we check our speedometers every three months, and they are quite accurate on all automobiles and all motorcycles.

**CHAIRMAN FORSTER:** I think what Inspector Miller has said represents general practice in most departments. The pacing method is the most commonly used in all departments. It does involve, I think, certain recognized handicaps, however, morally, usually hazards to the officer and to other traffic, and in addition to that, the necessity

in most cases for allowing a somewhat broader tolerance than speed control really demands simply for the purpose of certainty of violation and adequate evidence.

Some departments resort to the use of speed checking devices as a substitute for pacing control. One of the newest things out since the war is mechanical and radar equipment. Some of you have seen it. The Virginia State Police and Connecticut State Police are using it, not in enforcement as yet, but experimentally.

I would be interested in getting Captain Buckley to tell us what they have done in that particular kind of mechanical speed checking, commenting also on his opinion of such devices in general.

**CAPTAIN BUCKLEY:** We have had a radar device for about five months now. We haven't used it for enforcement as yet, but we plan to. So far we have been establishing the fact that we have it in the minds of the public, and we have used it as an enforcement threat. We have used it to investigate complaints on speeding turned in to the department by various citizens, and we have used it to test the speedometers on our own patrol vehicles.

As in Washington, we now arrest the speeders by pacing them with the car and sometimes the motorcycle.

This radar device costs over a thousand dollars. Its adaption was made by a man in Norwalk, Connecticut, who worked on radar during the war. It is a very compact unit. It fits into a suitcase, weighs about 45 pounds, and it is run off the battery of the car, and it takes very little power from the battery.

We have found that the threat of radar detection of speed works wonders. We have signs that we put out reading "State Police Radar Speed Control." We put them out in about a dozen main arteries through the state over the Fourth of July and Labor Day. Then we moved the radar device from one road to the other, and we found that the speed observance there was the best that was ever known.

In addition to a speedometer that the officer reads when the car goes by this device, there is also a graph that is made of it. It makes a permanent record of the top speed of every vehicle that goes by, and it is a wonderful thing to make speed investigations, to set proper speed limits, and so forth.

**CHAIRMAN FORSTER:** Colonel, would

you care to comment? I don't know whether you have used that equipment, but does it sound like it would be useful to you?

**COLONEL WAGGONER:** It sounds good. We never heard of it back in Missouri.

**CHAIRMAN FORSTER:** Chief Hoyt, have you anything you would like to add on this matter of speed checking? Do you use the pacing method? Do you think these other methods would be useful?

**CHIEF HOYT:** I would think the mechanical methods would be very useful. We are looking for something of that kind as soon as it is perfected.

**CHAIRMAN FORSTER:** Let's move on for a few minutes to the individual enforcement officer. How can he do his job better? I think all of us are in general agreement that that is the ultimate test of what kind of enforcement program we get.

I think there are a lot of practical techniques we need to instruct men in, and I would like to have some of our panel members comment on some of them. I would like to pass one of the hottest potatoes on techniques to Chief Hoyt, first, and ask him, from the standpoint of his experience what he thinks about this question of concealment—whether the man should always patrol in the open, or is it legitimate and is it effective for him to sometimes not be quite so visible, and how invisible is he warranted in being?

**CHIEF HOYT:** That is a hot question. I believe that the man is entitled to make himself inconspicuous in certain spots under certain conditions. Normally, the patrol feature of traffic control is working from the preventive viewpoint, and that is a policy I think we are all agreed on. However, there are certain conditions and certain times of day, certain locations when concealment might have to be resorted to.

I have been surprised the last few months, at the demand of certain good-thinking citizens that we put men out in plain cars, and if necessary, in plain clothes, in order to catch these flagrant violators who are speeding when the officers are not present and are driving carefully when they are present. So I don't think that we will run up against opposition from the public such as we had a few years ago when we were doing it. We hadn't at that time seasoned the public to the point where enforcement was popular.

**CHAIRMAN FORSTER:** How about your views, Inspector Miller? You get people from

all parts of the country. What about its deterrent effect on your population?

**INSPECTOR MILLER:** We seem to boil it down to this, that active control requires that the cars be reasonably conspicuous and the men be in uniform. There are places, however, where we have used concealment very effectively and haven't had any real complaints—and that is around high schools and colleges, where these youngsters are watching for the officers in uniform and plainly marked cars. Here we have used plain cars, but the officers are in uniform, and of course, this combination is not as conspicuous as the marked automobile. We have to do that periodically, or when we get complaints or notice a large number of violations on the part of these youngsters. But basically, I believe the patrol car should be reasonably conspicuous and the officers should be in uniform. I can't unqualifiedly endorse plain automobiles and plain clothes officers for traffic work.

**CHAIRMAN FORSTER:** Let's ask our state contingent, here, Colonel Waggoner, what about that from the state point of view? Do you think your men should be in the open always, or are there some situations, where you have a bad speed zone or an area of curves and hills, where you are having trouble, where you think a man is warranted in working in a semi-concealed position, so to speak?

**COLONEL WAGGONER:** No, we can't operate like that in Missouri. We have a law that requires our men to be in uniform, with marked automobiles. We have a provision in the law forbidding hiding behind signboards, and when we park our cars at night along the highway we must have them parked with parking lights on. We must be identified at all times as state officers. We must be in uniform. I think that if we tried to put a man out in plain clothes in an unmarked car it would certainly cause a lot of discussion in the state and I don't think we would get by with it.

**CHAIRMAN FORSTER:** We seem to have a fair degree of unanimity that the most effective way is to rely primarily on open patrol but that in aggravated situations the man may be warranted in watching traffic, if the laws don't prohibit it.

**Captain Buckley,** I wonder if you would comment on whether you think there is any importance to laying down policies and in-

instructions for the men as to just how to patrol. Shall we tell a man in the state department how much mileage he has to cover, how fast he is to patrol, or shall we leave it up to his own judgment and discretion? Does it have anything to do with how effective he is on the road?

**CAPTAIN BUCKLEY:** I think it does. You shouldn't take too much initiative away from the man in the field. He should be allowed to make his own decisions. However, he should be well briefed before he goes off as to what the accident experience is on his patrol, and told what to look for, and if it is speeding violations in a certain place, he should make it his business to get those speeding violators if he can. But I don't think you should set a certain number of miles that he has to cover or a certain speed that he has to drive at, because, as I say, it takes too much initiative away from him, and he will drive his hundred miles and then stop. A lot of times the activities vary so much during the day that you can't set a day's operation ahead for him. I don't think it should be done.

**CHAIRMAN FORSTER:** I wonder if any of the departments represented have had experience on what are variously called spot checks, blockades, and other techniques for mass checking of some of the less obvious violations.

**Inspector Miller:** have you had any much experience in checking driver license or any other regulations?

**INSPECTOR MILLER:** We cooperated with the United States Public Roads Department on two occasions, in setting up blockades and getting certain information, and the public reaction was very bad. We tied up traffic for miles. So from our standpoint, I think blockades are extremely bad, and I am not in favor of them at all.

**CHAIRMAN FORSTER:** A lot of the states have developed rather elaborate techniques in the use of blockades. Sometimes those criminal blockades turn up amazing returns in traffic.

**CAPTAIN BUCKLEY:** That's true. We have a blockade system that we set up for a major crime, say an escape from our state penitentiary, which, fortunately, happens to be in the center of our state. Invariably, when we set up this blockade to catch an escaped felon, it turns up almost without fail three or four drunken drivers and some

men operating under suspension and other minor driving violations.

I think spot checks and road blockades are good things. However, they should be set up with care and should be well lighted and well marked in advance, and they should be manned by enough officers so that they can handle the volume of traffic instead of causing a lot of delay.

**CHAIRMAN FORSTER:** I have one last question I would like to submit to our panel members, and then we will get into general discussion.

I would like to ask Colonel Waggoner to open with a little comment on this matter of the apprehension of the violator, as to how standardized a procedure he thinks should be followed, what is good practice in the stopping of a car on the highway, and approaching and dealing with that man as a traffic violator.

**COLONEL WAGGONER:** We have a certain policy we follow in our state with reference to stopping a motorist, warning him, or issuing an arrest ticket or summons to him.

What we try to make these contacts as pleasant as possible. We want to impress upon the driver our job in the violation that they have committed. We go on the theory that we don't push these people around, that we try to give them better than a fifty-fifty break in the violations that they have committed. We have tried, in the past few years, to get to them from the educational standpoint rather than enforcement, where education will work. Of course, we realize there are some individuals that can't be handled any other way than through enforcement; but we also realize that today more than ever before we have to have our men trained to the point where they are able to make good contacts, leave a good taste in the mouth of the motorist, and to impress upon them our duty in trying to save their lives.

**CHIEF HOYT:** We have worked out a procedure that can be given to the new man step by step on what to do after he has stopped a violator. Number one, a salutation. Number two, a definite statement—not a question—a definite statement: "You were driving 45 miles per hour in a 30 mile zone," or whatever the violation was, and another definite statement as to what the officer intends to do, to leave in the mind of the violator.

We have worked out those various steps, and we don't encourage too much of a lecture as to why we are out there and why the laws are there, but they are thoroughly versed so they can give the reasons for the enforcement if they are asked.

**CHAIRMAN FORSTER:** One last question to you, Chief. We have talked about how to execute the general supervision in the individual apprehension. What about getting that quantity up? What, if anything, have you developed to get the amount of work up and the selectivity of the work up? I understand you have developed quite a bit of administrative technique on that.

**CHIEF HOYT:** I came here to get information on that. I am frankly stumped. I have done everything I can think of to keep my enforcement up to where it should be. We keep the men thoroughly versed on what our traffic problems are, along with other problems. Every two or three weeks I try to get out a departmental letter to each individual man. It is a mimeographed form, but in this letter we give them what the front office is thinking about and doing. I have tried every form I can think of to get our enforcement up, and I suppose that police officers being human beings, we are going to have to think up other devices.

I have records of every man's performance in the matter of traffic, on a graph form. The graphs are useful in comparing performance man-for-man and in uncovering standard performance by individual officers.

One man was doing the same type of work as the others, working the same type of hours, and after an eight month pattern of poor performance we were able to effectively call him in and lay his graph out before him, and along with his the graph of several other officers (their names are not on the graph) showing what they had been doing, and I think he had no argument whatever, no defense whatever.

We try to keep the boys advised as to what are causing our accidents. I have with me a chart based on the accident record for 1946. One circular graph indicates the violations that caused our accidents in our city for 1946, while another graph indicates the charges for the moving violation arrests the officers made. For example, on the causes of accidents, 10.8 per cent of the accidents were caused probably from speed, as best we could determine. We made over 25 per cent arrests

for speed.

We show 8.7 per cent of our accidents were caused by improper turning movements, and less than one per cent of our arrests were made for that type of violation.

This is a form we have used to increase the effectiveness of our selective enforcement.

Then, of course, we keep up a regular chart showing our enforcement arrests, and on the top are moving violation arrests, and on the bottom, the injury accidents and fatal accidents, month by month, starting, in this case, with January, 1946, running clear through to September of this year.

The boys are kept advised through that. I have about reached the end of my rope, and if any of you have any ideas as to how we can further give them a shot in the arm and bring up enforcement, I would like to know it.

**CHAIRMAN FORSTER:** I think you are well on the way yourself to meeting what every department realizes is a pretty tough problem of the mechanics of keeping up records on their enforcement in a way that will not approach the evils of a quota, but will give the commanding officer a picture of his production per man and per unit.

**CAPTAIN PAUL J. PRICE (Dayton, Ohio):** I would like to ask Captain Buckley if he believes the cost of radar equipment is worth the value of the thing. I mean are you getting your value out of it from the standpoint of what you pay for it?

**CAPTAIN BUCKLEY:** Absolutely. We have gotten much more than the value back already in publicity, and I believe it is a good investment. I have to say that, because I fought for two months to get it.

**CHAIRMAN FORSTER:** Does that answer your question?

**CAPTAIN PRICE:** Yes.

Now I have another question. How soon do you expect to take "radar evidence" into court?

**CAPTAIN BUCKLEY:** Some time this month or next. Very soon.

**CHAIRMAN FORSTER:** Have you done anything in educating the judges on it?

**CAPTAIN BUCKLEY:** Oh, yes. We have had the judges in on it. We showed them how to operate it. We have let them go by, we have timed them and told them how fast they were going.

**MR. W. J. ANDERSEN (Dubuque Police Dept.):** I would like to ask Chief Hoyt in

regard to that controversial matter of one or two man cars, what is the efficiency of the one man car? In other words, in my mind it isn't just a matter of putting the manpower out on the streets if they can't do the work. We all know that driving is pretty near a full-time job today. Does the man that is operating that one man car do efficient police work?

**CHIEF HOYT:** That's just as controversial as the subject itself, of course. A number of chiefs believe they are more efficient in the one man car than two men, and they will go at great length to give you the reasons for it. From my own experience, I have worked both ways as a police officer, and I was more efficient working alone than working with another man, just from the old bull session angle. We were talking all the time, talking about everything but police work, usually. I have been more observant working alone than I was working with another man.

Never go to the one man car unless you can double the number of units out and decrease by one-half the amount of area covered. The policy of the department, then, of course, can be set up, and two cars are always sent on every call, or more if necessary. It's a very controversial issue, though, I know.

**MR. TED R. SMITH** (Director of Training, Pasadena, California): On the matter of one man cars, this may be rather elementary, but in our case we have made use of the reserve police. They were an outgrowth of the auxiliary police. There were some 600 during the war. From that we chose sixty, and they served as regular officers and worked with the one man car. Thereby, during the night hours we are really able to have the cars manned with two men. It seemed to serve very well for our purposes.

**CHAIRMAN FORSTER:** I am going to call on somebody who has something to say on one of the big technical questions.

This question of Hot Rod cars started on the West Coast a year or two ago, and everybody back East was more or less complacent because it seemed to be a local phenomenon, but we have been watching it closely and found it spreading over the country very fast. One of the men who has had more headaches with it, and a great deal of success in dealing with it, too, is Deputy

Chief Caldwell of Los Angeles. I would like him to tell you who aren't familiar with it yet what that Hot Rod problem is and what their practical experience has been in dealing with it.

**MR. B. R. CALDWELL** (Deputy Chief, Los Angeles): I would like to rise to the defense, first, of the so-called Hot Rods. The Hot Rods have an association called the Southern California Timing Association. They have about 35 clubs and over 800 members. These individuals spend anywhere from \$500 to \$5,000 developing a real automobile, and then, to test it out in the matter of speed, they will transport them a considerable distance up to—it used to be Murock Dry Lake, and now they are taking another dry lake.

Those machines have attained speed up to 155 miles per hour. I don't mean to deny that they use the streets, and they have sought a closer location. They want approval of a section of our highways to conduct a speed contest, and if we were assured they would leave their speed on the track or leave it on the street, we probably wouldn't entertain as much concern.

The real trouble doesn't come from the real Hot Rods. It's the bailing wire jobs, the tin can jobs that are actually the cause of all of our trouble.

**CHAIRMAN FORSTER:** You mean the ones that mislead them?

**MR. CALDWELL:** When the Hot Rods are going up to conduct a speed contest, you find the highway littered with all the tin cans that are turned over, and all these kids will try to simulate the faster machines on the city streets. It is amazing to see some of those cars doing 90 or 100 miles an hour, with the tires down to the breaker strip. These youngsters are completely indifferent to their own safety in that regard. The Hot Rods do encourage real mechanical ability, but it is the tin can jobs that are actually causing all of the trouble.

**CHAIRMAN FORSTER:** Are those irresponsible ones high school boys, mainly?

**MR. CALDWELL:** It is true, most of them are developed by the youngsters. However, most of our arrests have been between 20 and 30 years of age, and in seeking some control, heretofore we have been limited, of course, but last year we were successful in having a bill passed by the legislature which provides that it is unlawful to conduct a speed contest on the highway; it is unlawful to use

any type of barricade, either physical or by the individuals' own bodies, which they have done on occasion. It has not been unusual for these youngsters to take a stretch of highway, sizing their machines across it, and send out advance warning, guide, detouring all traffic around it until we appeared on the scene, and then they fled in all directions. The men on the motors have had to do 114 miles an hour to catch some of the speeders. Then we give them a citation, and if he is a juvenile, of course, he is reprimanded and comes back and repeats the offense at some other location.

But the new law provides we may make a physical arrest at the scene and throw the whole works in for a cooling off period. It is still quite a game. They try to outguess us and we try to catch them, and we have a lot of fun, but it's dangerous fun we are having.

**INSPECTOR MILLER:** Is it spreading, Bob?

**CHAIRMAN FORSTER:** There seems to be evidence of it growing up around the country. It is taking hold, and as Caldwell has pointed out, it is not the bona fide amateur racing group who have good vehicles, who have rules for their organization and do their racing other than in the public highway. It's those who imitate them, the kids with junk cars, stepping them up as far as speed goes, who operate with vehicles in poor mechanical condition.

**MR. A. W. BOHLEN** (Exec. Dir., American Association of Motor Vehicle Administrators, Washington): The question was brought up just a short while ago as to seeing police on the highway. It has been my experience for the past two or three months in driving from the Gulf Coast of Mississippi as far north as Montpelier, Vermont, that we do not see what I would term a sufficient number of police on the road.

Of course, that is due to several things. First, we don't have enough police. Second, the police are off of the road, going to court and probably doing many other things.

It seems to me that if the police and the chap in charge of the administration of the drivers' license law, regardless of whether it be the police or some other administrative official, could get together on a program, I would say, in which the police would only take to court those violators that are violating the traffic laws in such a way that those

violations are the principal causes of action, all other violations could be handled in the way of warnings and turned over to whoever the administrator of the drivers' license law is, and let him handle them on a cumulative record basis.

I am fully aware of the fact that in quite a number of states nothing is being done about the drivers' license administration in so far as calling in drivers with an accumulated record. On the other hand, there are quite a number of states that will call in a driver on a cumulative record.

It just seems to me that if these two agencies could get together on a basis of police actually making cases for those violations that are causing accidents, and then taking all of the other cases and using those as warnings, and throwing them into the laps of the drivers' license administrator, that possibly you would see more police on the road, although we don't actually have more police.

**MR. FRANK:** About how many violations do you think a traffic officer can cover on the highway?

**MR. BOHLEN:** I made the statement that in my opinion we don't have enough police. The miles, in my opinion, that the traffic officer should cover depend on what the traffic conditions are in those particular areas. My whole thinking was that if through some cooperative program we could give the police more time to be on the road, that we would see more police even though we don't have a greater number.

**MR. JOHNSON** (Denver): I would like to get a little further discussion, if possible, on the use of one man in a car in congested metropolitan areas. From our observation, from our training, I can't see how we can justify one police officer in an automobile in congested metropolitan districts. Primarily we are taught safety, and we know that's a full time job to operate a vehicle. When the police officer is looking for license numbers, suspects walking along the streets, and many other things that come to his attention, how can he perform his duties in an efficient manner and still take care of his driving?

Also, on the point that Chief Hoyt brought out, they send two cars to handle one case. What are we gaining if we have to send two cars to handle one case, where two men in one car would handle the same case?

**CHAIRMAN FORSTER:** I am going to take the panel leader's prerogative and ask

one of the men in the audience to give his viewpoint on that. We have here Captain Schoenecker, representing the Milwaukee Department, which we recognize as one of the finest, and which has won honors repeatedly in traffic safety.

**CAPTAIN JOHN N. SCHOENECKER** (Milwaukee Police Dept.): We are still using two man cars. We are not cutting it down

to the one man car at all.

A gentleman just said that in the matter of safety you cannot be driving an automobile and still watch the traffic violator. So I believe that as far as we are concerned, two men in a car is the safest method. We have gone out for a few one man cars, as a matter of a test, but I don't think it's a safe practice. That has been my experience.

### Police Responsibility in Traffic Court Cases

(Panel Discussion)

*Discussion Leader—JUDGE HARPER E. HARR*, Municipal Court, Little Rock, Ark.

#### At the Scene.

*WALTER E. HEADLEY, JR., Dir. of Training*, Police Dept., Miami, Fla.

#### Pre-Trial.

*GEORGE E. MILLER, Chief, Dept. of Public Safety*, U. S. Atomic Energy Commission

#### In Court.

*FIRST SGT. W. B. UNPLEY, Ohio State Highway Patrol*

**CHAIRMAN HARR:** It does no good to make an arrest without a conviction. Your time is wasted, your money is spent, and perhaps damage is done instead of benefit. There are more cases lost through inadequate preparation than for any other cause. Preparation is important. There was a time when the arrest was made and the case was turned over to a lawyer to prepare, but now the police have that responsibility. Much misunderstanding between the judges and the police officers results from inadequate case preparation. The judge is bound by technical rules of law, the rules of evidence, and if the case is not made, no matter how guilty the man is, he is duty bound to discharge that defendant, and there is no other day in court for the defendant. The case is closed.

So we are here this morning to discuss police responsibility in traffic court cases.

#### At the Scene

*MR. WALTER E. HEADLEY, JR.: I think*

that assignment should properly be broken down into at least three parts: (1) where the violation is witnessed by the officer and the has not witnessed a violation and where he is making his case from evidence obtained at the scene; and (2) the apprehension of a wanted violator, such as a hit-run driver.

The approach, it seems to me, is a little different in each case. However, the responsibility, as far as the traffic court case is concerned, is the same. In the first one, where the officer has witnessed the violation, it is nearly always open and shut. However, his own conduct, as was brought out in the last panel, has a great deal to do with that. It seems to me that he should be as brief and businesslike as possible; that he should, after having stopped the violator, obtain, first, his driver's license before anything else, as that shortens the chance for arguments, and then write his citation or whatever he has, in a businesslike way.

Of course, in the case of a drunken driver, it is always well to try to establish the fact that the man was driving the car. Otherwise, later in court you might run up against his having somebody attempt to prove that he wasn't then driving the car, and being intoxicated is therefore beside the point. So the responsibility of the police officer at the scene of the apprehension of a drunken driver is to obtain a witness, not that he was drunk, but that he was driving the car.

In other words, at the scene of a non-observed accident you have to build your case from what you find, from the statements made to you in the presence of the defendant, the violator. There you have to be much more careful. You can't take anything for

granted. You have to bear in mind that the prosecutor is not there seeing what you are looking at, not at that time talking to people. He has to make his case from what you in particular report to him.

**CHAIRMAN HARR:** Your arrest is made. Your investigation at the scene or off the scene, in the case of the hit-and-run driver, has been made. But your case hasn't been won in court, and that's what counts.

There is something more to it than just making an arrest and investigating the scene, so I am going to ask George Miller to make a brief discussion on the pre-trial work that is necessary.

#### Pre-Trial Preparation

**MR. GEORGE MILLER:** Police officers have tried to overcome for years the idea advanced by parents to children that the policeman is a bogey-man who will get them if they don't watch out. But policemen have not been consistent in applying the same progressive thinking to their relations with prosecutors and courts, and continue to complain that their best efforts are frequently nullified by the bogey-men who serve as prosecutors and judges.

Establishment of channels and methods for constant exchange of information could contribute much to improving results from the efforts of all three members of this enforcement team: policeman, prosecutor and judge. Adequate pre-trial preparation of cases by police and the furnishing of complete information to prosecutors can assure a complete and just hearing and prevent discharge of well-founded cases.

A much-cited case concerns a famous lawyer who, while defending a client charged with abortion, continually declined invitations to examine prosecution witnesses. The State supported a strong case with facts concerning time, place and circumstances of the alleged offense and offered ample testimony placing the accused at the scene and describing the acts committed. Upon completion of the evidence offered by the State, the defense moved for, and was accorded, a directed verdict of "Not Guilty" because the prosecution had failed to establish pregnancy of the subject and, in the absence of pregnancy, an abortion could not have been caused.

Many cases are similarly discharged by courts because police or prosecutors fail to establish all the necessary elements of a case,

allowing the judge no choice but discharge. Present weaknesses in many prosecutions can be remedied by more thorough pre-trial preparation by police.

Three major steps are necessary for thorough examination—each composed of specific items. Some variation will be necessary in dealing with specific types of cases.

#### 1. Check on completeness of the case:

- Are date, time and place correct and properly identified?
- Are names of persons and places spelled correctly?
- Have all known witnesses been interviewed?
- Are all elements necessary to establish case covered?
- Have all necessary statements been secured, signed and properly witnessed?
- Has physical evidence been properly identified, preserved and can continuous possession be shown?
- Are sketches, photographs and results of scientific tests properly authenticated and identified?
- Has jurisdiction and authority of arresting officer been properly established?

2. Prepare a "Case Summary"—information in complete, concise and logical form for use of the prosecutor to take care before preliminary hearing, grand jury and court. A mimeographed or printed form is most useful for this purpose and should contain in brief form the following. (All items will not be needed for every case and some cases may require additional items.)

- Name, address, sex, race, age and employment of person charged, and his condition at time of alleged offense.
- Specific offense charged, gravity, time, date, place and manner of commission.
- If a vehicle was involved, give make, type, motor number, registration number and state of registration, owner's name and address, operator's name and address, condition of vehicle and connection with case.
- Weather conditions, if pertinent, such as daylight or dark, rain, snow, fog, etc., road conditions and control devices present.
- List of witnesses, whether or not a signed statement has been obtained from each, and brief description of testimony expected from each. List conviction records available on witnesses.



- f. List of physical evidence, sketches, photographs and scientific test results.
- g. Probable defense to be offered.
- h. Evidence which may be used in rebuttal.
- i. Check points on date of trial:
  - a. Be certain that all prosecution witnesses have been summoned and are present in court.
  - b. Give each witness an opportunity to review any statement signed by him.
  - c. Have in court all statements and the complete case report.
  - d. Have arresting officer bring original notes made at scene for refreshing his memory on the witness stand.
  - e. Have all physical evidence, sketches, photographs, etc., available in court.
  - f. Have defendant's previous convictions record available for court.
  - g. Assist prosecutor during trial.

Certainly all major cases deserve this careful preparation by police. There are many times when minor cases are important and should be prepared just as carefully. Time spent in this manner will be amply repaid in a reduced number of cases discharged and by the satisfaction which comes from a job well done.

To the questions concerning the amount of time involved in preparing court cases in this manner, one answer is apparent. If a complaint received by police is worth the two hours, ten hours or hundred hours of investigation necessary to secure the facts concerning it, then simple economy justifies the little time which must be added to insure that justice will be served.

**CHAIRMAN HARB:** I tried a case the other day. One of our best police officers made an arrest in a drunken driving case. The man was defended by an excellent attorney. In the trial, it was intimated that that officer struck the defendant three times, made three brutal blows to the face during the arrest.

I know that officer. I have known him for years. I knew that he was the last man in the department to do anything like that. I couldn't believe it at all. Yet when I tried that case, I believe that every person in the courtroom believed that officer struck that defendant.

Your case is not won at the scene, and certainly, if you do not present the prosecutor enough evidence in the pre-trial conference to convict that man, you don't have the essentials of your case, you can't hope to win it, and so many a case is lost in the courtroom by the officer.

That is an important factor in the trial of a case—a very, very important factor. It is there that the public sees the officer more than at any other time, and in a traffic court, it is the public that counts.

#### In Court

**SERGEANT UMPLEBY:** We try to stress upon our recruits and in our re-training schools with the older men, the importance of the officer's conduct in the courtroom.

As you men in traffic know, our cases are conducted in many different types of courts. Some of them are very efficient, very dignified; while some are common police courts, municipal courts, and so on. Some of them are mayors' courts, and justices of the peace. We attempt to stress upon our men the importance of their conduct regardless of the type of court that they are in.

An officer's presentation of his testimony to a court or jury is the final phase of the handling of his case.

The investigation or search for facts and evidence is one phase; the arrest of the subject is another phase; the preparation of his material, witnesses and information for court is a third phase. Regardless of the thoroughness and efficiency with which he has performed these earlier steps, his case can be won or lost by his actions in court and his manner of giving testimony.

The sole purpose of the officer's appearance in court is to serve as a witness to give what pertinent facts and evidence he possesses to the court and/or jury.

The jury and the court look upon officers as "professional witnesses." Due to their daily contact with this kind of work they are expected to be experts at giving testimony.

The jurors themselves are usually strangers to the officer, and also unfamiliar with court and legal procedure. Jurors are ordinary people, like yourself or your neighbors.

They are accustomed to judging a person on the basis of his words, attitude and behavior, and will make up their minds as to

his truthfulness and prejudice while hearing his testimony. They may and will disregard your testimony, if they personally believe that your fairness and truthfulness are questionable.

It is true that the officer as a witness, is not on trial, but his ability as an officer is definitely on trial, and in addition the reputation of his organization for efficiency and integrity is on trial.

The officer's personal conduct in the courtroom is one of his best weapons. Members of the jury and the court will instinctively have confidence in a well-behaved and sincere witness.

#### a. The oath:

Upon being called to the stand, the witness in taking the oath will raise his hand properly, speak out in a clear voice and be seated.

#### b. Upon being seated:

Assume a comfortable position, sit firm, do not squirm. Avoid gestures and mannerisms, remain calm and comfortable.

#### c. Speech:

Make statements clearly and deliberately.

Take your time, there is no hurry.

Look at the jurors, or the court in the absence of the jury, speak to them instead of the attorney.

#### d. Attitude:

Avoid any superior or cocky attitude.

Impersonal and matter-of-fact attitude is correct. Do not appear over anxious for a conviction.

#### e. Personal appearance:

If in civilian clothes or uniform, have them neat and clean. Hair cut, clean shaven, personally neat and clean.

#### f. Truthfulness:

Give the truth, regardless if it harms your case. Be impartial.

#### g. Avoid exaggerations or overstatements.

#### h. Notes:

Have your original notes easily available. If necessary, obtain permission from the court, and refresh your memory from these notes on such facts as dates, license or motor numbers, etc.

Do not take detailed and complete reports for this purpose, for if allowed at all, they will be scrutinized by the defense attorney and used as basis for cross-examination. If reports are subpoenaed then it is necessary to present them.

#### i. Direct Examination:

There are certain facts and items of information which the Prosecutor plans to have you give to the jury.

It is usually a part of his plan to give these facts in a certain sequence.

There may be other facts and information which you have, but which the Prosecutor does not want to be presented by you, if you volunteer more information on the stand than that which he asks for in his questions, then you may damage the case and destroy his plan.

The rule is to volunteer no information over and above that which the Prosecuting Attorney asks for.

If he asks that you tell in your own words about a series of happenings, you will give the pertinent facts in brief and concise form. He can bring out any additional facts by direct questions.

Speak clearly, so that all can hear and understand.

#### j. Cross-Examination:

The Defense Attorney may attempt to make the witness appear unreliable or untruthful in the eyes of the jury or the court. You will adopt a co-operative attitude toward the defense attorney.

Avoid any officious, sneering or wisecracking answers.

If he attempts to arouse your temper, remember he is only putting on an act. You must put on an act also, and remain calm, impartial and self-possessed.

If he puts on a show in order to get you rattled or angry, and you still remain calm and matter-of-fact, then he will damage his own case before the jury or court.

Maintain a courteous attitude, speak calmly and distinctly. After each question by the defense counsel, pause a few seconds before answering, to think out your answer, and to give the Prosecutor an opportunity to object if he sees fit. Do not be hasty, there is no hurry, even though the defense may attempt to hurry the witness.

If a Yes or No answer is demanded, and if the question cannot be answered fairly in that manner, then it is not necessary that the question be answered in that way. If the Prosecutor overlooks objecting to such a question, the witness may request of the court that he be permitted to answer in his own words.

If a double question, or one which requires

two separate answers is asked, then answer them separately.

The defense attorney may attempt to show that you have a personal desire to see the defendant convicted. Your answer to such a question is that it is your duty to give the facts of the case to the jury and court and let them decide.

j. Respect:

Show respect to the court, to the jury, and the attorneys. Avoid any tendency to show off or display a smart-alec attitude.

Do not allow your testifying to become a routine duty. Consider it a duty of the greatest importance and treat it so.

Your conduct and attitude while the jury is out and after their return, or while the court is making his decision and after he has made his decision and passed judgment, should be one of strict impartiality and that of wanting to see each case disposed of fairly and judiciously to all concerned with it, and in the event that for some reason you believe the decision not to be fair, this thought should be kept entirely to yourself while you are in or about the court, and later to be discussed with the Prosecutor and your superiors.

**CAPTAIN JOHN F. O'NEILL** (Police Assoc. Inves., Philadelphia, Pa.): One of the things that we try to get over all is a confession of guilt from the driver, if and when he is arrested. That is very difficult at times, but I think we, as police officers, ought to realize the value of the statement from the driver.

In the identification of automobiles the use of photographs is very important. Of course we realize we can't bring into court the automobile itself; but the police accident investigators, the fellows that take the photographs, know the type of photograph to take into court to show the damage on the automobile made perhaps by a pedestrian. For example, a pedestrian who was hit by an automobile and thrown up in the air usually lands on the hood of the hit-run car. We have taken a photograph to show the nature of the indentation on top of the hood. We have taken photographs to show blood stains on automobiles—and to have those blood stains properly identified is very important. Show the broken ornaments, the grille, and other damage on the car. I think the proper use of photographs in hit-run cases is very, very important.

Now, there can be mistakes made by photographers who don't know how to take the photographs of dents on cars. For example, the average photographer, perhaps, who does not know police photography, may take a picture of a dent on an automobile, and when that picture is developed, the dent is hardly shown because of the nature of the shadows, and so forth, or because the flashlight is used in such a way that there wasn't enough shadow thrown into the dent and the dented area shows very little if at all. It is important, I believe, to show the force of the impact, to show the depth of the dent and the area of the impact as it is spread out on the car.

So it is very important that whoever takes photographs knows how to take those photographs to bring out the evidence properly, and also that when they are taken into court, those photographs are properly identified.

There is a book that we have in our department—Photographic Evidence, by Charles Scott—from which we have developed a form that is used by all police officers when they take photographs. The officer has this form to fill out and attach to the photograph when it comes into court—of course, not putting any markings on the back of the photograph. We had a little trouble with that at one time, and we don't do it any more. The form is absolutely perfect. We never have a bit of trouble with photographs in court.

I want to add something else that I thought of while our three speakers were speaking on winning cases in court. I don't believe it was sufficiently emphasized that one of the things of greatest importance in bringing cases into court is to have a review with your prosecutor and your witnesses and your officers present. We do it, and we find it highly successful in eliminating any loop-holes or mistakes or omissions made by the police up to that time.

**CHAIRMAN HARB:** Is there any other discussion on the hit-and-run?

**MR. MILLER:** May I add a word to that? We have been very successful in a number of hit-run investigations, chiefly because the men have been taking precise measurements along with photographs and paint scrapings. In one particular case a pedestrian had been injured by a hit-run driver, and measurements taken by the technician from the heel

of his shoe to the injuries on his body were helpful in locating the vehicle and securing a quick conviction of the driver later.

**CAPTAIN O'NEILL:** We have trouble in hit-run cases in obtaining witnesses at times. We have known people to have been riding as passengers in the hit-run cars. In my opinion there should be in the law somewhere something that would compel people who were riding in the hit-run car to give some information to the police as to who the driver was. That might seem far-fetched, but it would make it a lot easier for the police, if, when we know there were several people in the car, and we don't know the driver, we can prosecute these other people. But there may be a conspiracy there, and there may not be. If under the law there was some specific measure whereby people who were riding in a hit-run car were compelled to give the police information, and otherwise, if they didn't they would be violating the law, that would help. They go scot-free. They have all the knowledge of the crime, but they refuse to assist the police because they are protected by the law in so doing.

**CHAIRMAN HARB:** It is very difficult to get the passengers in the car to talk.

**MR. ARTHUR W. STATTMAN** (Accident Investigator, St. Paul): I may pass along some information that may be valuable in hit-and-run cases.

First of all, we all agree that to find the car is important. Without the car we know nothing. We in St. Paul take the evidence found at the scene and establish the make of car, and we then make a picture of that particular model car. We get a '41 Pontiac, as an example, and a picture would be made. If it's a serious case, we run that picture in the newspapers. It may be your neighbor. Therefore, we have had splendid returns.

In addition to that, we have a city ordinance which compels garages to make reports to the police on any automobile that bears evidence of being involved in an accident, which has been indeed helpful.

**CHAIRMAN HARB:** They have a city ordinance that compels the reporting of cars that have been in accidents.

**SERGEANT UMPLYBY:** In Ohio we have a state law that requires garage keepers to report any evidence of any type of damage, such as bullet holes, blood, and so forth, as well as fender damage and things of that nature.

**MR. HERBERT E. CAPELL** (Lakewood, Ohio, Police): The Federal Bureau of Investigation will assist local police departments in a spectrographic analysis of paint other evidence found.

**CAPTAIN HERMAN CRITES** (Flint, Michigan): In answer to Captain O'Neill, on how to get the witnesses in the car to talk, in Michigan we have a state law whereby (we don't have the grand jury system there) before you get the complaint and warrant, you can, if you wish, require all witnesses to appear before a justice of the peace or a municipal court, and they will be put under oath and be examined by the court. I think that would answer your question.

We also have not only a state law, but we have a city ordinance at Flint requiring garage keepers to report all cases. We don't require them to report all cases of damaged cars, because it would be too much, but if we have a hit-and-run case, my hit-and-run squad immediately sends out a form that we have prepared to all garages, giving what information we have, and they are very cooperative, and we have gotten very good results from them.

**MR. W. D. MYERS** (York, Pa.): I can't quite understand Captain O'Neill. Under Pennsylvania law, especially in cases where you have definitely determined that that car was involved, your license plate or registration is accepted as prima facie evidence, and it is up to him to produce the driver. It is up to the owner of the car to say who was driving that car.

**CAPTAIN O'NEILL:** The only difference is that these drivers can take an affidavit and say "it wasn't me," and that's the end of it.

**CHAIRMAN HARB:** I wish we could make people tell the truth. You can't keep them from lying, can you?

There is one type of case that's a lot of trouble here, and that comes in the pre-trial case. I see more cases of reckless driving thrown out of court than any other case.

**MR. MILLER:** You said that in your pre-trial conference you should have your essentials of your case fulfilled. Take a drunken driver case. A man was driving on the public highway, and he was drunk. That's some of the essentials there: he was driving, and he was drunk. What are the essentials of your reckless driving case?

**MR. MILLER:** We have a state law to operate under which blankets many of the

moving traffic violations as reckless driving. Some of the courts are willing to accept that with very little added. The courts in our particular neighborhood are not willing, nor are we willing to accept it as such, because the reckless driving charge has very little value from the police department standpoint for advance planning for enforcement measures. If we use only the reckless driving charge, we wind up with one box filled with charges which mean nothing to us.

With the use of this form, any case where a reckless driving charge is filed is defined. There are specific instructions to the men to define what made up the reckless driving in that particular case: in other words, exceeding the speed limit, cutting in or out a two-lane road or four-lane road, passing at an intersection, and so on. For our record purposes we then use the specific violations rather than the reckless driving charge, so that we know what to look for in planning enforcement. We know that we are looking for bad passing or excessive speed, rather than going out and looking for everybody who comes under the blanket charge of reckless driving.

Our courts are now in this neighborhood asking for the same thing, that in the trial the officer must be specific as to what distinct violations constitute the reckless driving. I don't think we can get very far in the enforcement field without that procedure.

**CHAIRMAN HARB:** Mr. Miller thinks that wherever possible we should have a specific charge: driving on the wrong side of the road, speeding, rather than reckless driving. Is there any other discussion?

**CAPTAIN DICKERSON** (Colorado State Police): Our state and several others are regarding reckless driving to mean that a person drives in a manner to indicate willfulness and wantonness in regard to persons and property. I have found in my experience, in setting out specific charges, that a good defense attorney will turn right around and get out the definition of willful and wanton, and try to put the officer on the spot and make him prove what is willful and wanton. They will bring forth legal terms.

Therefore I believe legislation on that action could assist in the long run, because that definitely hits the driver that is causing a considerable amount of our accidents and slaughter on the highways today.

**CHAIRMAN HARB:** Does anybody else want to be heard?

We have gotten into some words that I would like to see explained—those words "willful and wanton." There is your trouble.

**CAPTAIN CRITES:** I was thinking the same thing, and I think Judge Harb is the man to give us the definition.

**MR. ROBERT STILL** (Police Inspector, Winnipeg): We have a law in the Province of Manitoba governing speed, and when a man is charged with any offense, the charge is "driving to the common danger." It comes under speeding, really. A man who is driving on a highway or street in other than a careful and prudent manner is "driving to the common danger." He is not charged with speeding. He is charged with driving to the common danger. Under that heading comes speeding, zigzagging through traffic, passing on the right, going through stop signs, etc.

**CHAIRMAN HARB:** I want to hear from Sergeant Umpleby on these "willful and wanton" words.

**SERGEANT UMPLYBY:** I am not going to give a definition, but we have a similar situation in Ohio in our reckless driving section that the Captain has. That section reads to the effect that this operation must endanger the life and limb and property of others in the use of this highway. That brings up a controversial question, just as yours does.

As a result of that, with the Uniform Traffic Code in 1941, we went along the same line of thought that George has, to use the section of law. In these states that have copied Act V in these model uniform acts, you will find practically every type of a motor vehicle moving violation can be covered by a specific section of that uniform act, and we advise the men to use "reckless driving" only when it is absolutely necessary or it is some unusual type that can't be covered by that specific section.

**CHAIRMAN HARB:** What kind of evidence is usually brought in, in a reckless driving case?

**SERGEANT UMPLYBY:** In Ohio we attempt to tie in reckless operation in some manner or form with every speed arrest. In addition to pacing, we attempt to show over a distance which can be at the judgment of the officer, of course, the various things that this individual has done in those several city blocks, or maybe a mile or two of open high-

way, such as crossing a yellow line, driving through a congested area or an intersection, and those things that would constitute and make up a generalized summary of reckless operation over a certain given distance.

That is the way we attempt to do it. But as I say, if the motorist does do some specific things, such as improper turn or driving to the left of the center line, or over one of the yellow lines, that is the section that we use, that specific section in preference to reckless operation.

**MR. MILLER:** Several years ago I had the pleasure of serving with some of the men in this room on a committee that had a number of very careful discussions in the use of the charge of reckless driving. We discussed that with police officers from all over the country. It was their opinion that the bulk of the difficulties arising from reckless driving charges came from misuse of the charge. We tried to find out when and how it should be used, and the consensus of that group was that "reckless driving" is intended to be used to cover a series of minor violations. In other words, if you have one or two specific violations, such as crossing a center line or improper passing or excessive speed, those specific charges should be made. If you want to put a more severe charge against that man, in most jurisdictions "reckless driving" provides for the revocation of the operating privilege, in addition to other penalties, and then the charge should be "reckless driving," provided he has committed three or four minor violations. But you would still be substantiated by defining each of those minor violations that make up the reckless driving charge.

**CHAIRMAN HARB:** The officer in court. That is most important. Is there any discussion on that?

**SERGEANT UMPLYBY:** I might add a little bit to what was said on the officer's conduct in the courtroom. I think that if all of us would just place ourselves in the position of the defendant, it would help. As a rule, in traffic cases, the defendant knows that he has done something wrong, and as a rule he doesn't want to make an issue of it, and his reaction and his opinion of the arrest, from the beginning to the end, is going to depend a great deal on the conduct of that officer.

A great difficulty with a good many police officers is that they are quite enthusiastic about their work, and they take the affront,

the violation, rather, as some personal action against themselves. Consequently, when they are in the act of effecting the arrest, taking the person to court or even preparing their case, and in testifying, it is pretty difficult sometimes for them to keep that feeling out of their actions. That is one of the things that we attempt to stress, that it should be an absolutely impartial proposition, as far as that officer is concerned. After all, the violation isn't against him, personally, even though he personally may feel that the offender is really doing something pretty terrible as far as traffic regulations are concerned. It still is not an offense against him personally, it is against the state or the city ordinance, whatever the case may be, and he should attempt to keep that foremost in his mind from the very beginning of the observation of the violation through the entire preparation of the case, court conduct, and everything connected with the case.

**MR. VERNON PAGE** (Toronto, Canada): On the point of attitudes that has been brought out this morning, I think we are looking at it from the wrong angle. We in the police departments are trying to build up the proper attitudes. That attitude, I think, has been built up due to the lack of discretion of the judges on our benches. I think before we can get further in our court work, our judges will have to take a more enthusiastic attitude on traffic conditions. They look at traffic as a minor thing, where they look at crime as something serious.

That is where I think our judiciary should take a step forward and become more enthusiastic in the traffic field. I think the problem lies on their shoulders, rather than the police officers'. The reason that that attitude is built up, as I said before, is that the police officers think the judges are letting down on the job.

We have the same problem in our own country with the attitude of our judges. I think there is a problem there, more so than with the police. I think the police realize they have a ministerial duty to perform, and prepare their cases, but they have an attitude that the courts are letting them down in presenting cases, because the judge is not interested in the traffic problem. Until we can get judges that are more interested in the traffic problem, we are still going to have this conflict between the ministerial body and the judicial body.

**CHAIRMAN HARB:** I think you are correct. I think judges should take more interest in the traffic problem. I don't think the traffic problem should be considered unimportant. There is a natural conflict between the judges and the officers, because the judges discharge the defendants sometimes when the officers know that they are guilty. Judges are bound by the technical rules of law, of course, and if the case is not made they have to discharge it.

Now, then, in your court, in your cases, if you make your investigation at the scene or in the follow-up in the case of the hit-and-run, if you prepare that in a report and take it to the officer who prosecutes it, and have a discussion of that before that case is pre-

sented, and then if you are careful about your conduct in the court, then you will have fulfilled your full duty to justice.

**CHAIR GARRISON:** Thank you, Judge Harb and gentlemen of the panel.

I think probably a number of us will still go out more convinced in the ideas we have on these two subjects; probably some of us have changed our mind. But we know this, that whether it be a police problem or anything else, in this democracy of ours, the mere presenting of a problem provokes thought and when we provoke thought in this country of ours, to some degree it brings out some organized thinking, and ultimately we will reach the proper solution.

#### TUESDAY MORNING SESSION October 7, 1947

#### Group Session for Traffic Court Judges and Prosecutors

Presiding: JUDGE EARLE W. FROST, Municipal Court, Kansas City, Mo.

#### Appropriate Fines and Penalties

By JUDGE E. EARLE RIVES  
Municipal-County Court, Greensboro, N. C.

The determination of what is appropriate punishment in any particular offense would probably elicit as many different answers as there are judges and solicitors. There are those who sincerely believe that severe fines will act as a real deterrent to traffic offenders, others feel that jail sentences are absolutely essential if we are to have greater safety on the streets and highways—still others believe that suspension or revocation of the driver's license of the offender is the most effective and equitable form of punishment since it offers equality of punishment to the rich and poor.

As one of those judges who has been attempting to cope with traffic cases in a Municipal-County Court for more than eighteen years, I belong to that school of thought which holds that there is no magic formula of enforcement by which streets and highways may be made safe for motorists and pedestrians, but that a combination of all of the means used by various sincere and conscientious judges is the best and most realistic approach to the problem of safety on the high-

way. The problem is an ever growing and a continuous one. We judges and solicitors must meet that challenge.

I propose to deal briefly with four avenues of approach to the subject of appropriate fines and penalties in traffic cases.

"First, should uniform penalties be invoked in like offenses? It took hard work on the part of vigorous and visionary men to attempt to get the Uniform Motor Vehicle Code through the legislative bodies of our forty-eight states. Now that this wise measure has been made the law in practically every state in the Union, it is only natural for the motorist to accept the theory that there should be uniformity in imposing fines and penalties by those charged with the responsibility of dealing with the motorist. Except for the offenses dealt with by traffic bureaus, I take the position that uniformity of punishment for traffic offenders is not feasible.

If each and every person convicted of speeding should be subject to a fixed penalty there would be no necessity for the granting of

discretion to judges by our various Legislatures. During peak traffic hours in congested areas, excessive speed wherein life and property were in jeopardy, could be a very serious offense. It is interesting to note, however, that the Eno Foundation for Highway Traffic Control conducted a survey in enforcement of speed laws in 31 states and 437 cities and found that fines varied from \$1.00 to \$300.00. On a straight stretch of road where there are no intersecting streets or highways, excessive speed would still be a violation of the law, but there would be no necessity for severe penalty in a case of this character. The thing the public cannot understand is the situation which exists in my own state. There is a three lane highway connecting two large cities. The judge in one city takes the facts in every case into consideration and deals with defendants accordingly, often imposing only the costs. In the neighboring city the judge has other ideas about the motorist who speeds on this particular road and rarely ever imposes a fine of less than \$50.00 and more often twice that amount. The motoring public naturally concludes that one of the two judges is wrong in his premise or the law is an am. Despite the apparent reasonableness of uniformity of punishment I feel that it is a step in the wrong direction. Discretion in the matter of punishment after conviction is a helpful, but challenging power for a judge to have.

The second avenue of approach to the subject of appropriate fines and penalties in dealing with traffic cases is, "Should mandatory jail sentences be imposed in serious traffic violations such as operating an automobile while intoxicated and other offenses wherein the motorist's actions disclose an attitude of reckless disregard of life, limb, and property of others?"

The responsibility of imposing a jail sentence on his fellow citizens is a most serious one and particularly is that true when one is required by law to cause to be incarcerated a youthful first offender. Most of us realize the gravity of our action when we send a man to prison for the first time. Our whole penal institutional system of punishment is such that we judges often have a sense of genuine revulsion when we order a convicted defendant to serve time in a county jail, on the state road, or a county farm.

I am ashamed to say it, but honesty requires that I admit that in my own state, we

are one hundred years behind the advance of science in dealing with those whom we call "criminals" for a lack of a better name for those who are often mentally or physically ill. A motorist who has been foolish and thoughtless enough to take a few drinks before driving with the result that he stands convicted of a serious traffic offense, may find that he is one of those "criminals" who must be committed to a penal institution. Time will not permit me to go further into this matter, but there is a strong probability that those of us who are gathered here today might agree that our entire penal institutional system could stand an intelligent general overhauling. Accordingly, when you find some of our well-meaning fellow citizens insisting that in a particular given offense a jail sentence should be mandatory, it is fairly evident that little thought has been given to the full implications of such a policy. Personally, I am grateful that the laws in my state invest the judges with discretion in dealing with offenders in all except capital cases. It is a terrific responsibility for a judge to have, but a challenging one. Let the punishment fit the crime and the individual is my theory in dealing with traffic offenders.

Third, do judges who deal with traffic offenders sincerely attempt to impose appropriate fines and penalties on the offender regardless of social or political influence, race, creed or color?

One of the principal reasons why our courts have been sometimes held in disrepute has resulted from actions of judges in predicated judgment on the relative position of the individual who stands before him for trial and punishment on the basis of that individual political or social position, or the color of his skin. Some of you judges from above the Mason-Dixon line may think that our southern Negro is discriminated against in the courts in the South. Of course, there are some judges who lack intelligence, vision, and understanding in dealing with the Negro, but I can truthfully say that in my own state I believe that the Negroes there have a friend in court in the person of the presiding judge.

In my own county 72 per cent of offenders who come into criminal court are white and the Negro minority are not afraid of being mistreated because of the color of their skin. I single out the Negro because of the attention focused upon him in our section of the country, but you in the North, East and West

have your particular problems too. If we, as judges, want to be true to our sacred trust, it would be helpful if all of us would ask ourselves often if we impose appropriate fines and penalties on the offender regardless of social or political influence, race, creed or color.

And, finally, do judges and solicitors honestly and fearlessly, meet the challenge of safety on the highway?

Nothing is quite so sickening to me as the statement, "Oh, I know the judge. I'll get by all right." And the tragedy of it all is that it is sometimes true. By and large the great majority of our judges and solicitors are conscientious and honest in the discharge of their duties, but there are some exceptions who bring discredit upon all of us. The solicitor or prosecuting attorney has it within his power to mislead the court in many instances, thereby causing a miscarriage of justice. Few of us question the solicitor's statement when he states in open court that he has investigated the facts and desires to take a *nol-prose* in the case of *State versus Sam Jones*. It is my firm conviction that there are very few dishonest judges and solicitors in the courts of this nation, but the public often wonders if there are court officials who are more interested in succeeding themselves in office or courting popularity by being a "good fellow" when dealing with those who are charged with traffic violations, rather than judges and solicitors who are unafraid to do their duty, honestly, intelligently, and in good conscience.

### "Suspension, Probation and Other Deterrents"

By JUDGE THOMAS M. POWERS  
Municipal Court, Akron, Ohio

Probably every traffic judge handling volume traffic cases has pondered the problem of how to slow down and thin out that stream of offenders that daily pass before the court. What makes them get that way? Why don't they observe the law? Don't they know the law is simply the rules of the game for courteous and safe conduct on the highway? Is it that these offenders are such poor sportsmen that they won't play the game according to the rules? Yes, that's true of many. Is it because they are wilful violators and can't brook restraint? Yes, that's true of

When we know from statistics authenticated by the National Safety Council that there were 33,700 motor vehicle fatalities in 1946, we must realize that we judges and solicitors have a colossal and challenging job to do in the remaining months of 1947 and the years ahead. There is no place in the courts today for the judge or the solicitor who will not intelligently, honestly, and courageously strive to meet the problem of appropriate and adequate penalties in dealing with traffic offenders and thereby make some material contribution toward greater safety on the streets of our cities and the highways of our respective States.

In conclusion may I suggest this mental teaser for your consideration. When you make an honest appraisal of punishment for the individual who misuses the highway, you are led to the inevitable conclusion that if you are intent upon murder—do it with an automobile on the highway for your chances of exoneration by the coroner's jury or acquittal in the court are 10 to 1 better than any of the ordinary methods used by a murderer. This condition is not the fault of the judge or solicitor, but rests squarely upon the shoulders of Mr. John Q. Public for rare, indeed, is the individual who can bridge the gap in his thinking between ordinary civil negligence and criminal responsibility. Then, too, you must remember that almost every motorist is imistent upon compliance with the traffic laws and severe punishment for law violators—for the other fellow, but he can do no wrong!

some. Is it because they don't know better? Yes, that's true of a few.

For those few who don't know better, education and experience will, of course, help. But for those others, those wilful violators and those who will not play the game, what can the court do to control and affect their future driving conduct. Is just simply a fine large or small sufficient? I believe not in most such cases.

In the case, of course, where it is the offender's first offense and where there is nothing particularly aggravating or wilful about

the conduct of the defendant, I believe that such a case may be satisfactorily disposed of by simply a fine. I refer to such cases as red light and boulevard stop violations and minor speeding infractions.

However, where the violation shows a wilfulness or reckless disregard of others on the highway or in a case of the habitual violator or the drunken driver I have found that the suspension of a part of the fine or other sentence of the court has a very sobering and salutary effect upon the defendant as indicated by the rare court appearance thereafter of such defendants. I will cite some concrete examples of situations in which suspension or probation has been used and how it has been used.

1. A sixteen year old defendant is hauled into court for speeding 45 miles an hour within the city limits where there is a maximum speed limit of 35 miles. Under our law the maximum fine that can be imposed is \$50.00 for this offense. I will impose a fine of \$50.00 or \$40.00 and a suspension, however, of part of it on condition that the defendant not do any speeding for three years. Of course if there is any element of recklessness or other aggravating circumstance in addition to the speeding I might also suspend his driver's license for some time, depending on the circumstances.

2. A defendant is cited for going through a red light and causing damage to the car of another person on the intersecting street where the evidence shows that the damaged party was lawfully in the intersection and that the defendant before the court was the sole cause of the damage to the other party. In such a situation I make it a point to continue the case to give the defendant an opportunity to make restitution for the damage that he solely caused. I do this with the thought in mind that it is fair and proper to take into consideration the defendant's attitude, so I continue the case and impose sentence later, taking into consideration that the defendant has taken care of the damage.

3. A 22-year-old defendant who pleads guilty to making a left turn in front of approaching traffic admits also that he was solely at fault in causing damage to the approaching car. He says that he has insurance, but upon further inquiry the court finds that his car is financed and the insurance that he carries is that required by the mortgage for the protection of the mortgaged

property. In other words, the defendant has no liability insurance that will take care of damage caused to a third party. In such a case as this, as with the one above, I continue the case not only to give the defendant an opportunity to settle the damages but also to procure liability insurance to take care of his future driving.

I appreciate that our court will probably be considered by most of us as indulging in extra-legal penalties especially when it goes into this matter of liability insurance. It is true that our law does not require that the motorist carry such insurance except after conviction or plea of guilty to certain offenses such as manslaughter, hit-skip and drunken driving. However, as in the case of the defendant who shows a disposition to make good for the damage that he has caused, so in those cases where the defendant cooperates and procures liability insurance, the court takes this into consideration in fixing the punishment. For the past three years we have been following this procedure which has met with strong public favor. The average layman can never understand why he should be pushed around from pillar to post to collect for the damages to his car caused entirely by the defendant who is before traffic court, nor can he understand why he should have to get a lawyer on a hundred dollar case and pay him half the recovery. I personally think the layman is right and that our traditional court procedure as it relates to the administration of justice in such traffic matters is all wrong considering that most traffic courts will do nothing about damages or about the future financial responsibility of the defendant. I can not see how complete justice can be done for all parties concerned including the public, if the court is blind to these things.

4. The next situation that is deserving of special attention is the drunken driver. You will notice I am not considering these necessarily in the order of their importance. If I were, surely I would put the drunken driver first because he is probably the worst menace on the highway today.

When a drunken driver appears in court there are many things to weigh in evaluating the punishment that should be imposed. First, of course, are the facts and circumstances of the case before the court; then the defendant's past record, the matter of damages, if any; has the defendant insurance;

what does the defendant do? Does he drive for a living? Has he dependents? Does he drink habitually? Has he ever been arrested for intoxication? How long has he worked for his present employer, etc. All these factors are taken into consideration.

Under the laws of our state the maximum penalty for this offense is a fine of not more than five hundred dollars or imprisonment for not more than six months or both such fine and imprisonment.

I have known judges to dispose of such cases by simply a small fine, say \$25.00 or even less, and no jail sentence given or suspended.

I have known other judges to give a fine and a jail sentence of say ten days.

As with the other offenses already discussed most courts will do nothing about damages or the future financial responsibility of the defendant or about his future sobriety.

Here is how our court handled a typical drunken driver who had run into the rear of a car that had been stopped waiting for a red light. The defendant admitted the charge and that he was solely at fault in causing the collision. The evidence further showed that he had been employed at one of the rubber companies for fifteen years, had a wife and three children, and his car was financed. He did not own his home and he had no liability insurance to take care of the \$300.00 damage caused to the other car. He lived six miles from his work and no public transportation was conveniently available.

The court gave the defendant a fine of \$100.00 and 30 days in jail. \$50.00 and 30 days of the sentence were suspended on condition that (1) the defendant not get intoxicated for five years, (2) the defendant pay the damages and always carry liability insurance in the future.

We have found that the moral effect of having the suspended fine or jail sentence or both hanging over the head of the defendant has a marked deterrent effect and rarely have we found such defendants violating the conditions of the suspension.

It is hardly necessary to mention that in aggravated situations of first cases of drunken driving or with repeaters the court in addition to other punishment will suspend or revoke the driver's license.

Also, the court sometimes will limit the driving privilege to business purposes, or daytime use or no pleasure driving etc., de-

pending on the defendant and all the circumstances.

So much for suspension, probation and deterrents imposed by the court. One of the most effective deterrents that we might consider and which our community has the good fortune to be able to use to good advantage is daily publication in the newspaper of the list of traffic violators, their name, address, offense and fine or punishment. I have here a recent list which I have clipped from our newspaper and I will pass it around among you. You would be surprised how widely read this list is and how distasteful such publicity is to offenders. There is little doubt that it has a deterrent effect for potential repeaters as well as for potential first offenders. Of course, where there is a particularly serious offense with heavy punishment it will get special news item attention in the newspaper.

On this subject of publicity and newspaper cooperation time limitation does not permit considering and exploring all the possibilities in this field. However, one observation should be especially pertinent. If proper publicity is not given to traffic offenders, their identity, offenses and punishment, then how can the work of the court and law enforcement have any deterrent effect upon potential offenders? They must know the punishment that awaits them and they cannot know it unless it is publicized. Moreover, this publicity is a further punishment for the offender himself and a deterrent toward becoming a repeater because he doesn't want his employer, his friends and neighbors reading and gossiping about his law infractions.

Without continuous and varied publicity a certain amount of apathy toward traffic safety is inevitable because of the distractions of soaring prices, world tensions, coming presidential election, etc. However, it is not lack of public interest that we should be concerned about, but rather lack of public information. We should get all the facts before the people employing such technique of picture and word, and such frequency of impact upon the public mind that constructive programs for traffic safety will readily receive the intelligent support they deserve. It was more than an accident, as you can perceive from what I have said, that our local newspaper, our only Akron newspaper, the Akron Beacon Journal and columnist Kenneth Nichols received last month from the Na-

tional Safety Council top awards and Grand First Prize in the national newspaper contest for the best pre-Fourth of July story or editorial on safety. Nor is it an accident, I believe, that over that long Fourth of July week end we had no traffic fatalities in our city. Yes, proper publicity does pay.

In conclusion may I say that I think the traffic judge can and should make greater use of the deterrents mentioned and should exercise leadership and do everything in his power to stimulate the public and create an awareness of the facts and figures of the grim story that only he fully knows.

## Violations Bureau Procedure

By HUBERT D. HENRY

Presiding Judge, Municipal Court, Denver, Colorado

The purpose of a violations bureau is to conserve the time of the court and the violators in the cases of violators involved in minor infractions of the law. The bureau can be used most effectively in parking violations, but is used in many cases of minor moving violations where the violation is not too serious and where there is no particularly beneficial result from ordering the violator into court. The handling of minor violations through a violations bureau not only reduces congested court dockets, thus saving the time of the court and its staff, but also the time of the violators, who may thus pay their fines in a few minutes in the violations bureau rather than wait, sometimes for several hours, in court for their cases to be heard.

The violations bureau should be under the supervision of the court and operated in conjunction with the office of the clerk of the court. It should not be in the police department or supervised by the police department because of the adverse effect of this arrangement on violators paying their fines.

No excuses should be granted except by the judge in open court. It is possible to establish a system of excusing everyone for a first time violation of some particular ordinance, but even this policy is not desirable and all tickets should call for a fine.

Upon failure to appear in violations bureau for a parking violation, there should be at least one notice sent to the owner of the car advising him of the violation and that he is responsible for the appearance of the violator. However, if the violator does not appear after one notice on a parking viola-

tion, or if the violator does not appear after having received a ticket personally for a moving violation, an arrest should be made and the violator should be required to post bond before being released.

The amount of the respective fines in violations bureaus will vary from place to place and with the various offenses. Considering that the more serious offenses will go to court, it seems to me after talking with other judges, that a schedule generally accepted of approximately \$10.00 for moving violations and \$5.00 for non-moving violations may be considered a fair standard. Of course, the actual amount of the fines should vary in accordance with the seriousness of the offenses in the particular community. For example, parking on a street where parking is prohibited in a busy hour in some communities might very well be classed as a very serious violation, subject to a very heavy fine.

All moving violations should be recorded against the name of the violator and these records maintained for a period of five years. In the case of moving violations which are heard in court, the violator's record should be used to assist the judge in determining the seriousness of the particular offense before the judge in view of the past record of the violator.

Violations bureaus when used properly can be of very great assistance in the handling of traffic cases, but if used improperly, giving the members of the public the idea that it is merely a revenue collecting agency, they can be of great harm to traffic law enforcement.

### Value of a Violator's School

By EDWARD C. FISHER  
Judge, Lincoln (Neb.) Municipal Court

It has been emphasized a great many times before this group that the prime objective of traffic law enforcement is to educate the public to the necessity for safe driving. I conceive the chief function of the court, therefore, to be educational. We all know that we can accomplish little in the way of genuine progress in traffic law enforcement unless we do have the support and cooperation of the people who use the streets and highways.

Many judges are now seeking to awaken motorists to the dangers inherent in driving, and induce them to comply voluntarily with the rules laid down for their protection and that of others. Opinions vary widely as to how such compliance may be obtained, whether by strict enforcement and heavy penalties, by "whoop-la" campaigns sponsored by citizens' groups or by other means.

Many cities have sought to achieve the purpose by setting up traffic schools of various types for the purpose of carrying on education along lines of traffic safety. It was suggested in one of our sessions last year that these properly should be called "Traffic Safety Schools" rather than violator's schools, probation schools and similar designations, in order to remove any possible stigma from attendance and to encourage volunteers.

Some of these schools are used very much in the nature of penal institutions, so which the violator is sentenced. Some are for juveniles only. Others are held open to all, with the chief emphasis upon voluntary attendance by young and old, guilty or innocent, attendance being based upon civic pride, self protection and the opportunity to learn safe driving principles. Some are conducted by the police department, some by other interested agencies such as local rotary clubs, some by the courts, and some of the more successful have been sponsored by all interested agencies.

We started a traffic school in Lincoln some years ago. It was set up jointly by the court, the police department and the local education council. For a long time a very attended quite hostile by volunteers, with only a sprinkling of students, but as interest waned and the war came on we found the proportion gradually reversed. When we got shorthanded and the school finally lagged down, nobody was attending but a few "house wreck"

juveniles who caused the officer in charge to become prematurely gray.

After the traffic school failed I set up a system of my own—a sort of traffic school extension course. To every traffic violator, except in certain serious types of cases, I offer, as an alternative to paying the fine, a suspension of sentence for a certain period during which the violator surrenders his driver's license, studies the traffic rules so that he can pass a test, and writes a 1000-word paper on "Traffic Safety". Every other Saturday morning at 9:30 we have what we call our "Juvenile Traffic Session" at which all persons under 18 are required to appear accompanied by their parents or persons responsible for them. At this session we show a traffic safety film followed by some local citizen, who speaks on behalf of traffic safety. Then we start through the list of violators, and as each is called he is given the alternative I have already referred to.

To summarize my thoughts on this subject, I submit the following: The purpose of Traffic Safety Schools is (1) to educate the public in traffic law observance, to promote voluntary compliance on their part and encourage attendance by volunteers, (2) to correct the first offender, (3) to start the youthful driver right, (4) to reach the consistent violator whose fines have failed to correct and (5) offer relief to indigent violators for whom fines or other penalties would work an undue hardship.

The approach must be educational, not punitive.

The types for whom it is provided are:  
(a) drivers who need instruction or corrected attitudes and  
(b) volunteers.

The name should not be "violators school" or some similar title, because this discourages volunteers and leads to a resentful attitude on the part of those attending.

The school should be held forth as an opportunity to learn. The instructors should be well qualified and enthusiastic. Examinations should be given and certificates of proficiency awarded. In cities where it is not feasible to set up such schools, the courts themselves may set up quite effective educational programs.

### TUESDAY MORNING SESSION

October 7, 1947

### Group Session for Traffic Engineers

Presiding: HARRY H. HARRISON, Traffic Engineer, Illinois Division of Highways.

### Accident Reduction Through Traffic Engineering

By J. E. P. DARRELL

Asst. Traffic Engineer, Department of Highways, State of Minnesota

Engineering in traffic accident prevention programs is not the exclusive responsibility of the traffic engineer. Every engineer who has responsibility for the location, construction, maintenance or operation of streets and highways and who carries out his responsibilities in a way that will improve traffic conditions is, in part at least, using traffic engineering. To a certain extent all of us must be traffic engineers regardless of whether our major duties involve operations or construction and maintenance. Surely the primary purpose for streets and highways is the movement of traffic. Society is becoming critical of its roadway facilities. The public now depends on facilities that are adequate to meet a highly mobile economy. Our streets, more than ever before, must be able to handle large volumes of traffic both safely and at reasonable speeds.

We are all familiar with the three "E's" of traffic safety. It is not my purpose to compare them either in importance or effectiveness. Surely all three are essential and each one is dependent to a great extent on the other two. But I do submit to you that we engineers have been a little slower than some of the enforcement and educational agencies in admitting or assuming our responsibility. It has been so easy to say the driver was at fault (and he is in a large share of the cases) or we hide behind the fact that engineering improvements take time and money and we adopt a "what's the use" attitude, pass the buck to the enforcement agencies, and expect to make a start on the corrections that are needed.

It is true that major engineering improvements take time and money. It is also true that many relatively inexpensive methods are available as temporary expedients until the ultimate corrections can be realized.

It is encouraging to note that engineers are accepting their share of responsibility for accident prevention, and the progress-

sive highway department as well as municipal street and highway administrations are giving at least as much attention to the safe and expeditious movement of vehicles and pedestrians as is given to other important details. We no longer have the "get out of the mud" complex, but are designing and building facilities that will move traffic efficiently and that will compensate for and, as much as possible, eliminate the unhappy consequences of drivers' failures.

All three "E's" have for their purpose the improvement of driver performance. The success of highway transport operations depends, after all, on the manner in which drivers actually perform rather than on our ideas of how they should perform. Engineering is contributing to this program by providing facilities which encourage good driver performance and discourage or reduce driver errors.

In the "Before and After" series published and distributed by the National Conservation Bureau, with which you are all familiar, are excellent illustrations of some of the engineering techniques that have been successfully employed to reduce accidents. By making use of markings, signs, signals, intersection redesigns, one-way routings, speed zoning and many other relatively inexpensive measures, remarkable reductions in accident frequencies and severity have been realized. Such "before and after" studies are a most valuable means of determining the effectiveness of improvements or corrective treatments of high-accident locations.

The A.A.S.R.O. in their several design policies have given attention to traffic service features of roadway design and construction. These policies appear to be sound and close adherence to them should bring about considerable improvement.

Comparisons of different types of highways carrying similar traffic volumes also provide a good basis for evaluating the effect of

the roadway features on accident occurrence. For instance, the materially lower accident rate on the Merritt Parkway as compared to the rate on U. S. No. 1 in Connecticut is familiar to most if not all of us. The Pennsylvania Turnpike, according to studies by the National Safety Council, has a death rate well below the rate for other Pennsylvania roads as well as being lower than the average for all rural roads in the country. The Merritt Parkway and the Pennsylvania Turnpike are good examples of what engineering can do to make highway travel safer and more pleasant.

Undoubtedly, similar comparisons could be found in every state. I know that our accident records in Minnesota show that the elements of the roadway do influence accident experience.

For instance, Routes Nos. 10 and 51 are a mile apart and roughly parallel with each other north of St. Paul to their junction at a distance of about six miles from the city. Route No. 10 is a three-lane pavement, while Route No. 51 is a four-lane divided except for three-fourths of a mile of 24-foot bituminous surface. This route is also provided with service roads through the built-up areas, and two important intersections are signalized. No. 51 carries an annual daily average of approximately 6,000 vehicles or nearly twice the volume on Route No. 10. On the basis of a recent study, the accident rate per million vehicle miles on Route No. 10 was 4.8 whereas the rate on Route No. 51 was 3.2 or 30 per cent lower.

A few years ago a portion of one major street in St. Paul, a distance of approximately 1 1/2 miles, was experiencing a large number of accidents. A study of the previous five years' experience showed an average of 27 accidents per year. The area had a speed limit of 30 miles per hour. It was apparent after studying the accident histories that the speed limit was too low and that an increase might be beneficial. Accordingly, speed surveys were made and standard speed zoning techniques were employed which indicated a limit of 40 miles per hour was warranted and that such a limit would tend to reduce the excessive amount of passing which was prevalent on the street. As a result of the study, a 40-mile-per-hour limit was established. Subsequent studies at intervals during the several years following the change disclosed that the frequency of accidents had been reduced to five or six per year or a

reduction of 78 per cent compared with the average of the five years preceding.

We have two routes leading out of Duluth which offer a good comparison. Route No. 61 consists of a two-lane, 18-foot concrete pavement. Route No. 53 is a four-lane divided highway as far as Pike Lake. Traffic volumes are not high on either road, averaging around 1,600 daily on each. A check of 1947 accidents to date shows that the two-lane concrete road has an accident frequency of 4.8 per million vehicle miles, while the divided four-lane highway has a rate of 2.8, or 41 per cent less.

Parking practices have a direct influence on accident occurrence. A few years ago one city changed from angle to parallel parking and reduced accidents materially. Several other cities have since either revised or entirely eliminated parking on major streets, with noticeable reductions in accident frequencies in nearly all cases.

In our state we have a considerable mileage of 18-foot pavements on some of the principal routes. This width of pavement is entirely inadequate to present-day traffic requirements, and generally results in an aggravated shoulder maintenance problem. Accident rates on these sections of highway have been among the highest. On one section of road of this type, 24 per cent of the total accidents were apparently influenced by low shoulders adjoining the 18-foot pavement. These accidents involved vehicles either dropping off the pavement or others which crowded over the center to avoid a bad shoulder. During the past two years, especially, many miles of this narrow pavement have been widened by the placing of 2 1/2 to 3-foot strips of pavement on each side and then resurfacing the entire width with a bituminous mixture. In all cases where accident experience has been checked, there has been a noticeable decrease in accident frequencies.

A very bad experience developed after the war on a winding, crooked route on which was located a number of taverns. This route was below standard in every respect, except that it did have a reasonably good bituminous surface. You can well imagine the growing demand for action by those who used that road. Speed and accident surveys were completed and as a result a number of signs were replaced. Reasonable speed limits were established and advisory speed signs were placed on every curve that required a reduction be-

low the speed limit. All signs were reflectorized. The situation changed immediately. Accidents have been rare since the changes and complaints have been entirely eliminated.

Sometimes where large and popular nightclubs are in operation generally experience high accident frequencies. Perhaps more attention will have to be given to insulating the main highways in such areas either through acquisition of wider right of way or by better access control.

One could go on and on reciting instances of where engineering treatments and improvements have reduced accidents. This type of traffic engineering will perhaps always be necessary. But such treatments are costly, and as new roads and streets are designed and built the need for such spot corrections should decrease. If we are ever to arrive at such a Utopian period, traffic engineering principles must be employed in the early stages of locating and designing the improvement. Engineers must increasingly keep in mind the needs of traffic and the fact that drivers do not always act as the designer might intend. It is only by learning what the average driver will do rather than relying on him to do what we want him to do that the engineer can design and build roads that will

encourage correct driver actions and make the improper action difficult or at least unnatural.

Accident records furnish an important, if not the best, source of information regarding driving habits. Traffic engineers have long recognized the need for this information. We have found that design, construction, and maintenance engineers are very much interested in these records if the information is presented to them in a way that it can be applied to their work. I am satisfied that if more use is not made of accident information in all phases of highway or street improvement, it will be the fault of those who collect the reports and fail to make the information available to the one who can use it. Accident reports in a file drawer have practically no accident-prevention value.

Engineering is effective in reducing traffic accidents, and we as engineers must accept responsibility for eliminating or improving those features of the roadway which have proved to be contributing factors in accidents. When we do that we can take our rightful place alongside the enforcement and educational groups as active members of a three-way team in which each member pulls his fair share of the load.

## Traffic Engineering in Small Cities

### (Panel Discussion)

**Discussion Leader**—GEORGE W. BARROW, Traffic Engineering Consultant to Northwestern University Traffic Institute.

#### Participants:

JOHN H. BUNCH, Asst. Traffic Eng., State Highway Commission of Indiana  
HENRY K. EVANS, Dir., Traffic Engineering, National Conservation Bureau  
DAN HOLLINGSWORTH, Mgr., Oklahoma City Safety Council

**MR. BARTON:** The first question addressed to the panel is: "What are the duties of traffic engineers with particular emphasis on small cities?"

Jim Darrell has covered one aspect of what traffic engineers do in the accident prevention phase and this is an important factor of any city regardless of how small you may want to go. In recently published reports by the City Managers' Association, the Urban Land Institute and others, we find there isn't any limitation today on how small a

city may be and still experience decentralization or the effect of decentralization.

The latest tabulation included cities as small as 15,000. They suffer the same ills as big cities. If that be true, then it is probable that there is congestion in the small cities, particularly if there are two cities near one another.

However, treating congestion is another problem. There is a third job. Regardless of the size of the city, we have our existing street system; each movement on the arteries leading from the business district out to the residential district. We can see the evidence of gross inefficiencies in a city of 20,000 as easily as in a city of 1,000,000. The fourth job of the traffic engineer is participating in the planning of the growth of that city. The traffic engineer or the engineering function should play a major part in the development of the transportation aspect of city planning, even in a small town.



One of the most important current items of that type of planning is the matter of off-street parking. That type of planning is the formal planning in which traffic engineering service is required. We are thinking of accident reduction, congestion reduction, aid in planning, and efficiency of movement.

The next question we had set up was: "How small may a city be and still justify a full time traffic engineer?"

Some small cities have combined the traffic engineer's job with several other city functions, such as the city electrician. In one case, they have added street lighting and various other things to the traffic engineer's function until they have built the job up to a full time occupation. In a third case, they have given him the job of general maintenance engineer plus traffic engineer. What would you think of getting a man into a community trained in traffic engineering—is it a practical thing to expect that he handle other functions?

MR. MILLER: I think perhaps that would be a good idea if it were worked out.

MR. SEBURN: That is a good way to get a traffic engineer.

MR. BARTON: He is on the job full time on traffic engineering if he is on lighting. I think that is perfectly proper as a traffic engineer. It is a fine way to have someone trained and justify the paying of a reasonable salary to him.

MR. BARTON: Is there any figure now accepted as the lowest limit of population in which strictly traffic engineering work justifies the employment of a full time man?

MR. SEBURN: I don't know of any that is accepted. Unofficially, I have taken around 75,000 to 100,000. That is a personal figure.

MR. BARTON: What is the National Conservation Bureau attitude on that?

MR. HENRY EVANS: We have stuck with the figure of over 50,000. The National Safety Council recommends a ratio of 1½ full time traffic engineers per 100,000 population. This would indicate the need for a full time traffic engineer in cities down to 65,000.

MR. BARTON: It is a certainty that today there are a number of cities of 100,000 down to 50,000 without traffic engineers and this discussion can easily deal with something in the range of 100,000 on down.

MR. WILSON: Possibly jobs could be combined in order to justify a traffic engineer in the smaller communities. I personally feel

that it is difficult to combine jobs and the man who is trained in traffic engineering would ordinarily not be satisfied with the job where he has to spend a great deal of his time on other work. I question whether he is properly trained or classified as a traffic engineer.

MR. JOHNSTON (Nebraska State Traffic Engineer): I have many duties that have been assigned to me which definitely have nothing to do with traffic engineering. I have to do that to justify the traffic engineering department in Nebraska. I think we have to think in terms of a full time traffic engineer, devoting a major part of his time to traffic engineering pursuits.

MR. BARTON: Then you would say that the determination as to whether the city needs a full time traffic engineer depends on the city itself. A city of 100,000 in a metropolitan area, where it has more traffic dumped on its doorstep than an isolated city of 100,000, may have more acute traffic engineering problems and it is again considerations of that type which determine whether the traffic engineer is going to be a permanent man in the city. Mr. Seburn, do you agree, or do you disagree with the idea that it is practical to combine city electrical engineer and traffic engineer in one job?

MR. SEBURN: I think when you do that, one job is going to suffer at the expense of the other.

MR. EVANS: Are you talking about cities below 50,000?

MR. BARTON: Fifty thousand to 100,000. Cities of this size can't tell whether they need a full time traffic engineer or not. We have other ways of getting traffic engineering service in many states. For example, many state highway departments are doing a magnificent job in cooperating with cities in the study of their traffic problems. I would like to ask Mr. Bunch to what extent states are assisting the smaller cities and in what way that service is being rendered and how far they can go.

MR. JOHN BUNCH: It is the feeling in Indiana, and probably in all the states, that the state highway department will have to go into these smaller towns and help out on the traffic engineering problems. To give you the size of the problem, I brought along a few figures concerning Indiana. For incorporated towns of less than 1,000 population there are 348; for 1,000 to 2,500 there are 103; for 2,500 to 5,000 there are 31; 5,000 to 10,000 there are 31; 10,000 to 25,000 there are 17; 25,000 to 50,000 there are 10, and that brings you

up to the lower limit. We have found a definite need for traffic engineering services in towns as small as 4,000 people. It doesn't mean that there is a need for a complete parking study including off-street parking or parking lots, but there is a need for engineering service to the extent that all standards are improved and brought up to the level of the state or national standard. That includes signs and markings and some signal work.

MR. NEAL (Ohio Traffic Engineer): I agree with what Mr. Bunch has said. We have found a definite trend in Ohio on the part of the smaller municipalities, even cities up to 30,000 or 40,000 and one city of 160,000, to ask for aid from the state highway department. They know that we would assist them in so far as possible. I think very definitely there is need for some service to the smaller communities. We have found, for example, that there is a great lack of uniformity in traffic control devices.

MR. BARTON: You think it is a trend that is growing and it is the policy of your commission to broaden that service.

MR. NEAL: In Ohio it is the larger communities that apply for engineering. In the smaller places, there is not enough work to be done. We tried to make a general survey of ordinances and everything of that nature and we have found it has worked very well and the city seems to be quite well satisfied. I believe that is one way in which we can attain greater uniformity in traffic control devices.

MR. BARTON: That is one of the best functions to be performed by the state highway commission: to help them realize what their needs are, what their greatest weaknesses are, and in setting up for them a broad program and approach to the problem. They have to have an analysis or diagnosis of what their troubles are from an agency within the state which they can trust and depend on and which can truly be helpful.

MR. SEBURN: May I ask Mr. Neal a question? He mentions the fact that they do the work in the very small communities, and at certain points more or less he suggests that they hire someone or take other means. Where is the breaking point? Where is the point where you hesitate to take over?

MR. NEAL: We have gone into one city of 160,000 and suggested that they employ someone. They want us to do a job involving parking surveys. I don't think we would attempt that and I think possibly 25,000

might be our limit. I think Ohio has more cities of 25,000 than any other state I know of.

MR. BARTON: The first field that the highway departments can fill is this general analysis of a city's need to tell them what they require. You can do the advisory work on an administrative level without as great a staff as you would need if you had to go in and do the pick and shovel work yourself.

MR. NEAL: In seven localities, we made a complete survey and complete report and we came to the conclusion that it is beyond our capacity. We make reconnaissance surveys—if they want to go beyond that, we suggest they employ a consultant.

MR. JOHNSTON: We have been doing a great deal of work in the smaller cities. I recall an experience I had a few days ago in one of our cities of 25,000 population. I was called out there by the commissioner of light for the city, and apparently the city fathers had invited or asked him to install a traffic light at a certain location. He had learned of the services of the state department and had written to me in that regard, and I discussed the problem with him. I pointed out the way it could be done and also pointed out that if we studied the situation we might find there was no signal needed. He was unhappy as he had been requested to put signals in all over this community, which was already overloaded with them. He felt there was a need for some type of specialized service to help the city in that regard.

There is one detail that has come up in my experience in this and that is the matter of the individual with whom you deal in the city. We have gone into a few cities at the request of the light commissioner or the chief of police and possibly the chairman of the street commission, purely on his instigation. We have sometimes made an extensive survey and prepared a report with considerable effort, and then we have appeared before the board or city council and given our report only to find that the city council itself is not in sympathy with the making of the survey or the interference of state activity in the matter. We have learned by experience the best thing to do is make sure that it is an official request from the board and in fact in most cases we ask the board to pass a resolution inviting the department to come in and study the situation and make the recommendations.

MR. NEAL: We ask for an official request from the city council when we go in and ask them to designate some one individual who shall be the contact man with whom we work. We do not work with others in the community.

MR. BUNCH: I would like to add for Indiana that we find it necessary to ask for a resolution. When the work has been done, the council or the mayor are asked officially to accept the report in a letter to the highway commission. That makes any agreements binding between the two of them.

We had a request last week concerning a signal and one concerning parking regulations in a town of 1500. That gives you an idea of the way these people are thinking. We have the opportunity to do a lot of good by visiting these towns for a day or two and in this way give them what help they need. I don't think they will take the trouble to hire a traffic engineer or consultant for that one or two days' work, but they certainly do need advice.

MR. BARTON: In a large proportion of the states, the smaller cities can first approach the state traffic engineering department for general advice on what to do and how to attack their problems, and at least in the case of the small city, there is a possibility of getting very concrete help. That is one agency to whom the small city should first go for general planning and advice on how to proceed.

MR. EVANS: According to the last reports from the National Safety Council, 19 states reported that they do just that. They spent a total of 78,000 man days last year which was a fifth of their time on assistance to the urban areas, the small communities.

MR. BARTON: At least it is an agency in the field that can contribute materially to the smaller cities.

I would summarize the next point in this way. When automobiles became popular, the first job was to make drivers obey simple traffic rules. That was a police job, and as traffic grew and the job became complex, the city aldermen believed the police should take care of it. That attitude has continued and expanded to the point where we now have cities of half a million where an officer in the police department is the official designated as the city traffic engineer.

There is much discussion pro and con as to whether or not that is proper. That is

one of the reasons why Mr. Hollingsworth with his broad experience is on this panel and I would like him to give us his viewpoint on that question. Where does the policeman fit in as a traffic engineer?

MR. DAN HOLLINGSWORTH: We are finding now and have found in the past that our biggest stumbling block is that police can't hold up on simple traffic engineering changes when protests hit them. That was primarily found in changing from angle parking to parallel parking. In other words, the merchant would go to his councilman in a meeting and bring out the point, "Who knows that this is right?" and the policeman, if he were honest would admit he didn't know. We found that same thing in moving parking back from a corner or in the elimination of parking on a through street.

In our own town, I think we have a good example. Our town grew to the north. As traffic became more congested, we put in two boulevards adjoining each other. We added a little more on each side. Today there are five parallel boulevards to the north. The town took a swing in building to the west. If we could train our people to go west and then north, we would solve much of our troubles. But over the period of years, we have established a driving pattern of driving out the five boulevards and then going west. How long it will take to change that, I don't know.

Another example, a police captain in charge of traffic for many years had been operating signal lights on a 48 second cycle. At four o'clock on the dot, they move them up to 80 second cycles. I questioned him on it. He said, "The reason I do that is because I can put three times as many cars through this light as I can on a shorter signal." He was storing them down the other blocks and it was causing serious trouble. The pattern was set for the pedestrians. All day long for 23 hours, the pedestrians had become accustomed to walking up to the light and waiting so many seconds. They measure the time subconsciously and take off across the street, and they had more pedestrian trouble during the afternoon rush hour than all the rest of the day.

I think every policeman feels (and I think this is a compliment to them) that there is nothing in the traffic field that they can't correct with enforcement if they can get enough of it.

I suppose that the police department is the only place in which to put a traffic engineer, but I do believe that you could have separate lines of authority. I have never seen any reason why the man in a police department who is assigned the job of traffic engineer should be under the command of the director of traffic. I know he gets his thinking fouled up when he does, as I have served in all of those positions.

MR. BARTON: What are we going to do in the smaller cities where the traffic function is now in the police department? What is going to be done with it? In the first place, what is the effect on the acceptance of the traffic engineer's recommendation by the city planning commission, the engineer in charge of building streets, and so on, if that recommendation comes from a man in the police department?

The job of traffic control must influence the geometric design of streets, the inclusion of proper facilities in the city plan, and all of the things of that type which are strictly engineering in character. In a city where the recommendations on traffic control come from a man wearing a policeman's uniform, what would be the normal acceptance of his recommendations? Would they be accepted by the director of the department of streets, the engineer in charge of city design and so on? What do you think is the effect?

MR. SEBURN: I don't think that working in a policeman's uniform would have any particular effect. It would be how he ranked in the police uniform. If he carried equal rank with the other departments with which he was dealing, that would probably be accepted. I don't think he could carry equal rights unless he was almost chief. I think if it comes from another department of less rank, they are liable to be misinterpreted.

MR. BARTON: With no criticism intended of police operations, I should like to know whether the average police administrator is sufficiently conversant with traffic engineering techniques to understand the need for research before arriving at decisions about such things as a one way street or a signal system?

MR. HOLLINGSWORTH: I don't think so. There is a reason for it. A policeman is taught to be ready to meet immediately any one of a thousand emergencies just like that. That's his business and he doesn't go in for pouring over records, or studying counts and taking balances of flow charts and all that

sort of thing. I don't know of any policeman who would do that, neither do I know of any police administrator who would do that because he hasn't the proper training. He hasn't trained himself or been trained to do business in that manner. It is also true that police problems are pressing and of an immediate nature. If he sat down to give 30 minutes to this, something else would come up of a strictly police nature and that would take him away from this.

MR. BUNCH: We recently had an experience in a city under study. One of the officers had come back from a training course in which he had a little traffic engineering. He was more enthusiastic about what he had learned in traffic engineering than he was about the police section of it. In the discussion of some of the city problems, one intersection was pointed out to him as causing a little bit of trouble and his first reaction was, "As quick as I can, I am going to have a signal put there." That was his solution and even this training he had just had at this university wasn't enough to counterbalance that feeling of being a policeman and that attitude that he had had so long.

MR. EVANS: I think the enforcement agency has a duty to back up and enforce traffic laws set up for us, and I think traffic engineering should be in the inner arm of the city government in reviewing requests for new street locations, widening of streets, and other things such as the installation of control equipment.

Street signals and those things are engineering matters and aren't logically and naturally police matters. I think they should fall into the engineering department. I should say there is some exception in some communities where there are men in the police department who know and understand engineering. In that case, I think probably that objection that they don't understand engineering aspects might disappear. Still, I think they would suffer by being let us say, under the rank of chief of police.

MR. BARTON: In summary we can say that police departments on the whole would like to be relieved of the responsibility. In the second place, police departments would gain in many ways if they could be released from that responsibility so they could budget a little more freely for their operations. In this way they could have another agency of the government collaborating with them on the subject of traffic matters, and it wouldn't

be the police department fighting single-handedly. In the third place, we recognize in every instance I know of that they would like to have a lot more engineering training before they tackle the problems of traffic control.

I would like to raise a question regarding these cities where the police department does the traffic engineering work because there is no one else to do it. Should the job of the traffic engineer be redefined so that some of the work of simple control is set up in the traffic control department of the small city's police department, while the more technical phases of the traffic movement is handled by an engineering agency obtained from the outside? Divide the traffic engineering into two phases; one a traffic control function and the other a traffic engineering function.

MR. SEBURN: Where are you going to make the break? They are interdependent. Haven't we agreed here that, for instance, the traffic signal should be put in on the basis of traffic studies and timed on the basis of traffic studies? I don't see that you can break it any place effectively or satisfactorily.

MR. BARTON: Would we then recommend to cities of 25,000 to 50,000 which are now doing their work in the police department that they reconsider their program and take that function away from the police and put it in the city engineer's lap? Would that be a uniform recommendation?

MR. HOLLINGSWORTH: Most of the police administrators would appreciate it if you could get it out of their field.

MR. EVANS: One of the big weaknesses that I have discovered in various communities in which I have analyzed the traffic situation is not the wrong centralization of traffic engineering, but the lack of any at all. First of all, it is better to have six people investigating complaints, making traffic counts, and keeping up the proper records and the data than have none. First you must get the information, then you can make the system more efficient. I would centralize certain duties in the police department and engineering department. I think in too many of these communities under 100,000 we haven't got to the first step where anybody is doing any traffic engineering work. We felt if we could go out with the police department and traffic department and make them acquainted with the activity and get them started on the initial step of applying traffic engineering

that we would be building up prestige of traffic engineering locally and introducing it there.

MR. BARTON: I think that in all fairness to the police training programs, it should be said that that is one of the purposes of giving police administrators an introduction to what traffic engineering is and what it can do, not to equip them to be traffic engineers but to let them understand the possibilities in their city by setting up proper engineering programs.

We have said in the small city we should uniformly seek to set up the responsibility under the city engineer. How is that going to be done, would you say, Mr. Evans? You have gone into a small city where the work is not being done in the police department. They have a city engineer's department, of course. What is the next step to get a young traffic engineer set up in there?

MR. EVANS: In a community of 50,000 or over, I think there should be a possibility of finding someone in the department who could be sent to the Yale Bureau at New Haven for a year's training, or at least to some of the short courses that are held at Northwestern and in other parts of the country. The Institute of Traffic Engineers is beginning a series of traffic engineering conferences, so there is more opportunity for the short courses. By all means, a man should be sent to the short course if not the year long course. There are other universities that give training. I know the University of California at Berkeley is setting up a big training program, and there is an Institute of Transportation and Traffic Engineering. So there are more opportunities in the future as well as what we have now for this type of training. I think that a city under 50,000 should send their engineer, their city engineer or his assistant, if they have such a setup, to a short course so he can become acquainted and educated on the functions of traffic engineering and the various methods used to meet these problems.

The reason traffic problems are not thrown into his lap is that some of the other officials, the city council and the chief of police, have the wrong idea about traffic. They think it is a job of restricting and prohibiting, rather than trying to move traffic. Besides the job of giving a short course or long course to the engineer and the police department, there is a big job of educating and selling the other city officials on the

need for traffic engineering. The Conservation Bureau, the National Safety Council, Automotive Safety Foundation, and others, are doing that.

MR. BARTON: Mr. Bunch, could you tell us what qualifications a man should possess in order to take the course mentioned above?

MR. BUNCH: It should be somebody with an engineering background or at least with an interest in engineering. The assistant city engineer would be a good choice.

MR. BARTON: You wouldn't seek any special branch of engineering as preferred to any other? Civil or electrical?

MR. BUNCH: The preference would be civil, if you have a choice. Any graduate engineer or anyone with engineering training would probably have the right attitude to start with.

MR. BARTON: You would look for two things: training in engineering and definite interest.

MR. SEBURN: I would also look for personality and the way he is received by other members of the administration. That would be more important than what type of engineering background he has.

MR. BARTON: All right, that is one way in which the cities below 100,000 would then go about setting up a traffic engineering function. Admittedly, while this new man is acquiring training and experience, there are some things that may come up a little bit in excess of his present knowledge. That brings up the point of consultants who are in this field. Would you, Mr. Evans, cover that point of what the consultant agencies are and how their services are to be obtained?

MR. EVANS: I believe that any community, that has one street or one intersection, needs traffic engineering consultant service.

A city of 5000 or even 1000 needs traffic engineering service. The quantity should be less, but surely not the quality. I would like to suggest that every city, no matter what the size, employ the assistance of a traffic engineer at least once a year. We take our automobile to the service station and lubricate it periodically. We have our drivers inspected and licensed in some states, and it is being adopted by more and more states. If our automobiles are inspected periodically in more and more states, why shouldn't the street system which is the other part of the transportation picture be inspected

at least annually by someone competent to inspect it who knows the elements in the transportation picture. This should not be a policeman, nor a civil engineer who knows more about one phase than another, but a traffic engineer who is educated to understand all of the components of traffic.

The smaller communities should centralize duties and the traffic engineer should have the assistance of an outside consultant.

I think service should be requested by these communities at least once a year. The national organizations such as the Institute for Traffic Engineers should adopt a promotional program to acquaint the cities with the fact they should have the benefits of the consulting service.

MR. BARTON: If a city actually wanted to get consulting service, how would they go about it?

MR. EVANS: In 19 states they can go to the state highway department. It is possible that they might get service from the highway departments in the other states. They can go to the local service organizations, the motor clubs, and there may be others that offer service.

MR. BARTON: The National Safety Council and the Institute of Traffic Engineers on inquiry will send a list of names.

I wonder if in talking about consultant traffic service we might not say that even a small city can handle its traffic problem by that means alone. Doesn't a city that has its annual surveys made as you propose, Mr. Evans, also need a continuing activity in that community all year long? In any event, you generally come up with the same conclusion anyone else would that regardless of the size of the city, traffic engineering by itself doesn't work unless the program consists of an occasional visit from the consultant from the state highway department or other organization, and that in itself is not enough.

They must bring coordination between the police, engineer, and so on and that organization must carry on the work program laid out by the agencies that come out.

I think we can summarize the discussion of the panel by saying that almost regardless of the size of the city, there is at least a periodic requirement of a traffic engineer and we can't limit the lower population level. If it is in the population group somewhere between 50,000 and 150,000, its requirements can best be met by now finding in the city engineer's department some man to be

given training and under whom responsibilities can be centered. While that man is gaining experience, cities of that size and smaller will obtain assistance from agencies that can help them, some with charge and some without charge. If they require general broad analyses of their requirements, the best agency to do it is the state highway department and then they can proceed to get assistance through other agencies. Regardless of what they do in connection with the in-

dividual engineer, they require in that community a consultant program that can only be obtained by the proper organization of public officials and if desired, civic agencies also who continue to spark-plug the program between visits of these outside agencies that are there to help them. Finally, we still have not done the job we are required to do in demonstrating to cities the values that can be obtained from a sound technical approach to their traffic control problem.

#### TUESDAY MORNING SESSION

October 7, 1947

#### Group Session on Traffic Safety Education

Presiding: EDWIN S. SMITH, Director, Rochester Safety Council; Chairman, Committee on Public Safety Education, N.S.C.

#### How We Did It (Panel Discussion)

Discussion Leader: E. S. SMITH, Dir., Rochester Safety Council, Rochester, N. Y.; Chairman, Committee on Public Safety Education, N.S.C.

##### Participants:

GROVER M. CHAMBER, Managing Dir., Texas Safety Assn., Inc.

ERNEST C. GOULD, Secy., Chamber of Commerce, Watertown, N. Y.

GAY HINTON, Albert Lea Safety Council, Albert Lea, Minn.

A. W. LUNKE, Asst. Secy., Minnesota Safety Council.

SGT. ROLAND B. SOULE, Dir., Safety Education, Police Dept., Wichita, Kansas.

R. C. SALASURY, Dir., Safety Div., Wisconsin Motor Vehicle Dept.

RAY M. WALKER, Safety Dir., Tanner Motor Livery & Motor Tours, Pasadena, Calif.

CHAIRMAN SMITH: Each of these speakers represents a city or a state which won a high place in 1946, in the National Traffic Safety Contest, public safety education section.

Our first speaker is Sergeant Rolland B. Soule, director of safety education, Police Department, Wichita, Kansas. In 1946 the City of Wichita scored a first place rating in Group III of the Traffic Safety Education Section of the Contest.

SERGEANT SOULE: In 1945 we won the Grand Award. We decided that we would make the people of Wichita proud of that fact by an extensive program relative to our award. Here is what we did:

The mayor, the chief of police, and I accepted the award. We had a very extensive billboard program started. As you entered the city limits, big signs informed travelers, "You are now entering Wichita, the safest city in the nation." Through the civic organizations, mainly through the chamber of commerce and the junior chamber of commerce, we put across to the people that we had won an honor, and that it had been accomplished through the hard work of every person in the city. It was an honor not achieved by politics, but by the good common sense of the people; one of the highest honors that could be bestowed upon any city, and we did not want to lose it. Gradually the people got the feeling of "Let's keep on making Wichita that way."

As a result of our work, we won another award in 1946, and the promotion of our program during this year was based on the fact that we had won the Grand Award in 1945, and that we wanted to keep winning it in years to come.

This promotional work was made up of radio speeches and different types of entertainment.

The most outstanding things we did in 1946—and are still using successfully in 1947—involve programs on two of our four radio stations; 30 minutes once a week. On the other two stations I have a 15 minute broadcast every day.

Now, up until 1946 the broadcasts consisted of dry speeches. More radios were turned off than were tuned in. The stations were kind enough to give us the time, and we wanted to make it worthwhile.

We bought a wire recorder. I took the recorder with me, and rode around the city in police cars. When we would have an accident call, I would go to the scene. The only thing about this was it required about 100 feet of extension cord, and I had to run up to some house and ask permission to use one of the electrical outlets. However, the people were willing to cooperate with us. I would make an on-the-spot broadcast of that accident, stressing the fact that each accident meant the loss of life and property, and that Wichita would not win an award if this were kept up.

I not only used that at accidents but also at fires, and different public meetings that we thought might be of interest to the traffic safety program.

And, believe it or not, we created such public interest in that program, that when the radio stations checked their programs, our program proved that it was being listened to, in many cases, more than the coast-to-coast programs. The programs were broadcast in the morning and afternoon. We had a big spread in the papers in which we asked the people to listen to what happened at such and such an accident.

To me, and the Wichita police, that was our most important traffic safety promotion in 1946; the fact that we rated a wonderful radio audience through the use of a wire recorder, which made possible an interesting radio program instead of a lot of dry speeches.

MR. GOULD: The thing that has helped us in Watertown—and I think this applies everywhere—was making the whole community safety minded. In order to do that, we felt we had to personalize the problems to every resident as well as to the business men.

We also attacked our problem from the chamber of commerce aspect rather than from a strictly humanitarian point of view.

In carrying on this campaign during the past 10 or 15 years, we have secured a considerable reduction in our insurance rates.

We emphasized the importance of safety from the financial side, and tried to create public sentiment that would demand safe physical conditions, and strict enforcement of traffic laws.

We came to the conclusion that we needed something beside hallyhoo. We had to have right driving conditions; curbs cut back; signs that obscured vision removed. We had to have a lot of things like that done to our streets, and they were done, in order to create safe driving conditions.

And, we used the story of individual accidents where these conditions were faulty, emphasizing the need for improvements. For, when you spend money to create physical engineering improvements, then you meet that old argument of the taxpayer, objecting to the expense.

We have overcome that by personalizing these accident problems, and showing the citizens where they were getting a return in dollars and cents.

We tried this program, that went over big during the last several years—we started our work in 1938, and it was not until 1940 that we won our first award. However, it is cumulative, like all advertising, as we keep working every year improving our physical and enforcement conditions.

In that we have been constantly demanding better conditions, the public did not protest when we demanded new radio equipped cars for the police, and the sending of officers to a national training school. As a matter of fact, various organizations backed up our demand for those things with resolutions, and that made it easy to get the appropriations through.

We feel our success largely is due to creating an enlightenment on the part of the citizens, who then demanded that our community provide the best, safest traffic conditions possible, and the best enforcement regulations.

One thing that we accomplished was the revision of our traffic ordinance, which went back to 1910, and which had been amended and changed so that you could not recognize it. Many of the police were confused in trying to enforce the regulations.

We adopted the Model Traffic Ordinance and placed it in the hands of our police. It was an instrument that could be enforced.

We have had all of those usual campaigns of brake tests, and safe driving, and all that sort of thing. However, I think the whole crux of the matter is, the creation on the

part of the public of a feeling that safe driving conditions must be made possible, plus proper enforcement of the law.

MR. SALISBURY: Last year Wisconsin had every average city enrolled in the National Traffic Safety Contest—45 cities. Now, we are engaged in presenting to the officials of each of those cities the National Safety Council's analysis of the reports submitted in the 1946 contest.

This activity is one of the finest things, in my estimation, that has ever come from the National Safety Council. The Council has done a wonderful job in presenting these analyses to the officials of our 35 cities.

Every month the 45 daily newspapers, and the 325 weekly newspapers, in our state, receive a story with localized accident facts. I would like to stress that point. Our stories and material are forwarded to these papers for editorial comment or filler space. We send our traffic news to 13 foreign language newspapers, and to 12 farm journals, and we prepare papers for other magazines. We also issue a weekly radio talk which is given over many of the stations, and which furnishes facts and ideas to the local police chiefs, and others, for talks they are called upon to give locally.

If you are not using your police chiefs in this type of work, you are missing a great bet because they really appreciate the stuff that we send to them.

We have had excellent results with the new traffic questionnaire booklet which we utilize at luncheons, clubs and civic meetings. There, again, the audience participates by answering 20 questions to the best of their ability. That is a worthwhile effort. It is material you can use, and it is all printed.

We have held two state traffic court conferences. Last month, we completed a series of eight district traffic court conferences. We carried with us a panel, or rather a faculty, of seven members throughout the state and completed the job in nine days.

Our sound motion pictures are really in demand, and this is particularly important for schools, for they are used considerably.

Through these various means, and many others which, of course, time does not permit for discussion, we are trying to bring the message of accident prevention to the public.

Our efforts are coordinated with enforcement and engineering programs in order to do a better job.

MR. HINTHORN: Albert Lea is a small town of about 15,000 and, like many small communities, enjoys a wide patronage from the rural areas, which creates a very definite traffic problem.

Our program of educational work, therefore, has been adapted for the townspeople as well as for country folk.

No community can develop a sound educational program, unless the city officials are interested, and get in back of the program. We are very fortunate in Albert Lea to have that cooperation. Our mayor, city planning clerk, chief of police, fire chief, and others, are regular members of our safety council and they are active in the work of the council.

High on the list of our achievements, as a well organized safety council which functions through 10 committees, are regular meetings, held with a large percentage of the people in attendance.

Our Traffic Safety Committee does follow-up work, inspecting hazardous situations and securing corrective action.

Through the council's efforts, traffic education programs have been promoted in the schools, and a constructive display of traffic posters has been maintained.

The safe driving of tractors and farm trucks on our highways have been made a part of the vocational agricultural courses.

We are proud of our public speakers. Our Bureau of Public Speakers consists of a chairman and four speakers, all of them trained public speakers who develop traffic education programs in the service clubs, parent-teacher associations, lodges, and so forth. This program includes the use of a sound film on the subject of traffic safety.

We have made wide use of the traffic posters in prominent downtown windows. We also have a large bulletin board on our courthouse square, used exclusively for traffic safety work.

In connection with the posters, we feel that the spotting of posters in filling stations, where they can be seen by the people as they purchase gasoline, is an excellent idea.

Last year, we also distributed extra large safety calendars with an eye-compelling safety subject pictured in color.

We use our local theaters to publicize our work, and they are most cooperative.

I suggest that you get permission from your fair board to place posters at the en-

trance to the grandstand, and to have them hand out traffic safety leaflets to the crowd in the grandstand. We did that and found that the people would read them as they waited for the day's program to start.

Traffic questionnaires were very effective, and were distributed to schools and various clubs.

We only have one daily newspaper in our town, but it happens to be a good one. The paper lists notices of our meetings and we are very fortunate in getting good display on this, usually front page. Frequently, good articles and editorials appear on specific community hazards.

We are fortunate in having a radio station which broadcasts our announcements daily. Usually, these announcements tie in with the news, and we feel that we have a very large audience. During the winter months, we broadcast daily warnings to motorists about driving conditions, for city people as well as those in the country.

MR. CLARKE: I would like to deviate from what I had originally prepared, and single out a specialized public relations program, involving our traffic safety legislative program, which was enacted at the September session of the Legislature.

It is interesting because it was, and still is, a highly specialized public relations program; I say still is, because we have had to follow through and successfully defend passage of our six-point legislative program.

Back in 1944, when we began the initial phase of our traffic safety legislative program, we called an emergency traffic conference in Austin, attended and sponsored by the official agencies of the state, county and municipal governments. We kept our mouths shut and listened, and when they worked out what they believed to be the most essential needs in the field of legislation and formulated the program, we took the ball.

Usually we had some 35 statewide groups, like the PTA and federated clubs; writing letters to each member of the State Legislature, in which they pointed out the problems related to the improvement of traffic safety, and upon which the legislative program was based.

We asked for a traffic code which was passed in its entirety. We asked for wider streets in the cities where the traffic was heavy. We also asked for an adequate appropriation for driver education and training programs under the State Department

of Education.

Throughout that year we held 16 regional safety conferences, to which the members of the State Legislature were invited.

We utilized every media of publicity—the radio, newspapers, and magazines. Of course, we had special bureaus set up throughout the State so that we could call upon the community safety groups themselves.

To do a job of this size requires at least one year of public education, and two years would be better. It is absolutely necessary to get the public back of a program of this sort.

MR. WALKER: Our Council is formed as a coordinating group. Our service clubs (I am a member of one of them) insisted that we do something about the safety problem. So, a small group here and there got together and attempted to do something, but it was a futile gesture. We called on organizations and invited them to get active. We had every service club, every men's service club, every women's service club interested as well as our chamber of commerce, the chief of Police, and traffic engineer.

At that time, we organized our safety council. We have had a somewhat great degree of success. We tried every known way to preach safety to the public. Finally, three years ago we decided that no one man could delegate his time to this problem—I tried it. None of us could give all the time that was needed to do this full-time job without having an executive manager. We have at this time an executive manager, who is a full-time paid employee. Naturally, the rest of the committee is made up of volunteer workers. And, we have plenty of volunteers.

But, this work must be coordinated and planned through one man who can devote all of his time to it.

Now, some of you people may be representing communities, and wonder how we finance this. We had some very hard years in regard to finances, and tried any number of ways to raise money. Now, we have donations voted by the executive boards of various organizations within the city. We have a representative membership of 60 organizations, and a voting membership from each organization.

We have found that finance is one of the weakest points in safety work.

We have wonderful ideas we would like to follow up if we had the money. Radio stations in Southern California are not so free with their time; but would be most happy

to sell it.

We started our program through our board of education and the chamber of commerce. We did not, at first, get too much help from the police department.

In 1937, the traffic division was in command of the captain of the uniformed police and he was not especially interested in traffic. We now have a very capable traffic director, and his appointment was brought about through the efforts of the safety council.

But, to come back to finances, we felt, and believed, and sold our idea that safety was the need of the community; and, this year we have been delegated as a participant of the community chest. We have been allocated \$15,000.

We are in a position to go ahead, but it has taken years to build our organization.

I would like to stress one thing: safety council work can never be a complete success without the cooperation of the women of the community.

MR. LUECKE: The extent to which a state or a community is willing to go in an attempt to improve its traffic accident record depends upon the degree to which its citizens have been educated in accident prevention.

With a properly developed attitude, the public will not hesitate to endorse any sound traffic safety program.

The purpose of safety education is to make the public aware of the need for accident prevention, and to make accident prevention a part of community life.

Under the leadership of the president of the Minnesota Safety Council, who also serves as the Governor's consultant, the state has accepted its responsibility by carrying out the many safety programs.

For the past nine years, the Minnesota Safety Council has actively promoted safety programs within the state. The newspapers and radio stations have had their own active safety sessions. In 1946, these two important forces teamed up to coordinate their safety efforts, and this proved to be highly effective.

This program was extended over a period of eight weeks, and during this time outstanding activities were carried on by the cities and local safety councils.

The Agricultural Department of the University of Minnesota arranged for a full-year extension course in accident prevention education, which brought country agricultural community club leaders into the program.

An elementary course of study in safety

education has been distributed to all of the grade schools. A course in safety education has been developed and distributed to all of the secondary educational schools. In 157 of these schools, direct instructions in safety education are given.

The State Department of Education with the cooperation of the State Department of Highways, and the Minnesota Safety Council, has developed a course of study in driver training to be used in the Minnesota junior and senior grade schools during the year of 1947.

Through the public safety education program carried on within the State of Minnesota, each and every person is made to realize that they have a definite responsibility and obligation in traffic accident prevention.

MR. SMITH: Now, we are ready for those questions from the audience.

MEMBER: Have you a safety council in Wichita?

SERGEANT SOULE: At this time, no. The Police Department handles the whole thing.

MEMBER: I would like to ask Mr. Walker if he has had any trouble in getting money from the community chest.

MR. WALKER: Any trouble we had was our fault because we were struggling around trying to do something with nothing to do it with. We received donations from this club and from that, and in small amounts, and we never knew what we would have to operate on. We then asked to be included on the community chest with these other agencies, and were accepted.

MEMBER: Then you created an organization which the people had to recognize; is that correct?

MR. WALKER: That is correct.

MEMBER: I would like to ask Mr. Hinthorn if the material they publish on safety education is available for those outside of Minnesota?

MR. HINTHORN: They have been very cooperative in supplying other states material for special events.

MEMBER: I would like to ask the gentleman from Minnesota a question on the driver training program. How is this program worked out in your high schools?

MR. HINTHORN: At present, we have the same problem most of you have, a shortage of teachers. Although, in approximately 200 schools the driver training program is being taught.

MEMBER: Is this behind-the-wheel driver training program?

MR. HINTHORN: No, this is classroom work.

MEMBER: How many schools do you have with behind-the-wheel driver training programs?

MR. HINTHORN: About 15.

MEMBER: Mr. Salisbury, I would like to know how many of the papers in Wisconsin use the news releases which your staff gets out. I have an idea that one paper would run it and another one would not. Do you find that to be the case?

MR. SALISBURY: Some newspapers use them and some do not, but practically all of the weeklies use them. For the most part our releases are accepted.

MEMBER: Our community chest turned down our safety patrol, they did not want it nor would they contribute toward it.

MR. WALKER: We are getting into a little political situation there. However, I can say that it is a question of salesmanship. You must sell the idea to them, and I confess it is not an easy thing to do.

MEMBER: In regard to these on-the-scene broadcasts in Wichita, do you dramatize these

rather than have a direct talk?

SERGEANT SOULE: We dramatize them. The only time we have our direct talks is when we are interviewing some prominent people. We even go directly to the bedside of the person injured in an accident, one time we even talked to the mother and father of a five-year-old child that was killed by an automobile. I was talking to them within 30 minutes after it happened. They were torn with grief, and, yet, by my selling them on the idea that their talk on the radio might prevent this thing from happening to someone else, they were willing to cooperate. It was very sad, but we are showing the people the side that the policeman sees, and it works.

MEMBER: We are still killing a lot of people at railroad crossings out in the Middle West. I wonder if something could not be done about that.

MR. SALISBURY: In Wisconsin, at 800 feet, we have a warning, such as you are all familiar with, and the next warning the motorist gets is at the railroad right-of-way, by then it is too late.

I personally believe we have got to arouse the motorists to this problem, and through them, get some sort of action on it.

## TUESDAY AFTERNOON SESSION

October 7, 1947

### General Session

Presiding: JUDGE EDMUND B. SMITH, Municipal Court, Kansas City, Mo.

### PEDESTRIAN SAFETY

(Panel Discussion)

Discussion Leader: B. R. CALDWELL, Deputy Chief and Director of the Traffic Bureau Police Department, Los Angeles, California, and Chairman, Police Division, Traffic Section, National Safety Council.

#### Participants:

HOWARD F. ILGEN, Traffic Engineer and Chairman, Traffic Committee, Milwaukee Safety Commission.

HAROLD F. LILLIE, Director, Lansing Safety Council, Lansing, Mich.

M. W. FLETCHER, Enforcement Coordinator, Traffic Safety Assoc. of Detroit.

ELMER S. WATSON, Commissioner of Motor Vehicles, Hartford, Conn.

ARTHUR E. MILLER, Inspector in charge of Traffic, Metropolitan Police Dept., Washington, D.C.

CHIEF CALDWELL: An individual came into my office recently and was excessively disturbed. He told me that he was going along on the street and noticed a body lying on the pavement. He noticed automobiles were not stopping but simply dodging the body. He went into the nearest house and called an ambulance, whereupon the people burst out laughing; much to his surprise he discovered it was a dummy some one placed there in the street. The people who put it there thought it was a huge joke. What im-

pressed him was the complete indifference of the motorists using that highway to the body lying in the street.

I do not know if this is typical or not, but if it is, I think I am beginning to recognize why pedestrian deaths represent from fifty to seventy-five per cent of the total traffic deaths.

I am afraid that the majority of people evade their responsibility in this respect. Just recently we had a child killed on a four lane highway, divided by rail tracks, with no cross-overs. This happened just a block from the child's home, and nearby there was a crossing where there was an officer on duty.

This child crossed the highway upon instructions from the parents, and was killed by a hit-and-run driver. All attention was centered upon the fact that it was a hit-and-run driver, and involved a pedestrian from the neighborhood. The people were up in arms over that one fact, and they were completely oblivious of the reasons behind that accident which cost the child's life. It was just a reluctance on the part of the community to accept its obligation.

We have a group of men here who can give us the answers to many of the things we would like to know with respect to this problem.

Here is the first question: "Is a pedestrian ordinance necessary to reduce pedestrian accidents?"

MR. FLETCHER: We, in Detroit, believe we can use our experience in answering that question. Education itself is not sufficient. You must use enforcement along with education in order to make the pedestrian realize that he, too, has a responsibility in the use of streets. We have been using enforcement in Detroit for five years, ever since the ordinance went into effect, and in comparison with previous years, we have had a reduction of twenty-five per cent in both persons killed and persons injured.

CHIEF CALDWELL: Another question: "In view of the fact so many pedestrian deaths occur at night, is street lighting important for pedestrian safety?"

MR. ILGNER: Street lighting is most important for pedestrian safety at night. Often at night we have an irresponsible driver meeting an irresponsible pedestrian, and certainly when neither of these can see the other, we are going to have trouble. Fundamentally, accidents occur on streets because two things

can not occupy the same space at the same time. Certainly at night the motor vehicle driver should be able to see the pedestrian, and the way to see the pedestrian at night is by having good street lights. Now, that does not mean just putting a light at the corner, it means having lights that are properly spaced and properly mounted.

We should give the pedestrian a break, and give him the opportunity of being seen at night by providing proper lights on the streets.

CHIEF CALDWELL: I do not think that proper street lighting can be over emphasized. I am impressed with some of our experiences in relation to what we call our worst corners, and the amazing changes we found when they were provided with proper lighting. Most of our street lighting was outmoded, and the new modern efficient lighting helps considerably in the control of pedestrian accidents.

Street lighting is not limited to the cities alone; it is a problem on the rural highway as well. And, here is a question I think will be very interesting: "Is it practical and advisable for pedestrians on rural highways to wear some kind of protective material on their clothes while walking at night?"

MR. WATSON: Most pedestrians are killed at night, and I think the reason is that at night it is very simple to kill a pedestrian, due to the fact it is almost impossible to see the person.

We first started using reflecting material on our highway signs. Any of you who have driven in Connecticut will admit our traffic signs on the highways are good. These signs can be seen a thousand feet away. We then started putting this material on our highway posts so as to indicate very clearly the curves on the highway.

There are many places where they are putting this material on children's bicycles. This has been done through the Boy Scouts, American Legion, and the Red Cross. This reflecting material on bicycles means that children can be seen both from the front and from the rear.

I find they now have a fabric which can be used on jackets or coats, hats, shoes and gloves—on all types of clothing. In fact, just the other night I was driving home about ten o'clock at night, and I saw a big white object ahead of me, and I could not imagine what it was. When I got up there it was a policeman sitting on a motorcycle, and I saw

him at least a thousand feet away. I have a couple of jackets I had made for my two children. It really is astonishing the way this material shows up the outline of a person on the highway.

We have tried to educate people to wear white clothing at night when they are walking down the highway, but they will not do it. We have a program underway now in Connecticut to get people to put this type of fabric on their clothes while walking along the highway at night. I think we have got to get the pedestrians to wear something like this at night, if we are going to stop killing them.

CHIEF CALDWELL: There is a popular belief, of course, that the control of pedestrian accidents is purely a matter of enforcement by the authorities, and that the individual person has no responsibilities at all in this matter.

The next question I have is: "What is the most effective approach to coordinating our efforts on a pedestrian program?"

MR. LILLIE: I feel that we must sell John Q. Public—whether it is through fines, through the schools, or through the popular thing called "public education"—to live up to a pedestrian protection ordinance.

I want to cite an example from our little town of Lansing. We were bothered, and still are, on rainy days by mothers coming to the school to pick up the young children—they double park in front of the schools, thus exposing about six other young children to an accident. They will also park across the street, and in spite of having the patrols and the policemen at the crossings they will call their youngster to come right across the street and get in the car.

Teachers have spent considerable time in teaching these youngsters to cross at the proper crossing, and always abide by the rules of the safety patrol, but these mothers undo everything that the teachers spend hours in teaching them.

And, then, the mothers take them downtown on Saturdays, and have them jaywalk across the street.

When we started our enforcement program in Lansing—and there is nothing original about it, it was copied after Detroit's program. We held a six months' education program, stating that the enforcement of jaywalking ordinances would start in June. We started this educational program in January, and by the time it went into effect

everybody in Lansing knew of it. We even adopted a slogan for this program, "Green means go, red means no." The newspapers and radios backed us up one hundred per cent on this program. When enforcement started in June, the police did not have such a tough job in enforcing the regulation. The municipal judge told me not so long ago that in all the cases coming before him he had never received one serious complaint from the jaywalkers.

We are not killing people in our restricted enforcement area—we are killing them out in the outlying areas. Withing a certain area, maybe we can stop pedestrians from becoming involved in accidents, but unless we have this enforcement all over the town we can not. However, there is another way of looking at this problem. As I said, I live in a section of Lansing that is not thickly populated, and if I wanted to cross the street to see my neighbor, I would feel awfully silly if I had to go down the street to the corner and cross and come back up the other side of the street, when probably the motor vehicle count on that street is not more than two an hour.

I also feel that in our educational program for the public we have not trained our police well enough. I mean that we have not sold our policemen on the idea that it is his duty when he sees a jaywalker to give that person a ticket.

We must continuously look for ways to combat this traffic problem. In Lansing we have not found the answer. We are still killing people—we have had seven fatalities this year, six of them were pedestrians, but these accidents did not happen in the enforced area. We have got to find some way in our community to tell the city officials that we need more traffic policemen, and we have got to sell the public. We have got to find some way to enforce the pedestrian ordinance in the outlying areas.

I still think that good enforcement is good education.

CHIEF CALDWELL: While you are thinking that over gentlemen, I will give you the next question: "Should the pedestrian obey traffic signals?"

INSPECTOR MILLER: Our regulations in Washington provide that a pedestrian shall obey the lights just like the operators of vehicles. That regulation was passed in 1939, and after a period of education we began to enforce it. And, up until 1941 or 1942, we had made something like seven

thousand arrests each year; actually, it has now leveled off to where we have usually about three thousand cases each year.

In answering that question I think we might make a few statements in reference to the responsibility of the pedestrian and the motorists. For instance, if we expect the pedestrian to pay attention to the green light and the red light, and this is in all parts of the city, then we have to protect the pedestrian. If he is walking on a green light, then it is our job, as far as we can, to force the motorist to give him the right-of-way, particularly on right and left turns. We can not expect the pedestrian to obey the green light or the red light if we do not protect him, and it is a sort of fifty-fifty proposition as far as we are concerned.

We like specific regulations that say you can and you can not do a thing.

Between the intersections, there is another problem. Our regulations permit you to cross between intersections, if you can do so without creating a hazard, but if you create a hazard by walking into the side of a car or walking into the rear fender or causing automobiles to swerve or stop suddenly, then the pedestrian can be charged with walking so as to create a hazard.

CHIEF CALDWELL: I have another question here: "Has effective pedestrian enforcement produced the desired results?"

MR. FLETCHER: In Detroit we believe enforcement has accomplished the desired results because fatalities and injuries have been reduced. It is our feeling that enforcement will accomplish the desired results if the enforcement is reasonable. When a pedestrian is asked to do something to conform to one of your laws, the law must be such that it gives the pedestrian every right he has to exercise his judgement. For that reason we do not believe a pedestrian should be asked to stand on a curb and wait for a light when there is no traffic or when the traffic is very light.

We can only go so far in regulating people's actions. If the street is clear, regardless of whether the light is green or red, let the pedestrian cross, and if the person crossing the street injures or almost injures himself, then the person deserves a ticket. And, I am sure the people will go along with you on this plan.

Any person crossing a street who has been almost struck by an automobile is pretty

agreeable to whatever the policeman might say—the policeman could tell the person that he has just endangered his life and for that and as a matter of safety education that he is going to give him a ticket. More than that, and most important, the police officer is on solid ground every step of the way.

CHIEF CALDWELL: I would like to ask Mr. Fletcher one question in regard to his observations in the reduced pedestrian death rate. Was the greater saving among those crossing at the intersection or those crossing between intersections?

MR. FLETCHER: There is no indication of that. I believe our records will show that in 1946 only four per cent of pedestrian accidents occurred at intersections where we have signal lights.

CHIEF CALDWELL: Here is a question I am going to give to Mr. Lillie: "Does an undue amount of enforcement against the motorist leave the pedestrian with the opinion that he is guiltless and, if there is an undue amount of enforcement against the pedestrian, would it leave the motorist with the opinion that he was guiltless?"

MR. LILLIE: I do not think the pedestrian objects so much to enforcement as he does to the attitude of the thing. He has had the attitude all of his life that he could cross the street where and when he so desired, and he believes that it is his God-given right to do that. We have got to discover new means of convincing the pedestrian that he is wrong in the conception.

CHIEF CALDWELL: Here is another question: "Why should not all pedestrians, and that might well include all those involved in traffic accidents, be required to file reports?"

MR. WATSON: I think that we should require all pedestrians involved in an accident to file reports. We do not do it now, and I do not know of any one who does.

We started a program on this just to find out from the public their reactions to such a system; we passed out police department accident reports for pedestrians, and we got about 95 per cent of the pedestrians to fill in the reports. I personally think the pedestrian would like to make such a report because it gives him a chance to tell his story. All we get is the driver's report, and he always puts the blame on the pedestrian.

I think we should do something about getting legislation through to have the pedestrians fill out reports so as to get their story,

and in that way we could evaluate far better than we can at the present time, as to where the responsibility for accidents can be placed.

CHIEF CALDWELL: One more question: "How long a period of education is essential before the police department can take forcible action?" This question is based on the fact that actual arrest is embarrassing to the pedestrian, and especially so if the pedestrian is a woman.

INSPECTOR MILLER: I believe the education period should be approximately six months. If you carried on a good education program, by using your radio and newspapers,

you could do it in six months time.

Under our regulations our men have the power to make arrests when an offense is committed. In that connection, we have the unpleasant duty of arresting women, and have on occasions arrested them. The officers go a long way before they will actually give them a ticket. If the woman will not identify herself (and this happens on occasions, and a crowd usually gathers) and the officer can not back out of it, he has to bring her in in the patrol wagon.

We have instructed the men to do everything possible to prevent that, but there have been a few incidents of that sort.

### Tests for Intoxication

By COMMISSIONER DONALD S. LEONARD  
Michigan State Police

The story told of a police officer who testified in court that he knew the man he arrested was drunk because he found him kneeling in the center of the highway trying to roll up the painted stripe was not too great an exaggeration.

But, on the other hand, it was not conclusive testimony, for the defendant could have said that he was not trying to roll up the stripe, but paste it down where it had come loose, and furthermore, he was not intoxicated because of spirits trumetti but suffered dizzy spells due to the spinning of the earth on its axis.

Farcious as that little story may be, it nevertheless expresses all so realistically the problem that has confronted law enforcement officers in dealing with the drinking driver. Without any standardized, legalized, and recognized method for measuring the extent to which alcohol has affected an individual, and whether he is intoxicated or not, it has been an uphill battle to control this problem adequately and prosecute successfully this worst of all traffic offenders and nuisances.

Then, too, intoxication, in the absence of a measuring gauge, is ordinarily a matter of opinion on the part of an officer. The judgement of officers varying, as it does in all human beings, it has happened more than once that a person has been accused of drunken driving, when actually he was not guilty. It may have been that he had not consumed enough alcohol to make him intoxicated as we interpret it, or some other cause—of which

more than 60 are listed—may have been the reason for his having exhibited the appearance and actions of an individual intoxicated by alcohol.

Thus a measuring gauge serves the double purpose of protecting the innocent as well as determining the guilty.

All of us here are too well acquainted with the seriousness, yes, the desperate seriousness of the problem presented by the drinking driver. He is the greatest single hazard on our highways. Every day, each 24 hours, he is responsible for thousands of accidents and for the injury and death of innocent persons.

According to nation-wide statistics compiled by the National Safety Council, one out of five drivers involved in fatal accidents last year had been drinking. And it's not just always the driver, for one out of four adult pedestrians who lost their lives on the highways also had been drinking.

Special studies show the drinking driver problem to be much more alarming than is revealed by the general statistics. One of the best of these was made in Evanston, Ill., by the Northwestern University Traffic Institute in cooperation with the National Safety Council and other safety groups. This study revealed that, first, nearly one-half of the drivers involved in personal injury accidents had been drinking to some degree; second, the chances of such drivers becoming involved in accidents increased rapidly as the concentration of alcohol in their blood increased; and third, the driver with an alcohol con-



centration of .15 per cent or more in his blood was 55 times more likely to become involved in a personal injury accident than the non-drinking driver.

Other studies have shown the incidence of alcohol in more than half the traffic accidents in which the drivers have met death, and there is good evidence that about one-third of the drivers in injury accidents have sufficient alcohol in their systems to be fairly classified as "under the influence."

Sometimes drivers have the weird delusion that several drinks make them better drivers. Others just black out, or at least drive in a fog, or with one eye closed to counteract the deceptions of seeing double.

Whatever may be the case, or the delusion, the cold hard fact is that alcohol shows no distinction. It affects the rich and the poor, the big and the small, the old and the young. Even in small quantities it impairs vision and speech, muscular coordination, judgment and quick thinking, and reaction time. All of these faculties must be at their very best if a driver is to be a safe driver.

With the incidence of alcohol so prevalent in traffic accidents, it is definitely clear that here we are dealing with a problem with which there can be no temporizing and no compromise. But that is easier said than done.

Without a standard to go by, the enforcement officer is usually under the necessity of making a diagnosis that even a physician would hesitate to undertake without calling upon the aids which medical science has developed. The officer must base his decision on his observation of how a driver handled his car, how he looked, how he talked, how he acted, and so on. Nor does he have the helpful guide of knowing how a particular driver appears normally. He is also aware that there are other conditions, such as injury, illness, medicine, or even extreme fatigue, which may produce the same symptoms as being under the influence.

In court it is the testimony of the officer against that of the driver, and in most instances the driver claims that his indulgence was limited to "a couple of beers." Defense attorneys can confuse the issue and create doubt in the minds of the jury by asking questions as to the extent of the defendant's intoxication and whether the condition observed was caused by alcohol or something else. Witnesses are brought in to testify to the sobriety and good character of the ac-

cused. Then in most states the laws fail to define the exact meaning of "driving under the influence."

Finally, there is the pressure angle. Convictions for driving under the influence usually result in the loss of a driver's license for a period of time in addition to a fine or jail sentence. Consequently, prosecutors and others are besieged and beseeched to reduce the charge to reckless driving or some lesser offense before the case ever gets to court.

Of major importance, too, is the fact that the public, and frequently even prosecuting attorneys, judges, and enforcement officers are not sufficiently conscious of the gravity of the problem, and therefore have a somewhat tolerant attitude toward it.

Because all of this makes it difficult in many communities to obtain convictions for driving under the influence, enforcement officers too often will not press a charge for such an offense unless the driver is obviously and undeniably drunk. Yet it is known that the bulk of the problem is represented by drivers who have consumed only enough to deteriorate their ability to drive safely, even though they may not be obviously drunk. The result is that only a small percentage of the drivers who should be arrested for driving under the influence are so charged.

Many of the difficulties encountered in connection with the drinking driver problem can be minimized, if not overcome, by the use of chemical tests. Where they are used properly and fairly, good results are generally obtained.

Chemical tests accurately measure the amount of alcohol in a person's blood and this is a reliable index of the extent of intoxication. When such tests are available to the officer, it takes the guesswork out of judging whether a driver is under the influence, even in the borderline case. The officer quickly knows whether the driver has had just two beers or two beers too many, or whether his condition is due to illness, injury, or some cause other than alcohol. Likewise, a thoroughly investigated case plus chemical test evidence will quickly and positively refute most of the common defenses employed to beat a charge of driving under the influence. The result is more arrests for the offense, more convictions, and a wholesome effect on the conduct of other drivers in the community.

It is not uncommon for departments using the chemical test to obtain guilty pleas in

more than 50 per cent of their cases. A driver who knows that he has registered well above the two-beer mark will usually admit that perhaps he made an error in his mathematics and that he really meant two times two, or four, or eight.

Also, by providing scientific, accurate, and indisputable evidence to supplement the officer's testimony, only a small percentage of contested cases are lost in court. The scientific test is an unbiased, unprejudiced witness and it is no easy task to create a doubt on the part of a jury that this witness is not telling the truth.

Chemical tests offer an excellent educational medium. They are well new to most people; hence, they present a way to educate the public to the seriousness of the drinking driver problem, the obstacles hindering the enforcement officer in dealing with it, and the value of the test in stamping out this driving evil.

In communities where chemical tests have been used extensively, records show a sharp decrease in the number of drinking drivers involved in accidents.

A report on Detroit's experience last year in handling the drinking driver problem following introduction of a chemical test program is of interest and lends weight to the claims made for this type of evidence. There were 945 persons convicted of driving under the influence, or more than 98 per cent of those charged with the offense. Convictions were 225 per cent higher than for the previous year, and this was attributed primarily to the chemical test. More important, the Detroit record showed a reduction of more than 47 per cent in accidents resulting from driving under the influence of liquor.

Chemical tests are not exactly new. Ten years ago they were in use by several of the larger cities and state enforcement agencies, and this group has slowly grown to 78 cities and 18 state agencies. In all, chemical tests are used in 35 states and the District of Columbia. Iowa leads with the largest number of departments in any one state using the test, or 11 cities and the State Highway Patrol. Ohio and Wisconsin, with eight cities each, and Indiana, with seven cities and the State Police, are next on the list.

Those cities and states using chemical tests have in general obtained a higher number of convictions for drunken driving, on a population basis, than have those not using them. Unquestionably many lives also have

been saved because these cities and states have the tests and are curbing drunken driving. In view of this record of success, it is surprising that more states and cities have not adopted the tests.

During the ten years since the introduction of the program, traffic accidents have caused the death of more than 300,000 persons and the injury of more than 11,000,000. How many of these deaths and injuries were caused by the drinking driver and how many thousands of casualties might have been averted by more universal use of the chemical tests are questions with which you and the public should be vitally concerned. By the same token, those officials charged with the responsibility of preventing traffic accidents should take inventory to determine if all accessible tools are being used to make police efforts most effective.

There are several reasons, of course, for the retarded development of the chemical test program. In the first place, to establish such a program requires the interest and cooperation of enforcement officers, prosecutors, and judges, as well as the backing of the public. It is not always easy to obtain this interest and cooperation. Many persons, including enforcement officers, still question the value of scientific aids utilized in such a manner. There are also other practical obstacles all along the way which must be overcome if chemical tests are to be used properly and the results admitted as competent evidence in court.

Through the years the Michigan State Police department has obtained blood or other specimens in serious cases where the question of the extent of intoxication was especially important. Because of the difficulty of getting such specimens, however, they were not always obtained when they should have been. We also used one type of breath test experimentally for several years and had satisfactory results. But again such tests were on a very limited basis.

About the middle of 1945, our department became interested in a new type of chemical test equipment which seemed particularly well adapted to our requirements in rural areas.

We wanted a device which would be portable so that it could be carried in our patrol cars and a test made at the scene of a violation or accident. We wanted one which would be operated accurately and efficiently by our officers with a minimum amount of training

and which would help an officer to determine if he should charge an individual with driving under the influence. And we wanted one which would produce accurate laboratory results to be used as evidence in court.

Having found such a device, we outlined our procedure for its use, and also discussed the entire program with prosecutors and judges. We gave special consideration to observing legal requirements, such as obtaining the consent of the individual to make the test, and assuring admissibility of the evidence by maintaining proper records and methods of handling. All the members of our Uniform Division were then trained to give the test.

Our officers are instructed to obtain a chemical test sample whenever the result of their preliminary investigation gives them reason to believe a traffic violator may be under the influence of alcohol.

In every case chemical test results are considered as evidence to supplement the officer's observation of the conditions and circumstances which attracted enforcement attention, and never are they a substitute for the officer's observation, interrogation, and orderly recording of findings.

To assist in the proper recording of findings and give direction to these factors which would be considered, our officers fill out the *alcoholic influence questioning form*. The information gathered in this way assists the officer in deciding whether to charge the subject with driving under the influence and also provides a written record which can be used in presenting the case in court. It is also of assistance in the interpretation of the chemical test results. The written form and the direction it gives to good investigation is, we believe, one of the best aids available in these cases.

To insure that the chemical test evidence will be admissible in court we provide that:

1. The test must be given as soon as practicable after discovery of facts which indicate a determination as to alcoholic influence should be made.
2. The subject must be advised by the officer that the test is entirely voluntary and that the results may be used either for or against him in court.
3. Only a sealed container may be used and the seal must be broken in the presence of the subject, calling this fact to his attention.

4. The officer must follow explicitly the instructions provided for making the tests.

5. Upon completion of the test, the container must be resealed in the presence of the subject, again calling this to his attention.

6. The breaking of the seal, making the test, and resealing the container must be done in the presence of witnesses whenever possible, their attention called to the various steps, and their signatures obtained on the seal after it has been replaced.

7. The officer making the test must retain custody of the container, not permitting it to be accessible to anyone until turned over to a properly designated person. A written record of all persons through whose hands the testing equipment passes before it reaches the laboratory is also kept on the container.

It is necessary in Michigan, as in most of the other states where the use of chemical test evidence is not specifically defined by law, to have an expert testify in contested cases as to the amount of alcohol found, extent of impairment caused by varying concentrations of alcohol, and the validity of chemical test results.

Fortunately, guilty pleas are being obtained in a high percentage of our cases. Even so, however, our expert is called upon to do a lot of traveling and this is a handicap which must be considered in carrying out a chemical test program. What is needed is a law similar to those in Indiana, Maine, Oregon, and New York by which the phrase "under the influence" is defined in terms of alcohol concentration in the breath, blood, or other body fluids. Until there is such a law, an expert will be required to appear in court in every contested case where chemical test evidence is presented.

Our experience is still quite limited as our training program has been completed for only about six months, and we have had some difficulty in getting equipment. We have had enough experience, however, to make us feel certain that we can deal much more effectively with the drinking driver by using chemical tests than we can by not using them.

Our arrests for driving under the influence during the first six months of this year increased 30 per cent and our convictions increased 45 per cent in comparison with the

same period last year. Pleas of not guilty have been entered in less than five per cent of the cases in which the chemical tests have been used. Convictions have been obtained in all of such cases which have gone to trial except one, and in this instance the charge was dismissed by a justice of the peace who ruled that there was no showing the defendant had been properly advised of his constitutional rights.

In connection with the successful prosecution of the contested cases, here is an excerpt from a letter written by our commanding officer, Sergeant Freeman, of the Cadillac, Mich., detachment, to Dr. C. W. Muehlberger, of the Michigan state crime laboratory, who is our expert witness in these cases. The letter was written with reference to a recent case in which Dr. Muehlberger testified.

"Dear Dr. Muehlberger:

The jury convicted the defendant of drunk driving. They were out just long enough to smoke a cigaret. . . . Our Prosecuting Attorney was well pleased with the disposition of the case and he feels that without the aid of the intoximeter and your expert testimony the defendant in all probability would have been acquitted of the charge.

"This is the first contested case we have experienced at this post and the result accomplished by the jury has given everybody a lot of encouragement in the use of the intoximeter."

Now, good as chemical tests are, it should be remembered that they offer no cure-all and cannot take the place of careful and thorough police investigation. On the contrary, they should be used only to corroborate and supplement other findings which through the years have been proved necessary to substantiate charges of driving under the influence. But they do provide a tremendous aid as the records prove.

In summarizing the values of the chemical test, I should like to emphasize the following:

The test takes the guesswork out of judging whether a driver is under the influence.

It convicts the guilty and exonerates the innocent.

It provides a means of awakening the public to the seriousness of the drinking driver problem.

It places a restraint upon those who would otherwise drink and drive.

It is the most notable advance in recent years in attempting to control the biggest single traffic hazard problem we have.

Maybe other and more effective means will eventually be found for dealing with the drinking driver. I do not know. But I do know that this is one means for reducing the inexcusable and horrible slaughter of the innocent by reckless individuals who have no greater sense of moral responsibility than to drink and then drive. If we have to bring them under control through fear of an arrest by a method that leaves no doubt of their guilt, then this fear should be encouraged.

The drinking driver has no place on our highways. He has no right to bring tragedy into thousands of homes through his wanton disregard of the lives of others. The daily toll in deaths and injuries that he exacts must be stopped.

Every means that is used to eliminate him is a fair means, and the chemical test is not only a fair means but an effective means. The greater that its use becomes, the more decisive will be our entire general attack on this grave problem of the person who combines drinking with driving.

Let us overlook no opportunity to press this attack aggressively, with all our energy, ability, and resources.

October 8, 1947

**Group Meeting on Driver Education and Training**

Presiding: GORDON C. GRAHAM, Supervisor, Safety Education Dept., Detroit Public Schools;  
Chairman, National Driver Education and Training Committee, N.S.C.

**What the 1947 Winter Driving Tests Show**

(Summary of a Talk)

By RALPH A. MOYER

Research Professor of Highway Engineering, Iowa State College  
and Chairman, Committee on Winter Driving Hazards,  
National Safety Council

1. Motor vehicle death rates as related to motor vehicle travel are highest in the winter in all sections of the country. Winter death rates are from 24 to 53 per cent higher than summer rates in the northern half of the country, and from 5 to 45 per cent higher in the southern half. The two major factors producing these higher winter accident rates are inadequate traction and reduced visibility.
2. Inadequate traction on road surfaces is primarily due to snow and ice and, to a lesser extent, to wetness, particularly on certain types of pavement. Combined with faulty driving practices, poor traction generally results in skidding, a circumstance frequently reported as a factor contributing to motor vehicle accidents.
3. Reduced visibility in winter driving generally involves one or more of three circumstances: longer hours of darkness; lowered visibility at times of snow or sleet storms, fog, mists, etc.; and obstruction to driver vision from frost, ice or snow-covered windshields, snow banks, etc.
4. The most striking fact revealed by the Committee's test projects\* was the surprising differences on smooth ice. Braking distances on smooth ice range from a low average of 110 feet to a high average of 150 feet, depending upon the ice condition, and to a lesser extent, the type of vehicle. Acceleration and performance on curves likewise varies, but to a somewhat lesser degree. The extreme variability and unpredictability of the surface condition present the real hazard of ice and snow to the unwary driver.
5. During the winter months special emphasis should be given to winter driving problems in the fields of driver education, highway maintenance, accident analysis, engineering improvements, road condition reporting, and traffic law enforcement. Full cooperation should exist between those responsible for road maintenance and those responsible for traffic safety.
6. Drivers must appreciate hazards of winter driving and understand ways of surmounting them if they are to avoid trouble on the highway. Thus, a broad educational program should be conducted by those responsible for traffic safety. Drivers should know that:
  - a. Ice and snow increases braking distances from 3 to 12 times that required on dry pavements. "Wet" ice, most frequently encountered after freezing rain or sleet storms, is twice as slippery as "dry" ice encountered at low temperatures. Braking distances on glare ice for cars and trucks equipped with natural rubber tires are 10 to 30 per cent less than with synthetic tires. Glare road ice and the smooth ice of a frozen lake give comparable braking distances. Trucks generally skid farther on ice than passenger cars.
  - b. Speeds must be materially reduced on slippery pavements to avoid dangerous skidding. Speeds should be in the normal driving range of other traffic and passing kept to a minimum. The recommended safe speed on glare ice for cars and trucks with bare tires is in the range of 15 to 30 m.p.h.

- c. The rules for safe driving under adverse road and weather conditions are fundamentally: Get the "feel" of the road; adjust speeds to conditions; slow down well in advance of intersections and curves; use tire chains on ice and snow; keep windshield and windows clear of snow, ice, fog and frost; follow other vehicles at safe distances; signal intentions of turning or stopping; and apply brakes with a gentle pumping action. Tests have shown that a very rapid and hard pumping action will produce considerably shorter stops, but it is doubtful if the average driver can employ this technique to advantage.
7. During fall and winter months, public officials and safety organizations should also give special emphasis in public information programs to the hazards of driving and walking during the hours of dusk, darkness and at other times of reduced visibility.
8. The use of tire chains is the most practical means of self-help for increasing traction on snowy and icy roads. When such roads are not treated with abrasives, chains are a practical necessity for providing traction for passenger cars and trucks. Tire chains reduce passenger car braking distances on ice and snow around 40 to 50 per cent; truck braking distances about 60 to 70 per cent. They provide fairly uniform traction on dry and wet ice. On icy curves, however, speeds with chains on the rear wheels only should be no higher than without, because chains on the rear wheels only do not provide the necessary steering control required on curves. However, in the event of a skid, chains on the rear wheels are helpful in maneuvering out of the skid.
9. Highway departments should strive for "bare pavement maintenance" during the winter season. This can usually be accomplished by prompt and complete snow removal, expedited by the direct application of chlorides without abrasives. Where it is not economically feasible to remove the ice or to prevent its formation, the spreading of abrasives treated with sodium or calcium chloride is recommended.
10. The spreading of treated abrasives on snowy and icy roads makes driving safer. Braking and acceleration performance is from 30 to 65 per cent better than on bare ice. With untreated abrasives performance is from 10 to 25 per cent better than on bare ice, depending on density of spread.
11. Traffic engineers and accident analysts should continually check the records of accidents occurring during the winter months to identify and correct road locations which are especially prone to accidents when the surface is slippery or visibility poor.
12. State highway departments should develop effective systems of winter road condition reporting, so that drivers will be sufficiently warned of snow and road conditions. This information should be made readily available through all publicity media, and should be accurate and dependable. Safety instructions dealing with road or weather conditions should be combined with the reports.
13. Police should cooperate in this program by promptly reporting road conditions and by warning motorists of the need for using tire chains when traversing sections which are extremely hazardous because of ice or snow.

\* (The talk by Professor H. M. Johnson entitled "The Detection and Treatment of Potential Accident Hazards" and the panel discussion "Have Driver Clinics Any Safety Value?" can be found in Volume XXVIII of the Congress Transactions, the School and College Session.)

WEDNESDAY AFTERNOON SESSION  
October 8, 1947

General Session

Presiding: HON. JOSEPH M. WYATT, Chief Magistrate, Traffic Court, Baltimore, Md.;  
Chairman, Traffic Court Div., Traffic Section, N.S.C.

A Chain Is As Strong As Its Weakest Link

By T. N. BOATE

Director of Special Service, National Conservation Bureau

"A chain is as strong as its weakest link." That is a familiar proverb, used frequently before and undoubtedly to be used again to initiate so-minute papers treating on world politics, hot lunches for school children and perhaps even accident prevention programs. The few words contained in my quotation tell a story of dramatic successes and dismal failures.

Undeniably, one of America's paramount problems is to cope with the rising loss of life and property on streets and highways. Through the concerted effort of civic organizations and governmental agencies on state and national levels, the National Safety Council and its subscribing members, as well as insurance and industry in general, an unparalleled public information program has been set in motion. Utilizing the mediums of press, radio and the motion picture, the person who was heretofore lukewarm about accident prevention is "steamed up" and ready to cooperate in any program that will lessen his chances of ending up in an ambulance or recorded on the police blotter of motor vehicle fatalities.

There are numerous solutions advanced for checking and subsequently reducing traffic tragedies.

Education is one—teach our youngsters proper techniques in operating a car and in so doing, develop in them essential skills.

Continue an aggressive, comprehensive, public information program, disseminating the facts about highway safety to the public. Devote ourselves to the development of uniformity in state and local traffic laws and regulations. Improve driver licensing standards and regulatory measures affecting highway safety. Give special attention to the adoption of a program of motor vehicle inspection that will insure the sound state of

America's automobiles.

All are essential factors in determining our future accident pictures. None can be either neglected or given piecemeal support if our accident prevention activity is to be of maximum effectiveness.

In the time I have here, I would like to outline very briefly the history of motor vehicle inspection, cite some examples of the resultant reduction in accidents in areas where such a program has been adopted, and quote some factual insurance statistics. From there on, you may conclude for yourself the role that a sound program of motor vehicle inspection can play in reducing the death and injury toll and economic waste growing out of traffic accidents.

The development of inspection programs reads like many of the graphs hanging in school rooms or sales managers' offices. From a slow but steady beginning, it burst out of infancy when "Save A Life" campaigns were instituted by proclamation of the Governors of several eastern states. The campaigns required that all motor vehicles, during a stated period, ranging from two to three weeks, be presented at designated garages for a complete inspection and repair of all safety equipment.

Conducted by Delaware, Maryland, Massachusetts, New York and Pennsylvania, during the years of 1947 through 1949, this activity finally resulted in Maryland, Massachusetts and Pennsylvania enacting laws requiring statewide periodic inspection of motor vehicles in 1949. In 1950, the six New England States joined in a united program for promotion of street and highway safety through periodic inspection of motor vehicles. From 1950 on, inspection history presents a record of steady development of traffic accident prevention.

Additional states, recognizing the inherent value of an inspection program, came "into the fold" and added programs to their accident prevention activity. Several states with private stations switched to the state-owned and operated type. Taking the lead from Memphis, where, in 1934, the first city-owned and operated inspection system was initiated, cities all over the nation, from Billings to Chattanooga and Omaha to Evanston, inspected their cars for mechanical defects.

Motor vehicle inspections became a part of the uniform vehicle code and were approved by the National Conference of Street and Highway Safety in 1934.

Nineteen thirty-seven found the American Association of Motor Vehicle Administrators and the National Conservation Bureau, accident prevention division of the Association of Casualty and Surety Companies, sponsoring the development of the motor vehicle inspection code—under procedure of the American Standards Association.

National organizations increased in saving lives through inspection of motor vehicles instituted program of public information, making pamphlets and periodic news bulletins available. The program development was somewhat slow, but certainly steady and with no retreating. Then came 1941—Pearl Harbor—and a concentration of effort on the staggering job of winning the war on the battle and production fronts. With manpower and materials rigidly concentrated on whipping an enemy to the East and to the West, the practicality of continuing motor vehicle inspection in many areas became doubtful.

Consequently, many of the country's inspection lanes were boarded up for the duration.

Through the last days of war and the first of peace, America's safety-minded became increasingly conscious of the need for inclusion of motor vehicle inspection as a part of the "postwar traffic safety plan". This was directly due to the unsafe condition of most automobiles, resulting from wartime shortages of manpower and materials.

States that had discontinued their programs returned to checking the mechanical condition of the automobiles of their area. States that continued the program, during the war began a process of revitalization, installing new equipment and adding personnel to take care of the anticipated increase in

inspections. State legislative bodies considered, and in several instances enacted, new laws instituting programs of inspection or set up committees to investigate and report on the advisability of such a course.

The International Association of Chiefs of Police organized a program known as the Police Traffic Safety Check. Conducted in the United States, Canada and Honolulu, from May until the end of June last year, nearly 3,000,000 vehicles were inspected.

The revelation that one out of every three cars checked was operating with an obvious defect is a thought-provoking report that strongly substantiates the need for a continued program of motor vehicle inspection. While not intended as a professional mechanical inspection, but merely as a road check for obviously dangerous conditions, officers were urged to note and call to the driver's attention obscure vision, unsafe steering, no rear vision mirror, defective mufflers and other defects. Because of the program's salutary effect on motorists and substantial reduction in the traffic accident death rate, many administrators have continued this activity.

Obviously, this check plus reports from areas where motor vehicles are periodically inspected have established the fact that a large percentage of our cars are in an unsafe mechanical condition and that far too many motorists are unconsciously piloting potential dealers of death and destruction.

Official safety inspections have disclosed many things. Blackened headlamp bulbs or "gyp bulbs", many of which are imported and usually inaccurately made, are perpetually out of focus. The prime requisite of adequate night vision is good headlights.

Discolored glass and temporarily repaired windows and windshields are hardly helpful in the motorist's maintenance of a clear, all-inclusive view of traffic and road conditions about him. Yet, inspections have disclosed that thousands drive with their windshields and windows in a condition that simulates "perpetual fog".

You cannot stop a car by pressing on the floor board, yet many automobiles have brakes of negligible effectiveness. Many of them work just well enough for the routine ride, but in an emergency their ability to stop the vehicle is dangerously wanting.

Tires worn to the blow-out point are still found on millions of vehicles, all ready for

the sudden swerve or sharp stone that will pierce their last thin cord and send car and occupants careening into another traffic tragedy.

The need for inspections has been established and confirmed, but how effective have the programs been?

To cite only one statewide program as an example, New Jersey has set a high standard in organizing safety measures with an eye to the future. Utilizing to the fullest extent the experience gained in the accident prevention field prior to 1938, Arthur W. Magee, commissioner of motor vehicles, became convinced that the increasing traffic accident toll could be stopped and possibly reduced, if the maintenance of motor vehicles was improved. Having a good insight into the way human beings behave under varying conditions, he knew that all of the people could not be depended upon to have their automobiles maintained in a safe condition, all of the time. Consequently, James J. Shanley, then an equipment engineer in the Department of Motor Vehicles, was appointed to organize and head a periodic motor vehicle inspection program. Appropriate legislation was enacted, adequate funds were appropriated, buildings were constructed, equipment was acquired after careful study and research, personnel was employed and carefully trained. The whole machinery of a sound organization dedicated to a thorough, semi-annual inspection of every motor vehicle registered in the state of New Jersey was set in motion.

During the first motor vehicle inspection year, there were 413 fewer fatalities. Total repairable accidents and non-fatal injuries also decreased 73 per cent. This substantial reduction has been sustained consistently through the years, representing an outstanding example of the value of periodic inspection as an accident prevention medium.

National Bureau of Casualty Underwriters statisticians, the foremost casualty insurance rate making organization on this continent, have only one yardstick for determining automobile liability insurance rates. Generally speaking, it is the cost of claims resulting from accidents. In even less technical language, it is the cold arithmetic of the price we pay for accidents. Thus, from year to year, these studiously realistic statisticians determine the rate we must pay for our automobile liability insurance on the basis of the record we ourselves actually write.

Let us now draw an arresting comparison

between two great metropolitan centers, one having compulsory inspection and the other having none. In the area where all cars are subject to periodic check by the state inspectors, broadly speaking, the rate for bodily injury and property damage insurance is 29 per cent less than in the city where periodic inspections are not required. This may or may not reflect the accident prevention values of periodic inspections. Draw your own conclusions.

Bear in mind also that the rate makers do not include motor vehicle inspection in their calculations, but that in arriving at the rates of those two areas, they found the one having such inspections merited a substantially lower rate.

Compulsory periodic inspection of motor vehicles reduces accidents! It undeniably improves the general standard of vehicle condition. It maintains each automobile at a higher value level, by lessening depreciation. It affords opportunity to check motor and serial numbers actually on the vehicles against registration certificates and, in many other ways assists in the enforcement of motor vehicle laws. It improves quality of garage workmanship in making adjustments and repairs and offers an excellent opportunity for informing drivers concerning the condition of their cars and their responsibility for driving safely at all times.

Aside from the reduction in accidents, other benefits, less tangible but of vast importance, result from periodic motor vehicle inspection. The psychological effect on the driver is considerable, for the motorist who has been shown that his brakes meet only the minimum requirements will tend to drive more carefully.

Inspections also help to educate and keep car owners aware that certain parts need periodic attention and that it is, in the long run, less expensive to have the vehicle checked regularly and kept in repair, than to wait until the breakdown occurs.

Rejection of a vehicle usually informs the motorist in some specific way that he is driving an unsafe car and, as a consequence, is liable to be held as the negligent party in the event of a collision with a car properly maintained. The driver who subjects his car to periodic inspection tends to cooperate with enforcement officers and the general public in the observance of traffic rules and regulations.

The educational opportunity afforded by inspections is an excellent one. In some states having good programs, the driver of an approved motor vehicle is handed a pamphlet stressing certain phases of safety. This method of reaching the motoring public, if the context is changed periodically, affords an excellent medium for instructing motor vehicle drivers along safety lines.

Periodic inspection provides for the motorist an inexpensive maintenance service not available elsewhere. It gives a sense of security while driving and saves lives because the

constant gamble on the safe condition of the other fellow's automobile with which you are coming in contact all of the time on streets and highways is reduced to an absolute minimum.

If we are to save the lives and limbs of millions of Americans destined to die or suffer painful or permanently crippling injuries on the highway—if we are to check and reduce the economic waste which we can ill afford—if we are to carry out a program of safety which will have maximum effectiveness, we cannot neglect motor vehicle inspection, because a chain is as strong as its weakest link.

## Speed Control Panel Discussion

Discussion Leader: FRANKLIN M. KREML, Dir., Northwestern University Traffic Institute & Traffic Div., IACP.

### Participants:

CAPT. W. L. CROFT, Virginia State Police.  
FREDERICK C. HORNER, Dir., Field Operations Section, Distribution Staff, General Motors Corp.  
H. W. JOHNSON, Chief of Police, Kansas City, Mo.  
CARL J. McMONAGLE, Dir., Planning & Traffic Div., Michigan State Highway Dept.  
HARRY E. NEAL, Chief Eng. Div. of Traffic & Safety, Ohio Dept. of Highways.  
L. A. STRAIN, Vice-Pres., Petroleum Transportation Co.

CHAIRMAN KREML: Let's begin our discussion this afternoon by defining our subject—Speed Control. Speed is operation too fast for conditions. By "conditions" we mean the driver, the car and the highway. "Control" is an effective control of the speed of movement of motor vehicles through enforcement, through driver licensing, through engineering, and through education. This will be the main theme of our discussion this afternoon.

Captain Croft, suppose you start us off by talking a little bit about laws. How do they play a part in the control of speed?

MR. GROTH: At the present time many states have a prima facie type of speed law. Other states have absolute speed limits. Some have an absolute limit at night, and unlimited or prima facie in the daytime. Many states also have laws authorizing speed zones.

I think it is important to point out at this stage in the discussion that the speed law must be reasonable and that it must be enforceable.

CHAIRMAN KREML: The International Association of Chiefs of Police, is now on record as recommending that a sound speed control law should have, first of all, a "reasonable and proper" clause followed by prima facie speed limits which, of course, amount actually to rules of evidence. There also should be provision for speed zoning, either up or down, from those prima facie limits. There should be an absolute top limit depending upon the geographic conditions prevailing in the particular state. Further, there may be (either in the top absolute limits or in the prima facie limits or both) some day and night differential. We think perhaps this kind of law gives the greatest flexibility in operation and control.

How does that check with you, Colonel Horner?

MR. HORNER: Yes, I agree with that. However, in approaching the question of speed, we should consider the practical side for the average motorist. In my opinion, we should tell him this:

"Never drive your motor vehicle at any speed that would cause you to lose control of that vehicle should something unforeseen occur to interfere with the movement."

A speed limit is one of the most controversial subjects in the field of highway transportation today. If you talk of a speed limit of 50 miles an hour to a Texan, he thinks

you're crazy. "Way back in 1921 the English had a law that said you could drive any speed you wished, provided you did not drive to the common danger. In other words, you could kill yourself if you wanted to, but you must not drive at a speed that would hurt anybody else if anything happened.

CHAIRMAN KREML: I think we are agreed we have to have a sufficiently broad law to cover all situations, and it must allow for certain administrative latitude beyond that.

The next factor is the police. Certainly one of the important factors in developing good speed control under whatever kind of law we have is an effectively trained police agency which is operating under some sort of pre-determined policy of speed control.

Again I wish I could say that was very largely true in the country today, but it is not. It is true in some places where they are doing outstandingly good work. Chief Caldwell, in Los Angeles, for instance, has developed a good speed policy for his department.

Increasingly this is true in other cities—Detroit, Cleveland, and so on. But the fact remains that in most American cities today, as regards a policy on speed or, for that matter, any other kind of traffic law enforcement, there just isn't any. The police are taught the law and then are allowed to make their own interpretation and application. Consequently we get widely varying enforcement results.

In my own experience as a police officer I had the unhappy duty of arresting a gentleman for going 40 miles an hour the day after my partner had told him that on that 30-mile-an-hour street we never arrested anybody unless they went over 40. It was my partner's policy, but it wasn't mine. The citizen was victimized by the fact that our department did not have an operating policy in the enforcement of speed. For that matter, we didn't have it in anything else. That sort of thing is bad government quite apart from the question of traffic control and speed control.

MR. GROTH: State police departments must also set up some policy for speed enforcement. How much tolerance are you going to allow, and is it going to be 5 miles an hour in one section of the state and 15 miles an hour in another?

If we are going to get anywhere from an engineering standpoint, through speed man-

ing, it is no more beneficial than the enforcement put on it; so naturally the enforcement must be selective. The tolerances on speed limits must be uniform if there is to be any semblance of proper enforcement of the posted limits. What warrants do you use to establish speed zones, Mr. Neal?

MR. NEAL: In establishing speed zones the established speed must be reasonable, otherwise it cannot be enforced.

It is necessary to determine what the prevailing speeds are. A study should be made of the accident record. A study should be made of the topography, the grades, the curves, and so on; in other words, an attempt should be made, through obtaining all the facts, to establish a speed which the average driver considers as reasonable.

MR. McMONAGLE: We are doing research work to try to establish warrants. We must first determine the warrant for the speed zone, that is, whether it is necessary. After the speed zone has been put in, it is necessary to set the limits of speed in that zone. That has to be determined mathematically.

MR. GROTH: Have you given any thought, Harry, to speed zoning for only certain hours in the day?

MR. NEAL: Yes, consideration has been given to it.

CHAIRMAN KREML: I would like to have further thoughts from the audience or the panel on the subject of the police part in the development of good speed control. We have said, first, that the police have got to have a policy; second, the men have got to be trained in that policy; third, there has to be very close collaboration and cooperation with the engineers, and that it is a two-way street, because the engineers have to cooperate with the police also, and not give them too much to enforce. What else have we got to do in the police picture to get good speed control, gentlemen?

MR. GREYSON (Indiana State Police): The State of Indiana tried to pass a law at the 1947 General Assembly providing for a top speed limit. The State Police Department appeared to be the only agency in the State that really strongly advocated it. The police officers themselves were convinced we needed it. It appeared to us that the proposal was defeated in the Assembly partly on account of indifference or opposition.

MR. GROTH: Naturally, there has been some lobbying throughout the country in various legislatures, opposing certain speed laws. Some of that perhaps has been brought about by the unreasonableness of some of our existing laws, and if you will look into the picture from both sides you will see there are reasons for that sort of lobbying.

A police officer certainly wants a law that is enforceable, but today on our books we have many and many a speed limit maximum that is absolutely without value. For example, 10 miles an hour on the turning of a corner, 15 miles an hour in some of our business districts, and other speed limits of that nature. There is a reason for the formation of some of that lobbying.

CHAIRMAN KREML: And I would like to add that I think the best answer to it is to follow the recommendations contained in Art V of the Uniform Vehicle Code. There, I think, we have in principle, at least, the best thinking in terms of the type of law required for speed control, and it does contain the principles enunciated here earlier, at the beginning of this discussion.

I would like now to ask Chief Caldwell to tell us something about what they do in Los Angeles.

MR. CALDWELL (Los Angeles): There is no use putting the policeman out on the road during the time he is not needed, for instance between 3 and 7 o'clock in the morning. We have no police on the streets devoting their time exclusively to speed enforcement at those hours.

I have been trying to exercise a little restraint in the discussion of zoning. I think the engineers are not giving enough consideration to proper zoning in the community. Although you can't put up a sign at every street, the motorist should have something before him at all times to guide him.

Speed is generally thought of in terms of high speed, and never in terms of the speed at which people are killing most of the citizens. In urban communities 85 per cent of the people are killed at speeds lower than 45 miles an hour. Courts habitually think in terms of 60 and 70, and many times will automatically send a man to jail when possibly the hazard at these speeds to anyone on the street is a great deal less than it is at 75 or 80 miles an hour.

CHAIRMAN KREML: I would like to call for just a minute still on this subject of

"Police" upon Captain Schoenecker of Milwaukee, where they have had enforcement for thirty years. What about police responsibility for developing adequate speed control, Captain?

CAPTAIN SCHOENECKER (Milwaukee, Wisconsin): We have the 35-mile speed limit and it doesn't give us much trouble. We've held them down pretty well.

JUDGE HENRY (Denver, Colorado): I would like to know what the legal basis is for this question of tolerance. It seems to me you ought to eliminate tolerance. If your speed limit is more or less scientifically determined, then stick to the speed limit and forget the question of tolerance.

MR. GROTH: Some tolerance is necessary because of the differences in speedometers, and the difference in tire wear. This allowance is very necessary if we are fair in our enforcement. Our police officers certainly want to enter into your court thoroughly convinced they have brought in violators. There should be no question in an officer's mind, and that is the purpose of tolerance.

CHAIRMAN KREML: Generally 3 to 5 miles an hour?

MR. GROTH: A maximum of 5 miles an hour, generally speaking.

CHAIRMAN KREML: Just to allow for such factors as has been pointed out, plus the possibility of creeping. Particularly at high speeds—say at a distance of a quarter mile—for a police officer to absolutely hold his distance and not creep up on the violator at all.

L.T. BRITTON (Lincoln, Nebraska): We have talked a lot about zoning and speed control. We haven't said anything about the weather and such conditions. As far as we are concerned, with conditions of rain, snow and sleet, we have to forget our speed limits.

CHAIRMAN KREML: Under conditions which you state it should be possible to prevent a speeding charge even though the operation was under 25 miles an hour if, as a matter of fact, the operation was in violation of the basic rule, that is, without due regard for life, limb, property, proper use of the highway.

JUDGE QUILLIN (Portland, Oregon): It seems to me that the answer to this problem is a basic rule, giving one the right to drive as fast as is prudent and safe under all of the conditions.

**CHAIRMAN KREML:** Prima facie laws governing speed are today in effect in most of our states because of their eminent reasonableness and their flexibility. The difficulty is that the public is highly misinformed regarding prima facie speed limits. They interpret them as absolute speed limits. It is unfortunately true that this is largely the case also among the police all over the nation, and to some extent even in our courts.

We find, particularly in some of our J. F. and magistrate courts, these prima facie limits being enforced as absolute limits, when, as a matter of fact, they are not that at all. They are simply evidentiary rules, actually not speed limits at all.

Now, the question of courts is next.

**MR. GROTH:** There is a definite need for the courts of the nation to realize the seriousness of speed violations. My experience with many of our own courts is that they do not realize the seriousness of speed and the implications that go with it.

**CHAIRMAN KREML:** The implications of speed are so great, particularly in terms of severity. Yet in many of our courts today a speeding case is regarded with about the same importance as a charge of vending fruit from a corner stand without a permit. It is an insidious thing, because speed begets speed.

**MR. HORNER:** The Joint Committee on Postwar Speed Control, concerning the questions of speed and accidents, in part said this: "High speed, combined with a traffic violation or an unsafe act by the speeding driver, another driver or a pedestrian, or with a person, vehicular or other highway defect, makes it harder to avoid an accident and increases its severity."

**CHAIRMAN KREML:** Mr. Strain, as a fleet operator what is your observation of court handling of speed cases?

**MR. STRAIN:** In many instances (we travel in Washington, Oregon, and Idaho), we find wide differences in uniformity of fines. Before some J. F.'s or magistrates we are charged an enormous sum. The courts don't seem to have any distinct policy as to how they are going to handle cases that are similar in nature.

**CHAIRMAN KREML:** That is a valid criticism. It is particularly true in cities where the traffic court assignment is rotated between ten or twelve different judges a year, so that even in one community there is no continuity of policy at all.

Different judges take different views of speed, depending frequently upon their own capabilities and experience as drivers. We had a very old judge in Evanston who was a very indifferent driver, to say the least, and he thought anybody who went over 25 miles an hour was a fanatic. His colleague on the bench was a young chap who was very skillful in operating a car, and he thought anything under 40 probably wasn't too serious.

There certainly ought to be some reconciliation of viewpoint established with a policy particularly within the same city, county or court district in a state.

**MR. HORNER:** In one state in the United States there is a speed limit on commercial motor vehicles that is not being enforced at all. Can you imagine a driver of a big tractor semi-trailer who, when he is supposed to drive 45 miles an hour, drives 60 or 70 and nothing is done about it?

**JUDGE DEGRIF:** (Seattle, Washington): Do you think if all people exceed the speed limit in a 35-mile zone in a city they should all be fined the same?

**CHAIRMAN KREML:** No.

**JUDGE DEGRIF:** Most of the judges here at least will agree that a person going 35 miles an hour in a 25-mile zone when there isn't any traffic at all, should not be fined the same as when he goes 35 in a 25-mile zone when there is considerable traffic and the roads are slippery or full of snow.

I think that explains why some of the fines in the various towns or states are different. People who say the fines are different in different towns may not know all the facts pertaining to that particular case.

In Seattle we have cured "fixing." This has been done primarily through the issuing of a citation and having three copies of it made. One goes to the violations bureau, one to the chief of police, the defendant keeps one, and the other goes to the court. The original and copy of the citation must be accounted for at the end of the month. About 16,000 or 17,000 citations are issued in Seattle each month, and the average of lost tickets or tickets not turned in during the period of twelve months has not amounted to over four tickets a month. So, out of 16,000 tickets issued during the year, there are probably fifty tickets that are unaccounted for. Fixing can be cured if the people want to do it.

**JUDGE HENRY:** Getting back to uniformity of fines, there must be variations, as has been pointed out, but there is no excuse for

two judges in the same set of circumstances, and in the same city, giving two different fines. In most of the cities this is eliminated by having one man try all the traffic cases.

**CHAIRMAN KREML:** There is still another element in effective speed control, and this is driver licensing. Carl, would you kick off on that one?

**MR. McMONAGLE:** I don't think driver licensing has come up to the standard of highway engineering. Today we are building highways for high design speeds. But Mr. Joe Citizen who will drive on that highway isn't tested to see whether he can operate safely at the higher speeds. In the examination the driver may be asked to drive around a city block, probably at not more than 25 miles an hour. They determine whether he can stop a vehicle within a certain distance, whether he can steer straight, and so on.

They will give him a license, and he may be tott'ly unfit to drive a car faster than 25 miles an hour. Maybe his reaction and his whole nervous system isn't attuned to high speeds, yet he gets a license.

It seems to me there may be some way of exploring the possibilities of testing a man for his ability to drive at the higher speeds.

Again, how about re-examination of older drivers? When they get older their health may fail, perhaps they are not as able to drive at those high speeds.

**CHAIRMAN KREML:** I am certainly impressed with those points. I am most particularly impressed (as I think the audience is) about this omission in driver license examination. I know when I got my license in Illinois I was driven around the city streets of Evanston at a speed not to exceed 25 miles per hour, for about twenty minutes. I know that is true of the other members of my family who are licensed drivers.

Does anyone know of any place where the examination includes a test of driving at some substantial speed, such as 45, 50 or 60 miles an hour?

**MR. GROTH:** I raised that question the other day with a group of our examiners who were in for retraining, to see what their views on that subject were, and they threw it right back at me by asking me a question: Would I be foolish enough to ride with some of the folks they had to examine, at that speed?

**CHAIRMAN KREML:** Certainly it seems, now that we think about it, that this is a

very serious omission in our whole examining process. Virtually every one of us, at some time or other, drives on rural ways where high speeds are permitted, and we do drive at those high speeds, yet we are not examined as to competence in that important area at all.

**MR. GROTH:** That same line of reasoning goes right through with the age of the operator. I know from my own personal experience that I am not quite as adept at driving and manipulating a car as I was a few years ago.

**MR. HORNER:** I think it would be a very wise thing to examine older people. You frequently find cases where people getting up into their 75s and 80s haven't been driving for quite a while, and they start to drive again.

Entirely aside from that point, I think it would be a good thing if we would put into effect, nation-wide, a periodic re-examination of the drivers of automobiles and also commercial motor vehicles.

**CHAIRMAN KREML:** Now we come to that very important area in the matter of speed control, engineering, which falls really into two sub-areas or sub-sections, highways and vehicles. I wonder, Harry, if you would talk for just a moment about the importance of highway and traffic engineering, in dealing with this problem of speed control?

**MR. NEAL:** Engineers today are paying more attention to design of highways, and eliminating those inherent hazards on some older highways.

We still have many, many miles of highways that have hazardous sections and we need speed zoning for those sections. It is a fundamental principle that any speeds established, varying from the legal speed limits, must be established on the basis of facts. As a general rule if you establish a speed zone with a numerical speed limit less than the rate below which 85 per cent of the drivers travel in that zone, it is going to be difficult to enforce that limit.

**MR. NOTTHERFELDER** (Duluth, Minnesota): I would like the opinion of some of the men on the panel as to the value of stop signs for slowing traffic.

**MR. NEAL:** I don't think stop signs are effective in controlling speed. If it is advisable or considered necessary to control the speed at an approach to an intersection, there are other methods of doing it.

MR. McMONAGLE: There is a new device that the engineer can and does use today for controlling speed. It is a speed signal which does not stop the motorist at all if he is going at his proper rate of speed. It is automatically timed so that if you are in a 35-mile zone and you are going 35 miles an hour, you will get the green light to go through. If you are going 40 miles an hour in a 35-mile zone you will be stopped, and must wait for the green light.

That is the most effective device we have found yet for controlling speed when it is apparent that the signs and enforcement don't do it. We have used it extensively and it does work very successfully.

MR. NEAL: We use that in Ohio also. CHAIRMAN KREML: We must move on. What engineering contribution can be made to speed control through the engineering of the vehicle itself?

MR. HORNER: I think we will all admit that the vehicles being turned out today are good. They have perfected brakes and the manufacturers have done a lot toward perfecting vision. If we had really rigid vehicle inspection laws in the various states, it would do much to reduce accidents. You would be amazed how hard it is to get the people in a state or county to agree to have vehicle inspection. That, it seems to me, is much more important than anything else in connection with the vehicle itself.

CHAIRMAN KREML: Not only is motor vehicle inspection good from the standpoint of safety, but it is good economics for the driving community at large.

Now, let's take up the matter of education. Certainly there needs to be not only good public information on the effect of speed, but there needs also to be highly formalized driver training which, among other things, will take cognizance of the importance of speed in the operation of a motor vehicle.

MR. HORNER: In my opinion, in the whole question of highway traffic accidents the most immediate and most promising thing we can do to get the best and most far-reaching results is to train these teenagers who are coming along and who will drive cars on the highways.

MR. GROTH: I am in full accord with driver education, and I well recognize its possibilities, but it is going to take a period of years to accomplish the thing you hope to accomplish through driver education. In the meantime we still have millions of drivers

who are not going to be handled through driver education.

Therefore, we can't overlook the necessity of enforcement. We still need engineering. We are going to need public education for the folks who aren't going to get back to school for a driver training program.

MR. HORNER: There's no disagreement between you and me at all. In my opinion training of these teenagers is the most fertile field of endeavor. Of course the things you mention have to be carried on.

MR. GROTH: That's my point exactly, Colonel—it isn't going to remedy conditions overnight.

MR. STRAIN: One of the best ways of getting safety on the highways is by continuous hammering on the fellow driving the vehicle, telling him that he is driving a piece of equipment that can't go by itself—he has to drive it. It seems that driving has gotten to be a habit with the American people, just like sleeping and eating. When driving they will be thinking of everything but driving, because they do it so frequently that it is second nature. Police zoning, everything else reminds this driver that he is driving a vehicle and he should keep his wits about him and not daydream.

MR. NEAL: Education is necessary. It is a long-range program, but that does not mean we should neglect it. I think we should start driver training in the schools, and the sooner we start it the better. We should also adopt means to keep the adult population informed of the situation. There is too much apathy on the part of the public. We should try through every possible publicity medium to inform the general public and keep them informed as to the seriousness of the traffic accident problem. I realize that is a difficult problem because the newspapers do seem to publicize only those things that are sensational.

MR. McMONAGLE: Shouldn't the public be informed of the speed zones we establish, and that they are based on facts and not merely the opinions of a police officer and an engineer? If they understood that more, and were told it through the newspapers a little more often, maybe they would believe it.

MR. NEAL: That is very important. Before we establish speed zones we should inform the public that these zones are going to be established, and why, so they will understand. Then I think you will have a

better chance of getting observance.

MR. GROTH: The average individual does not recognize the implications of speed. A citizen in my community recently suggested that a certain street be one-way, and that the speed limit be raised to 40 and 45 miles an hour so that traffic would move downtown faster. The thing that individual forgot was that when you double your speed you quadruple your stopping distance.

Outside of some of our larger cities and towns, speed zoning is designed to slow drivers down before they reach the congestion point. I think we have to drive those ideas home to the public. They don't seem to realize why these measures are taken.

CHAIRMAN KREML: Thank you, gentlemen. We have come to the end of our time. I would like to summarize briefly, if I may:

We recognize that speed is a very serious, little-understood, and highly controversial phase of the whole traffic problem. We believe it can be controlled through having a sound, effective law with reasonable latitude for administrative interpretation.

We must have effective police programs in which the police are trained and follow a policy.

We must have courts which will support a non-"fixed" program, develop a serious attitude toward speeding cases, and maintain some reasonable degree of uniformity.

We must recognize, in our driver licensing program, the need for testing for speed op-

eration, and in our engineering work, on the highway side, we must give every possible assistance through engineering means to speed control, as in the case of the vehicle also, in not only availing ourselves of the safety devices built into the vehicle by the manufacturer but through government-operated vehicle inspection.

On the public education side, we need formalized education in order to develop good drivers, not alone for controlling the dangers of speed.

Further than that, as Captain Groth has ably pointed out, we need real public information so that the public may know what can be accomplished through speed, and what its limitations and dangers are.

The results of good speed control, the panel agreed, although we have not had time to develop it here, would be, first, increased highway capacities. Second, we would have material economic savings for the individual in that it would cost him less to operate his car, and he would have to pay less taxation, for example, for highway maintenance. He would also have to pay less insurance because there would be fewer and less severe accidents.

We would have a materially reduced accident frequency and a substantially reduced severity. Certainly out of all this, if we could get such effective speed control as we have outlined here today, a much greater convenience and utility in the use of the motor vehicle.

## THURSDAY MORNING SESSION

October 9, 1947

### Group Session for Police, Traffic Court Judges and Prosecutors

Presiding: JUDGE ROYAN D. HENDRICK, City Council, Shreveport, La.

#### Traffic Enforcement Policies

(Panel Discussion)

##### Discussion Leader:

WABE QUAIL, director of "Your Right to Say It," WGN, Chicago.

##### Participants:

Mrs. RUSSELL FIFER, "Wonder Wife," Wilmette, Ill.  
JUDGE JOHN GUTENBERG, Municipal Court,

##### Chicago.

JACK DRYOR, Prosecutor, Municipal Court, Lincoln, Nebraska  
HAROLD GOFF, Oklahoma Publishing Company, Oklahoma City  
HYDE PERCE, Insurance Editor, Chicago Journal of Commerce



A. R. FORSTER, Director of Training Division, Northwestern University Traffic Institute, Evanston, Ill.

MR. QUAALE: We are going into a discussion on traffic enforcement which will embrace several important points. The first and most important, I think, is the matter of the "raft" laws themselves. Are they modern, are they suitable for 1947 driving?

JUDGE GUTKNECHT: It is practically impossible to explain the traffic laws as they are today in view of the fact that we have 48 states and about 10,000 cities, all having some authority in connection with their own traffic laws.

I think it is fair enough to say that in the course of the last ten years we have seen a gradual modernization of our laws, simplifying them, but we haven't reached that point that we want to see—a great deal more unification throughout the country.

I am one of those—and I think so many of us are—that are afraid of too much centralization, but I don't think we have to be too much afraid of centralization as it applies to laws where the problems in all the localities are about the same. There is much more reason for unification of traffic laws than of divorce laws, for instance, and yet there has been much more movement for unification in divorce laws than in traffic laws.

Now, as to whether they are clear and simple, I think a judge is the last person that should answer that question, because he should know what they are. At the same time, he gets so many arguments on the point that they are not clear, that maybe he is somewhat befogged himself by the time he gets through. As to whether the laws we have in any particular time and place are clear and simple, I think the layman should have the right to say.

We have difficulty in many things that must be answered by science, such as driving while intoxicated. We have difficulty in many things where the law has to be indefinite, such as what is reckless driving?

But overall, our problem in traffic is not so much the rare cases where there is doubt as to what the law is. Our problem is essentially the common case where carelessness and negligence create trouble which ordinary intelligence must say leaves no legal doubt as to the interpretation of the law.

But I would like to pass that question on to the layman, as to whether our laws are simple, because if they are not, then it is the

job of the judges and the legislators to help simplify them.

JUDGE ROY DeGRIEF (Seattle, Washington): I think traffic laws, like all other laws, in order to be enforceable in the first instance must be sensible laws and meet with public approval. If they don't meet with public approval, they, like all other laws, will not be enforced. We had experience with that with our prohibition law many years ago. It was unenforceable, so the people eventually eliminated it. That is what will happen to bad traffic laws. They will be eliminated. The laws must be sensible laws in the first instance.

MRS. FIFER: I, too, am not in favor of regimentation as such, but I do believe that we need uniformity of laws so that motorists traveling from one state to another, and even one city to another, will have certain basic rules and regulations that they know should be followed.

In line with that, I think what we need with our laws is better education of the motorist. In many places the motorist does not know when he is violating. He can read the speed limit along the side of the road, but so far as other laws are concerned, unless there are signs there to tell him, he doesn't know whether or not he is violating the law.

So I think that when we are making our laws uniform, we should plan to inform each and every motorist, either with his driver's license or with his water bill, or however we might do it, but inform him basically what the traffic laws are for his own locality.

MR. GOFF: I would like to say that I doubt if ten per cent or fifteen per cent of the average driving public knows the laws of each city, and it is a matter of educating these people. I don't believe people willfully violate traffic laws, because they have to think of their own neck as well as the other people they are circulating among on the streets. I believe that the great thing is to make these laws simple so the average individual will take time to read and digest them and learn what is right and wrong and what is expected of him.

MR. QUAALE: The question of education has been brought up by both Mr. Goff and Mrs. Fifer, and I think we ought to get more education of the motorist as regards the law, education of the traffic officer who is making the arrest or warning a motorist or a pedestrian, and thirdly, education of our traffic courts.

I would like to call on another member of our panel for a discussion on that, Mr. Forster.

MR. FORSTER: I can only speak from the police point of view. I think I will be seconded by the policemen as well as the judges here in the room. The matter of the uniformity and the clarity and the sense of traffic laws, as Judge Gutknecht pointed out, is extremely important with the police officer, as after all, the traffic laws are the blue print of what he does in his whole action program. He is not interested in just enforcing laws, but in achieving safety, and if the law isn't a proper definition of safe conduct, or if the law isn't enforceable, then he can't get very far by just going through the mechanics and making arrests and issuing warrants or prosecuting cases. So he has a very vital interest.

I do think, however, that our great concern today should be effective enforcement of the laws we have, rather than improvement of laws. Not that there are not many defects in terms of uniformity and the wording of laws, but if we could get good enforcement of the laws that are now on the books, I think we would go much further than through any other single medium.

But there are in each state some glaring defects in the laws, and I think it is a matter for analysis within each state to find out what those are. They will be different in the state of Washington, the state of Michigan, the state of New York. But the police are confronted in every state with some handicap. In this state, for instance, pedestrian enforcement is very much limited by the fact that there aren't many teeth in the pedestrian regulation law. In most of the states today there are not enough teeth, not enough specific definition with regard to our drunken driving laws to permit enforcement of them. Many of our speed laws today are virtually unenforceable from a practical police and court point of view, and the policeman, I think, is interested primarily in those specific improvements to make the laws more enforceable so that when he does arrest people it is working toward better traffic safety.

MR. QUAALE: Mr. Forster, what do you think constitutes an adequate police force to enforce these traffic laws? How much training should a police officer have so that he can justifiably go out on the street and know whether a man is a reckless or careless driver or has just made a slight error in his driving habits?

MR. FORSTER: The only thing we can say positively today is that we have a woefully inadequate force, particularly in our state highway patrols. They can't begin to create enough of a deterrent. In the city departments, the International Police Chiefs Association said that on traffic we need about four men for ten thousand population, which works out to about a fourth of the police department, in a special traffic division. There aren't any formulas for the state organizations in rural highway areas, but we do know with most of them having anywhere from 50 to two or three hundred men, they just can't begin, they are just impotent forces.

On training, we generally feel that every police officer ought to have at least fifty hours in training in traffic control, so that he understands the laws thoroughly and is grounded in accident prevention and traffic control principles, so that when he goes out he knows the policies of the department, understands the psychology of dealing with the violator, and is thoroughly imbued from the standpoint of both efficiency and courtesy in how to do his job.

JUDGE GUTKNECHT: Mr. Chairman, I would like to ask Mr. Forster this question. How practical and to what extent is it being done throughout the country, or is it even practical, to have all officers check traffic violations, even though they are not on traffic duty?

MR. FORSTER: We think it is very essential, Judge Gutknecht, that every policeman perform traffic duty. When we say that about a fourth of the police department should be in a traffic division, should be what we call traffic officers, we do not mean that the whole traffic burden should fall on those men any more than we mean they should only perform traffic duty. We look on them as a spearhead for the whole department's traffic program, a flexible unit that can be moved around to do a selective enforcement job, that can do the specialized job of accident investigation which takes special training and equipment, do the job of downtown traffic regulation, and so on. But a police department in a community cannot get really adequate traffic law enforcement unless the entire uniformed force of that department does participate in the performance of the job. They all ought to be trained and in so far as their other demands permit, we think all of them ought to be doing that job in

order to create an adequate sense of supervision on the street.

JUDGE GUTKNECHT: Are any of the large cities really doing a job from that angle?

MR. FORSTER: Not as much as we would like to see. It is growing, however. More and more departments are giving more traffic training, and the consciousness of the fact that traffic isn't just a traffic division's job is growing. Milwaukee, I think, is one of the cities that has made excellent strides in that direction. They do have a measure of specialization, they do have men who are traffic men, but they also have their entire force imbued with the idea that every man has to do some traffic duty. Seattle, Washington, Detroit, and many other cities are moving in that direction.

MR. QUAAL: I would like to bring out the citizen's point of view in regard to police officers and the way citizens of our nation are handled by the police.

I am going to call on Mr. Perce to comment on that matter.

MR. PERCE: Years ago, when they were having kind of a campaign period, the officers stopped you in the middle of the night, climbed into your car, and very brutally said, "Go on over to the station." Now, at least in Evanston, where I made a few inquiries before coming down here, the matter has more or less been defused by strict instructions as to what the officer should say at the time of the arrest. This apparently was brought about by motorists coming in and describing the abusive language which the officer was alleged to have used, and it caused considerable trouble until they found out that having a pat speech—"Good morning, sir. You are traveling 58 miles an hour in a 35 mile an hour zone," more or less solved the problem.

I think most motorists build up a psychological resentment against getting stopped and getting a ticket, and I think there are a lot of motorists—I disagree with Mrs. Fifer—who are willful violators. I think willful violation of speeding laws and of stop lights is much higher than you think, and those people must be handled very carefully, because they will bring back this resentment straight to the chief of police and it might cause some trouble.

In the matter of speeding, I think the motorist is largely to blame almost anywhere in the country, because road signs are pretty clear. The highway speed signs are clear, the

speeding signs in town are clear, the stop signs are clear, and yet you get a tremendous number of violations both in the country and in the small towns. I think, therefore, you have to have very, very courteous policemen and very, very strict enforcement of the laws, to make any kind of a dent.

MR. QUAAL: I got into a discussion yesterday at another one of these panels as regards speed traps. A lot of cities evidently think speed traps are here to stay and should be maintained. They feel they serve a purpose.

MR. DEVOE: Every time you start a speed trap, and a motorist gets charged, he is going to tell all over the community that they are just lying in the weeds for you, waiting back there, and he is going to get a bitter attitude toward enforcement. What is going to happen when he comes into your court? He is going to be bitter, because he feels as though he hasn't committed any crime, and that's one thing that we should do—get away from the idea that it has been a crime to violate a traffic law. Perhaps we ought to call it a civil action to recover a penalty. No man likes to come into traffic court and plead guilty because he has been made to feel that he has committed a crime.

You judges and you policemen are trying to educate the people, but you want them to obey the law. One of the finest things you can do is to create a good impression on that person so that when he returns to his home or his club, he can tell that he was treated fairly and squarely and he knew what he was charged with. I have seen judges say, "You have been charged with careless driving. Guilty or not guilty?" He pleads guilty and he is fined. In many instances he doesn't even know what he has done. That is not going to educate the public as far as the laws are concerned. He should be made to realize what he has done, so that when he is talking about it to his friends, he can tell them in what way he violated that law.

If you are going to create good will in your courts, if you policemen are going to create good will, you can't do it by setting speed traps, by unfair treatment in court or anything else, because it is going to break down the theory of educating the public to help you. You are asking the public to help you enforce the traffic laws. You can't do it by arousing resentment. So I am definitely against speed traps.

JUDGE GUTKNECHT: I would like to ask a question in that connection. It really

goes to a definition of what a trap would be. If we have a situation with certain stop signs, and if a policeman is detailed to see that there is better observance, and he takes a position around the corner of a building to watch for motorists that don't stop, and then gets out and arrests them, would you call that a trap?

MR. DEVOE: Yes. I think that every man that saw that policeman standing behind a building would tell five men on his way to the office or in the elevator that he saw a cop sitting behind a building trying to catch somebody.

JUDGE GUTKNECHT: That raises this proposition. The stop light is there to be observed by the motorist when nobody is watching him. If the only way you can get people to observe the stop light is to put a policeman near that stop light, what service is the stop light doing? I think there are two sides on that. Of course, I distinguish that from the ordinary speed trap.

JUDGE DUGRIEF: I think the public conception of a speed trap is much as Mr. Devoe said, the officer hiding behind a bunch of bushes or a building. In our ordinance the speed trap is defined as the timing of a motorist over a certain space without following him, and under our ordinance that is prohibited.

The average American believes in fair play, and likes to be treated fairly by the officers who are given the duty to enforce the laws, and of course, the officers, in turn, like to be treated civilly by the citizen when he is arrested.

MRS. FIFER: In my opinion, rather than have a policeman jump at you from behind the bush and catch one or two violators out of ten, it seems to me it would be far better for the policeman to be actually patrolling the district. On our Outer Drive, for instance, in Chicago, I would assume the violations there are much fewer than in other parts of the city where people don't know the streets are patrolled. We know that our Drive is patrolled, we know that if people violate the law there is usually a squad of policemen cruising along there who are going to get them. You are not permitted to make U turns, and people just don't make U turns. They are supposed to stay in a certain lane, and when a motorist doesn't stay in his own lane you will see the squad car pass you and go right after him and nab him.

It seems to me it would be better to prevent the violation, rather than make arrests after a violation. I realize that all of our traffic forces are undermanned, and it means a lot more policemen than we do have, but I think that is something we should work toward.

Recently we were driving back from Milwaukee. The line of traffic on this big boulevard highway slowed down practically to a standstill. A friend in the car said, "I know why they are going slowly. There's a state police car up there in front." We were going along probably about twenty miles an hour, and nobody would pass that squad car. Finally, the policeman put his window down and motioned for the cars to come around him. That shows the psychological effect of knowing that roads are patrolled, and I think it would be far better to work toward that end than to worry about making arrests after violations, after accidents had happened. That doesn't save anybody's life.

MR. R. L. HOLCOMB (State University of Iowa): This speed trap problem, I believe, is simply a question of proper public relations. In the first place, the name is wrong. It isn't a trap if it is properly installed.

In Kansas City they time cars with a watch. The system is extremely effective in enforcing the law, and it is exceptionally well accepted by the public. They mark lines on the street a certain distance apart, the officers go back off the intersection and time cars across those lines. The purpose of those lines has been so well publicized in Kansas City and so continuously publicized, that everyone knows what the lines are for.

A similar program has been inaugurated in Waterloo, Iowa. We started that program on an intersection where there was a lot of difficulty with school children crossing at a high speed location. But before we started any enforcement at all, we had a full column story in the Sunday paper, with a picture of that location, a picture of the lines, the chief of police, and the principal of the school, and we told the people exactly what we were doing. When we locate other points where we will put up speed checks, at points such as school crossings high accident experience, and where we can justify every one of those controls, we believe that the carryover effect will be effective.

As to patrolling, there just aren't enough police to patrol. If you have ever been in a

police car going down the street, how many cars do you see speeding? The speeders don't go by the police car. If you are meeting a speeder, you can't turn in the street, make a hazardous movement to catch that speeder. It would be fine if we would some time have a situation where there were enough police officers so that when somebody did go by violating the law there would be a police car in back of him immediately. That would be ideal. But we are not playing a game with these people. We don't want to see if we can run around the streets and perhaps catch someone who is looking for us and waiting for us and watching for us. We are in a very serious business here. We should be fair and reasonable and follow the law, but we shouldn't make a sport of it to see if we can spot the policeman before he spots us. I don't think that is necessary. I am certain that a speed control program will be effective if it is properly publicized and fairly presented.

JUDGE GUTKNECHT: I want to interrupt on one other point. Of course, I am not talking about speed, which is a little different, but the stop light picture. A few years ago, being quite interested in a neighborhood up north where there had been a number of accidents, I got one of my friends on the police force to come with me. Two mornings before I went down to work, he and I stayed there. No arrests were made. We were out of sight. I walked around, but of course, they wouldn't know me. He was in uniform, so he hid. We counted, during the hours, something like 125 failures each morning to observe that stop sign.

Then the next two mornings, he got the squad car and we parked there in full view. He stayed there in his uniform and there wasn't a violation.

I am just throwing that out to the audience. Some of you say that's a trap, I assume. To what extent would you follow that policy of letting the man hide or stay out of view to make an arrest in that spot?

MR. QUAALE: I don't know whether you would call it a trap or not. How many of you folks in the audience would call that a trap? How many of you feel it is not a trap? (The majority voted that was not a trap.)

I think we can sum up this discussion as two-fold: one, understanding of the law; and two, presence of the law to see that the laws

are enforced and obeyed by the driving public.

JUDGE FRANK LITTON (Charleston, W. Va.): Along the line of whether or not the presence of an officer deters in any manner violations of traffic regulations, don't you think that if, for instance, a boulevard is patrolled and the presence of the officer on that boulevard prevents citizens from breaching the law, that that is perhaps more effective than if a man hid around the corner and pulled in fifteen or twenty people a day, when in reality the mere presence of the officer alone might have prevented some two hundred or four hundred people from having breeched that law?

I think that the presence of the officers on the street, certainly those that are used as speedways, is by far a greater deterrent than mere arrest on some occasions.

MR. FORSTER: I certainly agree with Mrs. Fifer and Judge Litton that the most decisive way to restrain traffic violators is to keep them under supervision, and if the public will give us enough police so that we can keep those potential violators under almost constant supervision, then we can drop our punitive practice to nothing in a short period of time.

But we haven't those, and I question whether it would be economically justifiable from the taxpayer's point of view to provide that number of supervisors. It begins to move toward a policeman in every car.

I think the use of this word "trap" has been unfortunate and that a lot of public misunderstanding and criticism of police practice has come from a confusion of technique—call it hiding, trap, what you will—a confusion between that technique and improper enforcement, because in the early days of law enforcement, the old days of the shakedown, collusion of some sort between a policeman and a justice, that method of unfair or dishonest enforcement involved the officer's being hidden, and people came to associate unfair or arbitrary enforcement with his being hidden.

Today that picture is pretty much changed. You don't find the shakedown officer any more. You don't find much of that collusion between a rural justice and a small town constable. If today the traffic officer is honest and impartial and is enforcing the law in an intelligent manner, we shouldn't say that because he happens to be out of sight of that

violation, he is unfair or dishonest. The critical thing is not where he witnesses the violation, but the basis on which he takes his action.

Until we get this great number of police officers, I think we must rely on creating a violation deterrent through this general sense of supervision. When I drive home from this meeting today, if I am inclined to violate for some personal reason, I will be restrained only because of the thought that I might be apprehended. Now, if I know that I am not going to be apprehended as long as I see no policeman in sight, I think we are giving a little too much of a break to that wilful violator and forgetting about giving a break to that great majority of people whom he threatens.

Certainly the officer should not always hide. Certainly he shouldn't go to such extremes as undue camouflage of himself and his machine. Certainly he shouldn't use that method exclusively, because you can't do an all-around good enforcement job if his only technique is to play certain hot spots and try to find any technical violations of some sign. But he has to combine some of that semi-concealed supervision with his open patrolling if we are going to create a real violation deterrent.

I repeat, if he is honest and if he isn't making a lot of technical arrests, that is going to be preventive. I think it is wrong to say that it is not preventive to arrest peoples but it is more preventive to be out there to supervise them. The whole basis of any kind of law enforcement is creating a violation deterrent through the fear of apprehension and punishment on the part of the wilful violator, whether he be an arsonist, murderer or traffic violator. If we can create a general deterrent through the knowledge that there is supervision and that enforcement may result, that is preventive just as much as his presence on the road.

MR. QUAALE: I think we all should see our budget chiefs for more money for the police force.

MR. HOWARD HOYT (Chief of Police, Kalamazoo, Michigan): I would like to argue against the suggestion made that policemen confine their work to patrolling. Of course, the primary purpose for having traffic men on the street is to prevent accidents. I was in command of a motorcycle squad of about thirteen or fourteen men back about thirteen years ago. We talked this over and found that we were averaging about six arrests

apiece for an eight hour day, driving fifty or sixty miles a day. We decided that we would still carry our traffic tickets with us, of course, but instead of fifty miles a day, we would all agree to put in at least 150 miles on our cycles a day. Our injury accidents averaged between thirty and forty per month. The next month they were 47. The following month they hit the sixties, and we called a halt and went back to our fifty or sixty miles per day with the average number of arrests we had been making. We brought the accident curve back down within six weeks into the thirties where it belonged.

Police officers don't enjoy making arrests, in spite of the fact that some of the public think they do. They would much prefer this cruising method if they could get by with that, because they are not encouraging any ill will. It is quite a bit more pleasant for them. They are not taking the abuse from the violator every few minutes, but they are charged with reducing accidents and the only effective way of reducing accidents we have found is by enforcement. You can't put enough officers on the street to prevent these violations.

JUDGE DeGREIF: I would like to know what the panel thinks, or the people in the audience, of the officers' disguising their car and being out of uniform at the time they arrest speeders. What is the reaction of the group here in regard to that?

The reason for that is that our chief in Seattle has just inaugurated a program where he has designated three officers to travel about the city in civilian clothes, without insignia on the car, and I just wondered what the panel's reaction was to that kind of enforcement, and the group's reaction to it.

MR. COFF: I think it would be a very bad policy indeed. I won't say you are not giving the driver a break—because he doesn't need a break if he is going to be a violator, but the idea of going around in that manner is much worse than speed traps, to my mind.

MR. FORSTER: I know what the Seattle chief's policy is, and what his intention is in that case, I believe. He is not advocating a swing-over to entire supervision by unmarked cars. He is designating only three cars out of a very substantial police fleet doing that work.

A highly specialized unit may be justified to deal not with the general driving public, but with an extreme minority for whom some

extreme measures are necessary. To make all the cars plain and unmarked would lose the deterrent effect of the sense of supervision, and we would swing too far toward reliance on the apprehension of violators. On the other hand, we have in almost every city a certain extremely wilful and reckless minority of rear view mirror drivers who will not be controlled by anything but that sense of fear of apprehension and punishment, and if the men in those plain cars are limited, and if they understand clearly that their function is not to go out and make a lot of technical easy arrests by virtue of their inconspicuousness, but that their mission is to work highly selectively on certain kinds of drivers and certain areas of drivers, I don't know why we should not have more public support for a limited application of that. It seems to me that we tend to veer more and more toward consideration for the violator and less and less toward consideration for the victim.

MR. PERGE: As a member of the public, I would protest simply on the tendency of a growth toward secret police.

MRS. FIFER: I would suggest that it could be a very dangerous thing with a plain clothes man on a highway. In a case in Ohio, a taxi driver in a small town was sitting outside the town getting cars from out of the city. He knew the license number of certain sections of the state, and he would take them back into this little town and tell them he was a plain clothes officer in a plain car, and finally one man was apprehended who was smart enough to know that in Ohio all officers are required to wear a uniform, and this man finally was caught.

I don't think anybody is going to get into my car and drive me a hundred miles and throw me out, but I do think it can be dangerous from that standpoint, also. We deserve to have that much consideration, to know it definitely is an officer and not someone who is posing as an officer.

MR. W. J. ANDRESEN (Dubuque Police Department): I think there is a general tendency on the part of the public to overlook the fact that these drivers are all law violators. There is a lot of talk about the general public being educated as to the laws. I don't think there is too much need of that. We all know that driving on the wrong side of the street is wrong, that going through a stop sign or stop light is wrong, and exceeding the maximum speed limit as established is

wrong. I don't think the public needs education on that.

I don't know whether this type of law enforcement should be any different than any other type. If, for example, in the criminal end, there is a certain territory that is infested with burglars, people are breaking into business houses or warehouses, the public doesn't object when the police department puts men down there in plain clothes and disguise and everything else. I don't see why there should be any more objection in this regard. We all know that those violations are causing accidents. I think that the police are justified in taking any means to apprehend these violators to reduce the accidents, the same as they are in any other type of criminal enforcement. That's the thing that I think the people are forgetting, that when they are exceeding the speed limit, when they are driving on the wrong side of the street or going through a stop sign, they are violating the law.

JUDGE OTIS R. HESS (Cincinnati): I would like to take issue with the gentlemen who spoke. We will have the same deaths, injuries, and accidents, unless and until we are able to change the attitude of the public toward the use of the automobile and the use of the rules of the road by the pedestrian as well as the driver.

We should see what you judges and prosecutors can do to drive into the minds of the public that it is just as morally wrong to violate a traffic ordinance and kill somebody with an automobile as it is morally wrong to shoot him with a gun. In the one instance the jury will walk in, send him to the penitentiary, and throw the keys away; and in the other instance they will come in and apologize for having annoyed him a little bit.

MRS. FIFER: I think it all sounds very wonderful, and I think we as motorists would be extremely happy if you people would arrest violators. We don't like to drive on streets where we think somebody is going to come out of a side street and knock us over and maybe kill our children. We would like to know that when a traffic officer gives a motorist a ticket, that traffic officer is going to see that the motorist has to pay for it. We don't like to know that maybe he will get a ticket, but he knows somebody, and maybe he will pay five dollars, maybe ten dollars, maybe he will pay a hundred dollars bail and forget it, and that's the end of it—there

isn't even a record on his driver's license as to what he has done, and he goes on driving at that high speed, or he gets a new car and drives a hundred miles an hour. We don't like it any better than the traffic police, and I think that is where we should have cooperation of the traffic officers and the courts, to see that people who are given tickets for traffic violations have to pay the penalty.

JUDGE GUTKNECHT: Let me ask Mrs. Average Driver, this. If you failed to stop at a stop sign, and then a policeman sneaked around from behind the corner of the building and arrested you, would you feel aggrieved?

MRS. FIFER: I certainly would not. I can read the English language, and when I see a stop sign I stop.

MRS. H. C. ANDERSON (Greater Minneapolis Safety Council): All violators do not want to be put in the same category. We are trying courtesy tags in Minneapolis. One motorist said, "I received a courtesy tag, and I am certainly going to be a better driver for having received it."

MR. DEVOE: The only value I can see in a courtesy tag is if your traffic bureau has a record bureau. It would mean nothing unless there was a record bureau to find out whether it did any good. Personally, I would be against it completely. I think the first thing you are going to run into is favoritism. John Doe will get a courtesy ticket. Maybe he was going to the hospital. He will tell his friends about it. The next time that friend gets caught for speeding, he is going to get mad. He had an urgent errand to do, even if it wasn't a hospital.

LIEUTENANT R. E. BRITTON (Lincoln, Neb.): I disagree with what the gentleman said about traffic violators being criminals, being considered as bad citizens. I would hate to have any officers get that idea and enforce the law under those circumstances, considering each violator a criminal.

It is mainly that he doesn't realize that driving is a privilege, and not a right. I think the legislatures in our states can do a lot. If he is a driver that is prone to traffic violations, remove his driver's license. I still don't consider him a criminal.

JUDGE GUTKNECHT: Is carefully supervised hidden enforcement (those words may be very unfortunate, but you know what I mean by hidden enforcement) justified because of whatever effect it may have on that

part of the public who will only obey the law if they think they may be watched?

JUDGE E. C. FISHER (Lincoln, Nebraska): I would like to add to Judge Gutknecht's general summary that the police should tell the public what they are trying to do, and how they are trying to do it.

JUDGE GUTKNECHT: I accept that amendment to the motion.

MR. QUAAAL: This question is on the floor: How many of you believe that there should be a certain amount of carefully supervised hidden police enforcement, in an effort to cut down accidents? Will you raise your hands?

That certainly is the majority of those present.

Now I think we should get into traffic courts. First of all, ladies and gentlemen, what do you think we must do to overhaul our courts? Judge Gutknecht, would you say a few words on our present day traffic courts?

JUDGE GUTKNECHT: I think the best thing we could do if we had time is to take you on a tour of our branch criminal courts in Chicago. They are the filthiest, most disgusting, most dilapidated buildings and places you have ever seen.

Then there is another thing I want to emphasize here, that this problem first hits the taxpayer. How are we going to get the City Council to see the need for this traffic picture as against certain other problems they have?

MR. QUAAAL: Earlier in the course of our discussion Mrs. Fifer mentioned the fact that a good many police officers become rather disgusted in their jobs because of the uncertainty of punishment of those they arrest. I wonder if there is anyone in the audience who would care to comment on what has been done to alleviate politics within the court room?

JUDGE E. R. SLOAN (Topeka, Kansas): There needs to be better understanding between the court and the policemen. Policemen would get along a lot better in their jobs if they understood that the arrests they make are not personal matters, that they are acting as public officials, and that when they arrest a person and charge him with an offense, they have completed their function. Of course, they come to court and testify. But what happens to the individual? The punishment that is meted to him, in my judgment, is not within the scope of the policeman's function.

Many times the officer goes out and arrests someone, and then he becomes personally interested in following that case through. He determines in his own mind what the punishment should be, and if it is less than that, he becomes mad. On the other hand, I have had officers come to me and ask me to go easy on someone that they have arrested.

If we could just get across to the officers the idea that the only function they have is to make an arrest and be prepared to come to court and testify as to what happened, and then forget it, it might improve the situation. What happens to the defendant is not their responsibility.

MR. DEVOE: We try to educate the public through letting them know what they are charged with. When a person comes into court, it is explained just exactly what the violation is that he has committed, whether it is careless driving or whatever it is. If it is careless driving the act of negligence are told to him after he pleads guilty or not guilty.

The courts can do just as much as the police officer to see that that man gets a fair and impartial trial if he doesn't think he is guilty. The prosecutor explains to the violator that he is either to plead guilty or not guilty, and then the violator says, "I am guilty, but—" and then says why he shouldn't be fined. The prosecutor can speak up, without the judge's doing it, and explain that the judge is sitting in an impartial capacity and knows nothing about the case, and say: "Wouldn't it be better to listen to your evidence and to the police evidence?" That man will walk out of the court room with a lot better taste in his mouth than if he tells the judge why he shouldn't be fined and the judge fines him.

If a man pleads not guilty in our court, a date is set for his trial, convenient, if possible, for him, because after all, he is a working man and he has a family. We don't put him under bond or to the inconvenience of posting bail. He appears on that day and has his trial, and if he is found not guilty, he hasn't been put to the inconvenience of posting bond, bail or anything else.

I would just like to ask you this question. When a man posts bail and later is found not guilty, doesn't he resent that a little bit?

JUDGE FRANK E. MOSS (Salt Lake City): I think the answer to that is definitely no. If a man has posted bail and has his trial

and he is found not guilty, and they hand him that money back, that signals his vindication. He feels wonderful, he has that money in his hands and he walks out thinking, "They found me not guilty and here's my money."

In fact, I think it's a good public relations idea to have the posting of bail beforehand. We have bail posted in practically every case. In nearly every instance we compile a sentence in traffic court with an admonition to go to traffic school, and if he goes to traffic school he is given a certain refund on the fine that is paid—and that comes back to that public relations idea again.

JUDGE DeGREIF: We have practically the same thing as they do in Salt Lake. If a person posts bail and doesn't want to appear in court, he has been inconvenienced by the posting of that bail, and that makes him a little bit traffic conscious.

MR. DEVOE: What do you do if he forfeits it? Are you doing any good for traffic education if he doesn't come up?

JUDGE DeGREIF: If it's a small amount over the speed limit, say forty miles an hour in a thirty mile an hour zone, he may post fifteen dollars, and if he doesn't wish to come into court, he may forfeit that fifteen dollars. After the second one he is not allowed to forfeit; he must come in and stand trial. But for the first one he is permitted to forfeit that bail.

Of course, we all know nowadays that if a person has to pay ten or fifteen dollars for going five miles over the speed limit, that is some deterrent. If I have to put up fifteen dollars for going five or ten miles over the speed limit, I am going to watch my speed from then on. I think that is an educational as having to go to traffic school.

We also have a pedestrian school. We require the pedestrian to put up five dollars bail, and if he wishes, when he comes into the Traffic Violation Bureau he tells the clerk, "I wish to go to traffic school." If he comes to traffic school and brings his citation, he is excused from paying this five dollars. If he doesn't wish to come to traffic school, of course, he can come into court or forfeit the five dollars. I think the payment of five dollars every time for jay-walking is also a deterrent, and an inducement to go to the intersection and cross where you are supposed to and wait for the green light.

JUDGE SLOAN: We make it a practice to require bail, usually double the amount of the fine. That has the effect of bringing all violators to court, because they know that even though they appear and plead guilty, they are going to get some money back. I have other cases to dispose of, but I always take the traffic docket first. By the time they have sat there for an hour or so and heard the traffic cases, they realize more fully the importance of obedience to the traffic regulations. I think that it serves a very good purpose, in so far as possible, to force every violator to come to court, that is, every moving violator.

MR. PERCE: On the matter of hearing trials, I would like to ask Judge Gutknecht whether this radio broadcasting of trials was effective.

JUDGE GUTKNECHT: I appreciate there is quite a division between the American Bar and what we did here in Chicago. I mean, the American Bar is against the radio, and the Chicago Bar followed suit, so they have had nothing official to say in connection with the court.

When we put the radio in (in 1934) within two years our death rate was down about 47 per cent. We had a particularly bad problem in Chicago because 95 per cent of our tickets, or a little over that, were either ignored or fixed. We had to have the radio in Chicago. The first month I went into that court without the radio, I couldn't do a thing. I had no support. Overnight the radio gave us support. The precinct captains that were thumbing their noses at you were coming around, if they met you on the street, to introduce their wives. You could enforce, you could have honest enforcement, because you could make the public get back of you.

JUDGE FISHER: I want to go back to the subject of bail. I know that every judge is faced with different problems, different heredity, different tradition, different laws and ordinances. It happens that in Lincoln we don't require bond on any ordinary violation. We do require it on a drunken or reckless driving charge.

We have studied that out on this basis. What is the purpose of bail? They tell me that in these places where they have bond forfeitures, in a large percentage of the cases that is the fine. The violator doesn't want to appear, so he pays it, usually to a policeman at some desk sergeant's desk. He hasn't been in court, and I have never been able to

see how he gets any education out of that, any idea of the purpose of law enforcement, except to avoid paying a fine.

The whole purpose of holding court is to try to impress these people with the purpose of law enforcement, which the President's Conference says is to encourage voluntary compliance. The only legitimate purpose of bail is to insure that man's appearance for trial. If you can get it without that, it is far more effective.

JUDGE EARLE W. FROST (Kansas City, Missouri): You asked a few minutes ago, Mr. Chairman, what had been done to improve traffic courts. A great many of us are familiar with the amazing program that has been developed within the past ten years. It has been even more recent than ten years ago, for then we did not even have in this Safety Council a committee of traffic judges. That has followed the program of the improvement of justice in courts started back about 1939 by the American Bar Association, starting with the so-called higher courts and finally, because we developed the impetus and support during those years, coming down to the courts in which most people appear, the traffic courts.

Back in 1939 and '40, the National Committee on Traffic Law enforcement worked on this problem, and then we developed the program of the traffic court conferences, which, by the way, was originated in the Committee on Traffic Courts and Prosecutors in the National Safety Council. That first conference was held in 1942, and since then over 250 traffic court conferences have been held in 44 states and the District of Columbia.

It is amazing the way the program developed and support was received from various organizations. The Junior Bar Conference of the American Bar Association took as its main objective this program in 1943. From the Junior Bar Conference a program went into the senior section of the American Bar Association, into the Section of Judicial Administration and into the Section of Criminal Law. I can say to you that at this last American Bar Association meeting in Cleveland, not two weeks ago, the main emphasis was on improvement in traffic courts, in both the Section of Judicial Administration and the Section on Criminal Law, and even the resolutions that went into the House of Delegates were concerned with the improvement of traffic courts.

So in spite of the shortcomings of our courts at the present time, we do have progress, definite and substantial progress that has been made within the last ten years, and I think maybe that has contributed to offset that prediction that was made by Carl Rutland in the early years of the war, that unless we do improve traffic safety and improve our

traffic courts, we would come up the year following the war with fifty thousand traffic fatalities. Well, we didn't have fifty thousand, and I think that that saving of over ten thousand lives in that first year was a result of improvement not only in enforcement and engineering, but in the traffic courts.

#### THURSDAY MORNING SESSION October 9, 1947

##### Group Session for Traffic Engineers

Presiding: MATTHEW J. SIELSKI, Director, Safety and Traffic Engineering Dept., Chicago Motor Club.

##### Street Lighting and Safety

By T. J. SEBURN

City Traffic Engineer, Kansas City, Missouri

Early in 1939 Kansas City took steps to meet the night accident problem. At that time we were in the midst of a tremendous campaign to reduce traffic injuries and fatalities and our accident records indicated we were doing a good job with the exception of the periods of darkness. This was especially true on the major arteries of travel on which speeds of 35 miles per hour were permitted; the balance of the city being under a blanket 25 miles per hour speed limit.

Consequently, after considerable study we adopted a reduced speed limit for nighttime on major streets, allowing a maximum of 25 miles per hour on these streets during the hours of darkness. I believe Kansas City was the first city to adopt a speed differential to meet the nighttime accident problem. At that time we recognized that this did not have the inherent permanency of improved lighting, the regulations depending entirely upon the ability of the Police Department to maintain necessary manpower and carry on a continuous and effective enforcement program. Other cities had taken steps toward meeting the high nighttime accident experience by improved street lighting, and although we recognized that reduced speed was not a complete substitute for improved visibility, we were gratified with the results obtained at the time. Kansas City went on to be named Grand Award winner in 1939 in the National Traffic Safe-

ty Contest, much of which we believe was due to the reduced nighttime speed limit.

However, during the war our Police Department as well as all others over the country, was drastically depleted with men in service and the consistency of our enforcement program suffered. As a result, our accidents and injuries increased steadily for several years. We still recognized the need of improved street lighting and in January, 1943, by executive order of the director of public works, the Traffic Engineering Division assumed the responsibility for the street lighting program. This action was taken as one of the steps in the postwar planning work of the city and was later confirmed by action of the City Council in which street lighting was officially added to the duties of the traffic engineer.

Our city, with a population of 450,000 persons, is the principal one in a metropolitan area of almost three-fourths of a million. The street lighting system is owned and operated by the Kansas City Power and Light Company on a contract basis which provides for the city to designate style of luminaire, lamp size, location, mounting height and similar specifications, the rates being established for each size light under each of the above installation conditions. The city has a street system of approximately 750 miles, including all residential streets and boulevards, and all the lighting in the city with

the exception of one section of almost a mile is composed of old style equipment using many radial wave lights and almost 100 miles of so-called "bright way" lighting that was installed 25 years ago. Obviously the city presented a fertile field for a street lighting modernization program.

It was the feeling of the city authorities that some adjustment should be made in the lighting rates and consequently the task of planning a modernization program consisted of two major phases. One of these was the actual planning of a system of lighting which would meet modern standards and which we anticipated would help reduce night traffic accidents without speed reduction and at the same time provide greater protection and convenience for pedestrians, stimulate retail trade, aid the police in combating various forms of crime, and generally add to our civic pride and municipal advertising.

At the same time it was necessary to renegotiate the lighting contract in order to make it economically possible to adopt a modern lighting system after it was planned. This phase of our work will not be discussed in detail but I believe it is only fair to point out that we found the public utility quite willing to cooperate with us in the project.

The lighting program was developed in two general phases, one dealing with the lighting of primary arteries of travel for night traffic safety, and the other dealing with the balance of the streets which we classify as non-traffic or residential streets.

For several years the Traffic Engineering Division had been maintaining accident records in a form that they were readily usable in a study of the lighting program. Also, the Division has constantly kept up to date on traffic volumes and other information necessary to develop the lighting plan. With this information as a basis, a system of arteries was set up upon which it was proposed to install traffic safety lighting. This system comprised 169.8 miles.

The balance of the 750 miles of the street system is scheduled to be relighted as non-traffic or residential streets. The lighting of all of these streets is of importance, but accident studies show that they are of secondary importance insofar as traffic safety is concerned.

On the arteries to be relighted the next step was the classification of the streets

by type of district, whether residential, retail business, or wholesale. From the traffic volume information, the heaviest night hour traffic movement was established for each section of the system and the streets were classified as to light, medium, heavy, etc., according to the criteria of the Joint Committee of the Institute of Traffic Engineers and the Illuminating Engineering Society. Illumination values were established for each section in accordance with recommendations of the illuminating engineers.

The number, size and style of light was then established for each of the major arteries in order to provide most economically the degree of illumination desired in preparing this schedule, factors such as roadway width, pavement surface and texture, foliage conditions, etc., were considered in the preliminary layout. Light patterns of the various luminaires were applied to these conditions and in this manner the proposed mounting height, spacing, and lamp size were determined. This work was done in preliminary form with the entire system of arteries to be relighted and the modernization program was set up for anticipated completion in five years.

Selection of priority of installation for the traffic safety lighting was based upon further analysis of night traffic fatalities. The location of all nighttime fatalities over the five year period from 1940 to 1944 inclusive was carefully mapped. Careful examination of this map compared with the proposed system of arteries indicates that of 106 night fatal accidents, all but five occurred on the arteries scheduled for relighting. Those streets having two or more fatal accidents in the five year period accounted for 89 of the total fatalities on approximately 40 miles of the street system. Obviously the biggest saving of life and consequently the most urgent sections to be relighted, were included in this system of 40 miles.

In order to provide a more complete system of arteries a few gaps were filled in which increased the total to 44.1 miles. In addition, there are approximately 5.6 miles of streets where the accident situation was good, probably due to the fact that these streets were fairly well lighted with old style fixtures. It was found that equivalent or better lighting could be provided on these streets with modern equipment at less cost than to continue the use of the old style

equipment. These were also added to the first phase of the traffic safety lighting part of the program, making a total of 49.7 miles which was recommended to be installed as soon as new equipment could be obtained.

Some sections having a high night accident experience were omitted from the first phase due to the fact that these streets were of a character which we felt justified the use of ornamental standards and underground wiring. The reason for separating these two groups was that during the period of our planning program it was indicated there would be greater delay in receiving the ornamental standards than would be the case with the mounting equipment for use on trolley poles and wood poles. The entire program was submitted to the Finance and Public Utilities Committees of our City Council and approved by those committees for installation as rapidly as possible.

The balance of the work carried on by the city in this program was the preparation of detailed strip maps for each street, showing the exact location, mounting height, bracket length, luminaire style, lamp size, and all required features to provide the desired lighting. These strip maps serve as a basis upon which formal orders are submitted to the Company for making the installation. The actual work of installing the improved lighting was started in May, 1946 and to date a little over 35 miles have been completed. The work is being carried on by two crews, one making the overhead installations while the second is engaged in installing ornamental standards with underground wiring.

A few officials were rather hesitant to accept the new style lighting because of the necessity of tree trimming in order to make the lights properly effective. Consequently some tests were made of increasing the lamp size on old style equipment and using refractors in the post top type of unit. A slight improvement in lighting was obtained by increasing the lamp size from 400 candle power to 1,000 candle power in this test section. However, the undesirable light on porches and in windows was an important factor and the decision not to follow this practice over the city. Costs were also important in that it was estimated that an equivalent distance on one boulevard would cost approximately \$370.00 per year for lighting, and the cost on another road, which is

very inferior, would be approximately \$580.00 per year.

Since the actual work of installation was only started in May, 1946, there is not sufficient time to make conclusive statements with regard to the effects of this lighting program on traffic accidents. However, the indications from preliminary investigation show an improvement in traffic safety is beginning to be made manifest as a result of the relighting. The following table shows a comparison on two of the relighted streets, giving results for the same six month periods before and after relighting:

| 15TH STREET<br>(BALTIMORE TO OAKLEY) |                             |              |                                              |              |        |
|--------------------------------------|-----------------------------|--------------|----------------------------------------------|--------------|--------|
|                                      | Motor Vehicle<br>Collisions |              | Motor Vehicle<br>and Pedestrian<br>Accidents |              | Totals |
|                                      | Fatal Injury                | Fatal Injury | Fatal Injury                                 | Fatal Injury |        |
| DAY                                  |                             |              |                                              |              |        |
| 1946                                 | 0                           | 4            | 0                                            | 5            | 0 9    |
| 1947                                 | 0                           | 5            | 1                                            | 3            | 1 8    |
| NIGHT                                |                             |              |                                              |              |        |
| 1946                                 | 1                           | 12           | 1                                            | 11           | 2 23   |
| 1947                                 | 0                           | 6            | 0                                            | 2            | 0 8    |

| MAIN STREET (15TH TO 43RD) |                             |              |                                              |              |        |
|----------------------------|-----------------------------|--------------|----------------------------------------------|--------------|--------|
|                            | Motor Vehicle<br>Collisions |              | Motor Vehicle<br>and Pedestrian<br>Accidents |              | Totals |
|                            | Fatal Injury                | Fatal Injury | Fatal Injury                                 | Fatal Injury |        |
| DAY                        |                             |              |                                              |              |        |
| 1946                       | 0                           | 5            | 0                                            | 7            | 0 12   |
| 1947                       | 0                           | 1            | 1                                            | 6            | 1 7    |
| NIGHT                      |                             |              |                                              |              |        |
| 1946                       | 1                           | 12           | 1                                            | 13           | 2 25   |
| 1947                       | 0                           | 5            | 1                                            | 1            | 1 6    |

Briefly, the table shows that 15th Street night injury and fatal accidents were reduced from 23 to 8 during the first six months period of the year and shows that daytime fatal and injury accidents held even at 9 in both years. On Main Street we find that there was a reduction in 1947 under 1946 in both day and nighttime accidents. However, the reduction in daytime accidents was 53 per cent while the reduction in nighttime accidents amounted to approximately 69 per cent.

In improving and modernizing lighting in residential areas, the program consists of

three principal parts. First, our studies have indicated there are approximately 250 residential intersections having no light whatever at present. Second, we have 1,700 gas lights that we feel should be replaced with electric lights. Third, we intend to replace all existing lights with modern equipment using no less than 400 candle power lamps where practically all of the residential lights are now of 250 candle power capacity.

In general, the residential and light traffic street system in Kansas City is composed of triangular blocks 330 feet by 660 and our proposals will provide new equipment with larger lamps at each residential intersection with an additional luminaire at mid-block points on the longer blocks. This will result in a spacing at these areas varying from 300 to 350 feet. By using the refractor type luminaire with equilateral distribution of light mounted on long brackets which will place them more nearly over the middle of the roadway, we shall obtain the required illumination for the residential areas.

The net result of our lighting program will be as follows: We will replace a total of slightly over 15,000 electric and gas lights with approximately 13,500 electric lights. As indicated before, where we now have several thousand 250 candle power lights we will use nothing less than 400 candle power with many 1,000 and 1,500 candle power sizes. We are now delivering approximately 11 1/4 million effective lumens of light to the streets of Kansas City at a total cost of \$554,000 per year or \$47.53 per thousand effective lumens. Our proposed system will deliver 49 million effective lumens of light to the streets at a total cost of approximately \$665,000 per year or slightly over \$13.50 per thousand effective lumens. The total increase in cost of the new lighting is \$74,000 per year and according to estimates of the National Safety Council this will be more than paid if we eliminate two fatal accidents a year. Therefore, Kansas City can well afford the improvement and it is our plan to be the best lighted city in the world.

### Control of Marginal Land Use

By DAVID R. LEVIN

Head, Special Administrative Studies Unit, Division of Financial and Administrative Research, Public Roads Administration

Aladdin, you will remember, was the lucky fellow who found a magic lamp. It gave him everything he wished for, from diamond-encrusted palaces to a sultan's daughter for his bride. Perhaps highway administrators need as Aladdin's lamp, when it comes to dealing with the problem of the roadides. But next to a magic lamp, no single device utilized today can be more effective in promoting the safety and efficiency of travel by highway than the public control of highway access and of marginal land use.

The lack of such effective controls has resulted in roadside exploitation and highway ribbon development. The Washington-Baltimore Boulevard is a notorious example. In 1943, between Baltimore and Washington for a distance of 30.5 miles, there were 618 commercial establishments and 863 residences, or one every 125 feet on the average, each with its own entrances and exits multiplying the traffic hazards, reducing highway capacity,

and precipitating congestion. To make conditions worse, 2,460 commercial signs and billboards were peppered along this road. This section of U. S. 1 is one of the most dangerous and congested roads in the country.

Another striking illustration is California State Route 26, so-called Ramona-Garvey Avenue. Within about four years after the establishment of this fine four-lane "super-highway" between Los Angeles and Pomona, a distance of approximately 30 miles, practically a continuous ribbon had developed so that a 25-mile speed limit had to be imposed for the greater portion of the route.

Six major highways in New Jersey were studied and a few startling facts uncovered. Along the 47 miles on State Routes 25 and 26, in addition to 478 billboards, a commercial enterprise or intersecting road, street, or railroad at grade occurred every 273 feet on the average. Along the 36 miles of State Routes 418 and 45, a traffic hindrance ap-

peared every 300 feet on the average, plus 538 signs and billboards peppered along these routes. On the 22 miles of State Route 6 an obstacle appeared every 356 feet, together with 243 roadside posters strung along the roadsides. Residential development along the routes is not accounted for in these figures. While this study was made in 1937, New Jersey highway authorities have indicated that conditions are probably even worse today.

As you know, the controlled-access highway seeks to minimize obstacles to the free flow of through traffic safely by the elimination, or restriction, of all rights of egress from and ingress to adjacent property, and by limiting points of entry to and exit from the general pattern of highways and streets in the vicinity to designated locations. As a controlled-access facility, the freeway serves all customary forms of street and highway motor traffic, while the parkway is restricted to passenger vehicles only.

Express highways of this character are now sanctioned by legislative act in 26 States,<sup>1</sup> by constitutional provision in one State,<sup>2</sup> and by judicial decision in an additional State.<sup>3</sup> Public Roads Administration studies reveal that there are now a minimum of 1,244 miles of controlled-access highways in the United States. Approximately 2,182 miles in 27 States and the District of Columbia of such expressways are being planned with Federal funds for early construction. Additionally, a considerable mileage of controlled-access highways is contemplated by State and local authorities in the various States. This extensive application of modern highway design is indeed salutary.

Pursuant to the Federal-aid Highway Act of 1944, the new 37,681-mile national system of interstate highways was finally designated and approved by the respective State highway departments in cooperation with the Public Roads Administration on August 2, 1947. This system of expressways comprises the most heavily traveled highways in the present Federal-aid system, and includes extensions of the system through urban areas. Perhaps the most important single characteristic of these roads will be the control of the

manner of ingress and egress, and through that means, of marginal land uses.

Comparisons of existing controlled-access routes with roads of ordinary design reveal conclusively that, in terms of safety and efficiency of travel, the expressway is by far the superior. Because controlled-access facilities are functionally designed to eliminate road conditions which generate motor-vehicle accidents, it is said that less than 15 per cent of the mishaps which take place on ordinary roads will occur on a comparable mileage of controlled-access highways. The accident records of some existing express highways are proud testimonials of this fact.

During the first 13 months of operation of the Merritt Parkway in Connecticut, a billion vehicle-miles were traveled without a single fatality. Accidents on Lake Shore (Outer) Drive in this very city totaled only 8 per 10,000,000 vehicle-miles of travel compared with 189 on ordinary roads in the area.

The safety value of modern highway design is again forcefully demonstrated in a comparison of the accident records of the Arroyo Seco Parkway, an express highway between Los Angeles and Pasadena, and Figueroa Street and Wilshire Boulevard, both heavily-traveled conventional city streets in the region. Casualties per million vehicle-miles of travel were almost 10 times as large on Figueroa Street and more than five times as great on Wilshire Boulevard as they were on the Arroyo Seco Parkway.

By the prudent exercise of the control of access now sanctioned in over half the States, prospective roadside establishments such as gasoline service stations, restaurants, taverns, and similar enterprises may be controlled as to location or design, or both, or they may be excluded entirely on express highways. However, an important aspect of roadside control that is not necessarily achieved, automatically with the regulation of access, is the public control of the right of view which involves, largely, the billboard problem.

With respect to express highways, perhaps the simplest method of obtaining statutory sanction for the public control of view would be to appropriately define the controlled-access highway, as follows:

"A controlled-access facility is defined as a highway or street especially designed for through traffic, and over, from or to which, owners or occupants of abutting land or other persons have no right or easement or

only a limited right or easement of access, light, air, or view by reason of the fact that their property abuts upon such controlled-access facility or for any other reason."

The phrase "or for any other reason" may be important as it would extend the control of view to business licensees, such as the billboard interests on an abutter's property.<sup>4</sup>

It may be of interest to note that, of the 26 State statutes that sanction the comprehensive control of highway access, 13 laws specifically include control of view, in addition to air, light and access. These statutes may be found in Florida, Illinois, Indiana, Kentucky, Louisiana, Michigan, New Hampshire, New Mexico, Oklahoma, Oregon, Utah, and Washington. In addition, Maryland enacted a separate law that achieves the same result.

Granting then, that adequate public control of access will effectively regulate marginal land uses detrimental to safe and efficient highway travel, it may be observed that only a relatively small segment of our vast highway system will be protected in this fashion, because of the limitation of highway funds, and the lack of legal authority. Yet the need to improve the transportation service rendered by the many miles of main highways is urgent today.

What, then, are the alternate means for the control of marginal land use that will tend to improve transport by highway? Techniques that have been used with varying measures of success include marginal land acquisition; zoning, platting, and subdivision control; billboard and set-back regulation; and the acquisition of so-called highway development rights or their equivalent.

A few states and some cities have attempted to regulate the highway roadside by the outright acquisition by public authority of lands marginal to the highway. By purchasing the areas adjacent to selected main highway routes at the time such improvements are first established, roadside development and access may be controlled in the public interest, and highway facilities effectively insulated from detrimental adjacent growth. Through such a far-sighted right-of-way

policy, adequate provision can also be made at moderate cost for future highway development, thus forestalling prohibitive costs later.

Marginal land acquisition as an instrument of public control of the roadside is sanctioned by constitutional amendment in only 10 States,<sup>5</sup> though a number of other jurisdictions have enacted statutes authorizing the device with varying restrictions.<sup>6</sup> The judiciary has yet to give it unqualified endorsement. To date, the practice has had only limited application. Where applicable, marginal land acquisition can prove to be highly advantageous.

Both highway access control and marginal land acquisition, as I have indicated, presume the purchase or condemnation, for a just compensation, of designated property rights. There is, however, a species of regulation of private property that involves neither the acquisition of rights or compensation, namely, land-use control. It may consist of zoning, platting and subdivision control, and billboard and set-back regulation.

Today, over three-quarters of the urban population of the United States live in zoned communities in approximately 1,500 municipalities in every State of the Union. Land-use controls are now customary and the accepted means for protecting property values and neighborhood surroundings and for contributing generally to orderly development of urban communities. Some municipal zoning ordinances have made provision for roadside regulations distinct from the customary urban zoning classifications, but the activity along these lines is far from impressive.

Twenty-three states permit county or so-called rural zoning, but rather limited use has been made of the authority, particularly in the protection of highway margins. California and Wisconsin are perhaps the two outstanding examples of widespread and effective utilization of county land-use controls. Approximately a quarter of the 58 California counties use these controls. In the important county of San Mateo, over 1,000 miles of highway have been zoned. Business and billboard advertising is confined to designated areas and the remaining roadside is left unencumbered.

<sup>1</sup>California, Colorado, Connecticut, Florida, Illinois, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Utah, Virginia, Washington, and West Virginia.  
<sup>2</sup>Minnesota.  
<sup>3</sup>Mississippi.

<sup>4</sup>See the model controlled-access highway law recommended by the Public Roads Administration. Copies may be found in Appendix A of PUBLIC CONTROL OF HIGHWAY ACCESS AND ROADSIDE DEVELOPMENT, Revised Edition, 1947, Public Roads Administration, or in Appendix III of INTERREGIONAL HIGHWAYS, 78th Congress, 2nd Session, H. D. No. 379.

<sup>5</sup>California, Massachusetts, Michigan, Missouri, New York, Ohio, Pennsylvania, Rhode Island, Virginia, and Wisconsin.  
<sup>6</sup>PUBLIC CONTROL OF HIGHWAY ACCESS AND ROADSIDE DEVELOPMENT, op. cit.



State agencies have not yet undertaken roadside zoning and control. Several states have applied regulations to specific types of roadside uses, such as billboard advertising, automobile wrecking yards and trailer camps. But bold and comprehensive land-use controls need yet to be applied. On the whole, the application of such regulations to public roads has been exceedingly slow and only a negligible fraction of one per cent of the total highway mileage in the United States has shared in the benefits of roadside zoning.

There are many who believe, therefore, that a more satisfactory alternative to land-use controls is the public appropriation of what may be termed "highway development rights," that is, the rights of owners of private property abutting on highways to improve road-marginal strips of their property in any manner inconsistent with present or future traffic requirements. Because of the legal limitations of the police power, establishment of the right to acquire such control should be conceived rather as an exercise of the power of eminent domain, for which compensation would be forthcoming.

Compensation for such rights would be nominal in most instances because the payment would be made only for actual demonstrable injury, and because the right would be acquired usually at the time when land is being taken for immediate highway improvement, often on new location in undeveloped areas. If the margins thus taken under control are later required for expansion of the road facility, as must inevitably be the case in many instances, the acquisition costs will be at a minimum because of the arrested development of the lands affected.

The Ohio Department of Highways with the assistance of the office of the attorney general of Ohio is perfecting the practical application of a new instrument substantially identical with the concept of highway development rights which I have described. By means of highway reservation agreements, the State presently acquires specified "rights" in designated "reserved" areas for a nominal consideration. At some future time, perhaps in five or ten years, the customary easement for highway purposes will be acquired. The owner is permitted to use the reserved areas for all normal purposes not inconsistent with the future use of the marginal strips as highway rights-of-way. The state expects to prevent the erection of buildings and public

utility facilities that would increase the cost of acquisition of easements in the future.

Under a highway reservation agreement, the owner of lands agrees not to construct within the reserved areas any building or structure that cannot be removed within to days without cost to the state, and not to make plantings of a permanent nature, such as orchards, that will interfere with the ultimate use of the parcel for highway purposes. The State director of highways has the right to cancel any highway reservation agreement in the event that the project contemplated is removed from the highway program or subsequent changes in alignment or grade line eliminate the need for the protection acquired.

The pilot application of this new idea was made last year on a four-mile section of the Columbia-Wooster Road in Delaware County, on new location. This section of road is part of a planned Cincinnati-Cleveland express highway, a portion of which at least will be designed for controlled access.

Twenty-two parcels of land are involved in this section of road and in May 1946 reservation agreements had been executed by owners of 21 parcels. The single recalcitrant owner apparently had no objection to the reservation of a portion of his land for future highway use or to the compensation offered, but desired access to the highway where it could not be permitted without violating principles of expressway design.

Payment for the reservation of these areas was at a uniform rate of \$5 per acre or portion thereof. Thus far \$421 has been paid for 21 reservation agreements covering 3.85 miles of road. This is at a rate of \$109 per mile—an amazingly low price for the protection secured. State highway authorities estimate that the average State investment will range from \$50 to \$150 per mile, depending upon the width of right-of-way and the area protected.

Ohio is well pleased with the results of this exploratory procedure and intends to utilize the technique on other sections of highway in the state. I might mention, too, that Texas, and several other states, have become very much interested in this means of controlling the roadides and are planning to utilize the device in the near future.

While the results of these techniques in the aggregate have been worthwhile, progress has been slow and difficult. Perhaps one of

the underlying reasons for the lack of ready acceptance of proposals to better the highway corridors has been the absence of scientifically-derived data. Comprehensive surveys of roadside conditions, at least with respect to the more important routes of travel, are needed today in order to provide the factual basis for desirable reform. Such surveys should include an inventory and logical classification of all roadside uses and structures, within a ribbon perhaps 500 to 1,000 feet wide on each side of the right-of-way outer boundaries, or such other distance as seems desirable. The type, location, size and nature of structures would be included. The location and design of all entrances and exits would be noted. The size, location and nature of advertising structures and the relationship of such advertising matter to the uses of the land wherewith it exists, should be ascertained. Other facts pertinent to the roadside in its relation to the road and transportation service might be investigated.

The wealth of information obtained from such surveys could be put to many productive uses. The facts, once assembled and analyzed, could provide a sound basis for the formulation of administrative policy by the State highway department and local road organizations as well. Efforts to obtain public sanction for desirable public controls would be bolstered immeasurably by the indisputable facts. Billboard enterprises would be constrained to alter or remove advertising structures found to be hazardous, or failing in will, this would jeopardize their public good will. At the same time rural scenery would be preserved for millions of motorists and others.

Confronted with specific data, adjacent property owners and entrepreneurs would be sympathetic to the improvement of the location and design of driveways and structures, if travel would be made safer and more efficient thereby. Finally, the press and the radio could be used to disseminate information so obtained, and garden societies and women's clubs could enlist their efforts, all to a common end.

Roadside surveys, embodying all or a number of the elements I have suggested, are not without precedent in the United States. The New York State Department of Public Works conducted a survey in 1946 of all billboards along State highways as preliminary to corrective measures designed to improve highway travel. About 14,000 roadside signs were recorded, some illegally placed within the

highway right-of-way boundaries. Of this number, over 800 billboards outside the right-of-way limits were classed as hazardous. These included 270 with objectionable illumination, 70 of which had red or green lights near traffic intersections. Two hundred others obscured safe vision. The remainder were considered objectionable because they created other hazardous conditions.

On the basis of these facts, state and local outdoor advertising associations have agreed to remove, or built or modify objectionable advertising matter. Over 1,000 signs, illegally placed within right-of-way limits, have already been removed without resort to any coercive measures. I might mention, too, that the Outdoor Advertising Association of New York has agreed not to erect any advertising matter which could be seen from the 46-mile New York thruway, except in commercial areas, if there be such. The campaign to improve the roadside on New York State highways continues and the State Department of Public Works is hopeful of ultimate success.

Another important contribution in the field of roadside surveys is being made by the State of Michigan. The Michigan roadside control study was initiated in 1946 to establish the basis for formulating a department policy to minimize the hazards of roadside enterprise to highway traffic along the principal state trunk lines. It was thought that the results of the study would produce evidence of the extent to which roadside establishments contribute to motor vehicle accidents on the highways, among other things.

The Michigan State highway department recognized the need for confining entrances and exits to roadside establishments to one or two driveways and for the separation of the traveled highway and shoulders from the standing and parking areas serving the enterprise. The owners of roadside establishments were to be encouraged to improve the safety of their parking service to customers. A campaign of public information was planned in the belief that the success of the project would depend on how well the objectives were understood by the local citizenry.

During 1946, Michigan reports that some improvement of roadside conditions has been obtained. A program similar to the 1946 endeavor has been formulated for 1947.

Inquiry may be made as to how comprehensive surveys of the areas adjacent to public

roads may be carried on and how they may be financed. It is fortunate that in the road-inventory work of the planning surveys undertaken by the respective State highway departments in cooperation with the Public Roads Administration during the past 10 years, techniques have been developed for observing and recording, not only the characteristics and condition of the road, but also the nature of the abutting culture and marginal land uses. More intensive surveys of the area immediately adjacent to the roadway would be a natural extension of the inventory technique, and could be undertaken by the regular inventory crews. Such projects, if so designed as to yield valuable information at reasonable cost, and if properly in-

tegrated with the entire program of planning survey studies, are eligible for participation in the so-called one-and-a-half per cent fund authorized under Section 8 of the Federal-aid Highway Act of 1944 for use in highway planning activities.

Highway management cannot ignore much longer the important influence of insidious ribbon development upon the safety and efficiency of road travel in general. After the appropriate factual data have been developed with respect to existing roadside conditions, simple and effective techniques, some of them already developed, need to be boldly yet realistically sanctioned and applied. In that manner, a good highway system can be improved to become a much better and safer one.

#### THURSDAY MORNING, SESSION

October 9, 1947

#### Group Session on Traffic Safety Education

Presiding: DOROTHY E. WILLS, Safety Education Supervisor, Better Traffic Committee, Pittsburgh, Pa.

#### "Operation Safety" (Digest of a Talk)

By COL. F. C. LYNCH

Secretary-Manager, Greater Los Angeles Chapter,  
National Safety Council

"Operation Safety" is the title given the monthly theme program of the Greater Los Angeles Chapter, National Safety Council. A similar schedule of themes is contained in the National Safety Council-Advertising Council handbook, "Promoting Traffic Safety."

Col. Lynch described how a safety organization can get cooperation from service clubs and other groups in carrying on a traffic safety educational program for one month, stressing some important phase of accident prevention.

He also told about the "Droopert" program in Los Angeles. This was a campaign

sponsored during August, 1947, by the local Junior Chamber of Commerce. Dick Shaw, a cartoonist, prepared a series of illustrations showing "Droopert" committing several unsafe driving acts. "Droopert" was depicted as a sort of moronic character.

To climax the campaign, Red Skelton, impersonated "Droopert," driving around the city in an ancient automobile. Police pretended to be hunting him, as they would a Public Enemy.

Finally, Skelton wrote a note to the police offering to give himself up. He was arrested ceremoniously on the street.

#### "SWAP SESSION"

Discussion Leader: DOROTHY E. WILLS,  
Better Traffic Committee, Public Education  
Supvr., Pittsburgh, Pa.

Participants:  
GARY M. GRIFFIN, Traffic Safety Assn. of  
Detroit.

BARNETT O'DONNELL, Dir. of Safety, Div. of Traffic & Safety, Ohio State Highway Dept.

COL. F. C. LYNCH, Secy-Mgr., Greater Los Angeles Chapter, N.S.C.

EDWIN F. WHITESIDE, Chief of Police, Wilmette, Illinois.

CHAIRMAN WILLS: Many cities are faced with the problem of eliminating ticket fixing. In the minds of many people fixing and lack of strict enforcement are accepted as necessary evils.

A policeman will ask, "Why should I tag violators? Before the case gets into the court, the tag has been fixed." And, frequently he is called on the carpet, simply because he has tagged a car owned and operated by someone who knew someone who knew someone. We have had a problem of this nature in Pittsburgh and in the last year or so, we have tried to do something about it.

Our problem today is to develop a program to eliminate ticket fixing by building public support for strict enforcement. It must be remembered that any methods of approach mentioned here today in connection with enforcement, are also applicable to any other phase of public education.

We are going to treat this problem both from the small community and the large community standpoints.

Chief Edwin F. Whiteside of Wilmette, Illinois, will discuss briefly, "How a Small Community can Inform its People Concerning a Traffic Enforcement Program."

CHIEF WHITESIDE: The first thing on a sound traffic enforcement program, I think we will all agree, is to have a sound traffic program; a general program. That is, good engineering, good public information or education and good record systems in the police department, and above all, well-informed, well-trained people in the police department.

Let's assume that we have that and go into how we can get that information about an enforcement program to our people. Naturally, we must use all the various means such as newspapers, radio, if it is available, posters, speeches to public gatherings, civic organizations and so on, and I believe the most important thing in this small community is our opportunity to make personal contacts and get to the people themselves. I think that is an advantage we have over the large cities, that too often we neglect.

We have found in my own town that in a month's time, a police officer who is trained

in helping the public and who knows something about his subject, did cover almost all the civic organizations. We have utilized our traffic records, our spot map, special features of traffic enforcement to put on demonstrations of these various organizations. I have worked with school boy patrols a lot and I know what they can do. We have used the schools a great deal and we have found when a schoolboy or girl takes these things home after they have been given some information on it in the schools, they invariably talk it over with mother and dad. Even our Illinois State Department Bulletins are distributed through the schools and hardly a week goes by that we don't get some question or some information from the parents. This indicates that they have read the Bulletin over and know something about it.

We are using personalized information regarding accident statistics. These are summaries of accidents that occur in our town, naming the worst locations and giving some information about our enforcement. If you have a traffic violator's school, you can use it to hand out information on your enforcement.

CHAIRMAN WILLS: Our next speaker will discuss our problem from the state angle.

MR. O'DONNELL: The job of the state in helping to gain public support for the enforcement program is as broad and must be made as continuous as the highway safety program itself.

Enforcement, as one of the official safety activities, needs public understanding and support. Without the promotion of a wider understanding of the necessary enforcement activities, the active public support essential to their effectiveness will in many instances be lacking.

Above all, the basic aim of enforcement is EDUCATIONAL: — to bring about better driving.

The law enforcement program, however, must be firm and impartial. Otherwise it is futile to try to build up through education habits of safe conduct in the general public.

The essentials of adequate traffic law enforcement are an enforceable ordinance and enforceable regulations. These form the legal basis for all the traffic work of the police.

There also must be uniformity. The ordinance of one city should conform with the ordinances of other cities. Where cities within a few miles of each other have conflicting

traffic laws, a citizen from one jurisdiction driving into another may violate any number of laws, even though his every move is strictly in accord with the laws of his own municipality.

In Ohio we have published a booklet *Model Traffic Ordinances for Ohio Municipalities* for distribution among the proper local authorities to give them a guide in bringing their local ordinances up to date and in conformity with other local communities throughout the state. This guide is patterned after the *Model Traffic Ordinances* prepared by the National Conference on Street and Highway Safety and correlated with the Uniform Traffic Act of the State of Ohio.

Moreover, in conformance with the national effort to obtain greater uniformity in traffic signs, signals and markings throughout the country, a part of the overall Ohio traffic safety program has been directed at obtaining, through education of public officials as well as the public, full compliance of all local authorities in the uniform use and application of traffic control devices.

The Ohio Uniform Traffic Act provides that all traffic control devices shall conform to the *Ohio Manual of Traffic Control Devices*, which has been prepared by the State Highway Department's Division of Traffic and Safety. A letter calling attention to this fact was sent under the signature of Director Murray D. Shaffer of the Ohio Highway Department to the officials of all incorporated communities in the state as well as to the sheriffs and county commissioners.

As a follow-up to this letter, stories on the uniform use and application of traffic control devices are being released to the newspapers. These releases are illustrated by cuts showing the proper use of the different traffic control devices.

Another activity carried on that benefits enforcement, as well as other phases of traffic safety, is the *Ohio Traffic Safety Course*, which is open to all cities in the State with populations of 4,000 and over. Each community submitting a report in the contest is sent a "rating" chart showing how that community compared with other communities reporting in the contest. The chart is prepared to serve a constructive purpose as a guide for the community in planning future enforcement and other traffic safety activities.

Enforcement was also given a prominent place on the program of the Third Ohio

Traffic Safety Conference held in Columbus on June 27, 1947. More than 300 local officials and citizens attended.

There still remains the question: how the state can aid in an even more direct way in getting public support for the enforcement officer on the local level?

The state naturally cannot do the job locally, but it can give assistance. A variety of safety literature is published by the Division of Traffic and Safety of the Ohio Highway Department and is made available to local enforcement officials to educate the public in supporting their efforts of traffic accident prevention.

Safety Slogan Signs, in series of two, are being erected every 10 miles on principal state highways outside municipalities to bring home to the motoring public the lessons of safe driving. Spaced about 150 feet apart, the two signs are read by motorists in the following sequence: WHY TAKE A CHANCE—PLAY IT SAFE. In this way the safety messages are brought to the attention of the motorists at the most propitious time—while they are actually driving on the highway.

Above all, the State can help in building public support for the enforcement officer by doing everything possible to keep the people from becoming discouraged with public officials who are doing the things that are needed; to keep the people from becoming discouraged if the results do not seem all that they should be.

Because the results of a community's safety efforts are, in many instances, intangible, it is not possible to say that this certain person or that certain person has been saved from death or injury in a traffic accident. Nevertheless, keep hammering away that safety efforts are not futile. They do a great deal of good in more ways than are visible. And help the enforcement officer to get across this idea to the public—traffic safety efforts, make no mistake about it, are responsible for many accidents that might have happened—but did not!

**CHAIRMAN WILLS:** It is apparent from the comments of our previous speakers that there is a definite need to develop public support before any enforcement body can do a good job.

May I interrupt to tell you the approach Pittsburgh has used to obtain this support, through a mechanism of a citizens' committee known as the Better Traffic Committee. This

group is divided into three subcommittees: enforcement, engineering and education.

The Enforcement Committee has had studies made on facts and figures of Pittsburgh enforcement. These were published in the newspapers and through various other media so that the lack of strict unbiased enforcement was apparent to the public. Along with these studies, the Engineering Subcommittee made a survey of traffic accident situations, pointing out how large numbers of accidents were brought about by user disregard of the law.

Having this factual information, the Education Subcommittee went to work. Persons were designed, calling attention to the enforcement problem.

Editorial copy along these lines was supplied local daily and weekly newspapers. Accident summaries were prepared to give vital statistics to the public.

Radio was used. "In This We Share" was a 15-minute narration expertly produced, using actual accident cases to show that enforcement was a problem in which we all shared.

We found all this was having some small effect on the public's thinking. In the case of accident summaries, we originally ordered 500. Now, the list has increased to 900. We print them every three months. They go to business firms, organizations, schools and many companies operating fleets.

With this small start, the Committee approached the Police Department, asking that specially chosen personnel be permitted to try out for the Northwestern University Traffic Course. Within the past year, two men have received fellowships. One is now conducting the violators' school. This has done much to promote traffic safety and to promote the respect of the entire Department. The other police officer is working with the school patrol.

Somewhere about this time, sufficient stimulation had occurred that it was possible to prove to the administration that a platform pledging a no-ticker-fixing plank was in order. This was made a part of the Mayor's Highway Safety Conference last year. This was held under the sponsorship of the Better Traffic Committee, and approximately 1500 citizens attended. The platform, of course, included other things not related to the enforcement issue, but they were all on traffic safety.

Still, the countless barrage of literature, radio broadcasts, and so forth, went on, and

in each one of these things, we included the enforcement issue. But, up until now, we had been doing two things: telling the public on the danger for enforcement and using that public desire to promote a good relationship with the administration which would permit them to pass the strict enforcement policy.

Following the conference, the Mayor's Conference last year, business firms fairly clamored to help. They offered space on billboards and milk bottle covers, radio time and so forth.

The administration then began to realize two things:

1. That traffic was an important part of civic government.

2. The public was definitely in favor of good, strict, unbiased enforcement.

A movie was then made, which ran about six minutes, and the principal part was taken by the Mayor. In this movie, he made it clear he was backing the strict enforcement policy. It was shown to approximately 800,000 people in all the movie houses in Pittsburgh.

The next move from the Committee was in the direction of the Traffic Court. Studies were made to determine some fool-proof method of processing tickets. New business machines are to be a part of the program now in progress and personnel changes were made where necessary. Publicity was released on the number of old tickets never answered, and warrants issued to bring in the offenders. Help was asked of the state to procure this backlog in outlying areas. Money long due to the City of Pittsburgh is now being paid on violations which date back several years.

In the past two months, the Better Traffic Committee appointed a subcommittee of five men to act as an advisory group. This was known as the Traffic Review Committee. A program was planned to apply a strict enforcement policy to the past periods. In many cases, businesses felt they would be seriously affected by having no parking restrictions placed in front of their places during those hours. The Committee set up a Subcommittee to talk to these people. These merchants who were fearful it would hurt their business, were provided with the opportunity to meet with the Traffic Review Committee.

This program began on the end of September and at the end of the thirty-day trial period, the Traffic Review Committee has recommended this setup be made permanent.

and the area which is to be covered, be extended.

Garnet Griffin of the Traffic Safety Association of Detroit will discuss briefly, "How Various Media can be Used to Gain Public Support for Traffic Enforcement."

MR. GRIFFIN: Ten years ago, in Detroit, when the police were confronted with a situation where traffic accidents were getting out of hand, they would strike back swiftly with one weapon—tickets. The motorist who had been driving down the street for months at 35 miles an hour when the speed limit was 30, suddenly found a ticket in his hand. He didn't like it.

Today in Detroit, one of the cardinal principles of the traffic safety program and of enforcement in particular, is to let the people know. Tell the people our story first.

Added to this is another basic principle, that is, that traffic laws are enacted for the protection of the citizen's life, limb and property and that violations cause accidents.

Now, with those basic principles, we can get down to the problem of how to get your story across to the public. Other speakers have gone through the accepted media: newspapers, radio stations, posters, movies, leaflets, and so on. I will devote this discussion to two or three specific cases.

Newspapers want their own stories. We try to give them different stories or pictures, or ideas. We suggest mostly, the ideas to them and we ask them to go on from there. We don't try to write their stories. We don't try to take a picture for them and then ask them to run it.

When planning our No-Accident, No-Violation Day last spring, we went to the papers and told them what we were trying to do. We asked one paper, for example, to run a daily box on the number of people picked up by an ambulance the day before because of traffic accidents. It was a daily box score which ran one week before No-Accident Day. The idea, of course, was, keep this slate clean on No-Accident, No-Violations Day.

Another paper ran a series of six stories, one each day, explaining the violations that caused the greatest number of accidents. Another paper went out with its photographer and got people actually committing the violations which were causing the greatest number of accidents.

Now, that is one method, using the newspapers to get across your story of enforcement. Another method, and one which we

regard very highly is the public contact of the police officer on the street. Detroit's police officers, the Traffic Division in particular, are given an intensive course in public relations.

These officers are told that it is the first 10 seconds that the police officer has with the traffic violator that determines whether or not that violator is going away feeling mad. The idea is to make him go away mad at himself, not at the officer. These officers are not only taught how to issue tickets, but how to make the public like it when they do get tickets.

In connection with our planned traffic safety program or Operations Safety, we have a number of police officers assigned to each precinct. That is, there are fifteen police officers in the city who do nothing but talk safety in one way or another. At the moment, those police officers are engaged in visiting every pastor in the City, to point out the problem that the city is facing, and to ask their cooperation. We want them to preach a sermon on traffic safety or to make some announcement from the pulpit.

That is general traffic safety, but when you are preaching general traffic safety, you are also preaching enforcement, because enforcement is a very integral part of the whole traffic safety program. If you have a good police officer out on the street making a good impression on the public, you are going to make that person feel a lot better about traffic law enforcement.

CHAIRMAN WILLS: This is the period when we start our "Swap Session".

The first question reads: "Do any states or cities which provide public funds for safety education proposals accept contributions from private organizations?"

MR. O'DONNELL: In Ohio, we don't accept any direct funds from outside organizations. However, we do have a citizens' support group called the Ohio Traffic Safety Council, of which the Industry and Highway Safety Committee for Ohio has become a cooperating agency.

MEMBER: May I answer the question from a city level? There is commercialism attached to that. We in Pittsburgh have no objection to somebody giving us ten thousand dollars to buy schoolboys' raincoats if they have no commercialism on them.

MEMBER: I heard a gentleman from Lansing, Michigan state that their City Council donated \$5,000 to their Safety Council.

MR. McCOURT: I am the Sergeant of Police from Lansing. We have a unique situation. Most of our school safety is arranged around greater safety patrols. That is the community organizations where the money comes in, as you say, with no outside advertising. The City Council does pay \$5,000 into the Safety Council. The other contributions come in. But for all schoolboy equipment and things like that, we have a community process which is backed by our main local paper. The advertising manager there happens to be the president of our Safety Patrol Committee which is made up of prominent businessmen and myself and some of the teaching staff. Then, we have a School Safety Committee which is made up of teachers with myself as an adviser. We have a series of different committees all coordinated with one individual to dump their problems in his lap.

CHAIRMAN WILLS: Pittsburgh has the same situation. As a matter of fact, following the Mayor's Conference, we cleared better than \$20,000 worth of free advertising. We were able to do projects one way and another and we paid for special promotions which were paid for by other agencies, simply by a tie-in with the agencies, and as long as there was no advertising connected with it, we did go along.

MEMBER: Do you get any money from your city government?

CHAIRMAN WILLS: Yes, we do. Our budget is established the same as the others and the past year we have had \$18,500 appropriated for safety education work. That is divided between the adult and child education conferences.

MR. MURRAY (Dallas, Texas): How does this group feel about financing through the Community Chest? Do you resent the necessity for that, and is anything being done in your communities to sell the people on the idea of providing through governmental channels, the money, as some of us felt it ought to be? It seems as if the whole thing had been put on a charity basis too long.

MR. WALKER: Pasadena fought for 10 years to finance their Safety Council. We did it through fleet operators and owners. We tried to secure funds from service clubs and organizations. We appealed to our city administration and they were very glad to give us certain funds providing, however, that the funds were under the management of the city. Recently our Board of Directors, in-

spired by the work of Los Angeles, went out on a drive for funds and did a marvelous job. We felt it was wiser to protect our individuals from two drives, by consolidating with the Community Chest. That was done.

MR. MURRAY: Haven't we something more fundamental to think about in the way of public education so they will bring this money in through channels—tax money and particularly gasoline tax money? It is a governmental function rather than a charity function.

COLONEL LYNCH: Why not support the churches and the American Red Cross and a few of those organizations with tax money instead of by contributed money? When you are doing a job in a community other than traffic education, you find yourself in a position where you can't do the job you have to do with tax money.

I was in Kansas City when Pendergast was running things. Do you think he would have paid me money to go on the radio and condemn the police department? It is an entirely different problem. This is working with human behavior and certainly you shouldn't ask the taxpayer to pay money to control his behavior any more than you would ask him for tax money to support the church, which is another type of human behavior control.

MR. McCOURT: As for the Community Chest, why should the city be primarily concerned when it is a community project and should come out of your Community Chest?

CHAIRMAN WILLS: This next question is, "Describe one specific project of your women's clubs."

MR. GRIFFIN: We have "Mrs. Safety in Detroit", here at the moment. I am speaking of Mrs. Janet Downey who is sitting here. She has been the Chairman of the Women's Traffic Safety Committee for twenty-seven years and the Traffic Safety Association has recently undertaken a project with her to get the women's clubs of Detroit busy on the child traffic accident problem.

MR. GRIFFIN: This is a book we have distributed among the women's clubs of Detroit, "The Child in Detroit Traffic." We figure that the women would have no greater interest than the child traffic accident problem and Mrs. Downey is supervising the distribution of this booklet to 30,000 members of women's clubs and P.T.A. Associations in the city.

It points out the problem. It tells what the women can do about it and asks them as community leaders to spread the gospel.

MR. KENT: I am looking for something I can put my finger on, something less general.

MR. GRIFFIN: As far as I am concerned, these are equally specific. In Detroit we have found out that 92 per cent of the accidents to children happen while they are under the parent's personal supervision, not on the way to and from school. It is the parent's responsibility to teach children safe habits. This points out that problem. It asks the parent to do something about it.

Another specific program perhaps is a four-color leaflet we put out. One of the three panels contains safety instructions which the parents are supposed to teach their own children each day. The back of this was gummed and they were asked to put it up in their kitchen.

COLONEL LYNCH: The Los Angeles Junior Chamber of Commerce, is planning to ask the women of Los Angeles next year to assume the responsibility of seeing that there is a safety talk on courtesy given during August in every women's meeting in Los Angeles. That is a specific thing.

CHAIRMAN WILLS: Is one month enough time to devote to these monthly themes or do you mean it as a guidepost to begin the activity and continue it throughout the balance of the year?

COLONEL LYNCH: My observation is, there is no city where they are even taking a month now to emphasize one particular thing. I am talking about the city, not the staff of the safety organization.

These activities will supplement whatever you are doing and it will give you time to do the other things that are necessary. In other words, if I would have had to do the job that the Junior Chamber of Commerce did by myself, it would have taken a staff of 50 people, because that is how many I had because they had two full-time men for a month who did nothing but work on it. If I would have had to have done that with my staff, I couldn't have done the other safety council things.

MR. GRIFFIN: We have tried to adapt our program as much as possible to the national pattern and I think that maybe you can't do it for 12 months of the year, but you might be able to do it for six or eight months.

#### THURSDAY AFTERNOON SESSION October 9, 1947

##### General Session

Presiding: LESLIE J. SORENSON, Chairman, Chicago Street Traffic Commission; Vice-President for Traffic and Transportation, N.S.C.

#### Wake Up and Live! By W. EARL HALL

Managing Editor, Mason City Globe-Gazette;  
Chairman, National Committee for Traffic Safety

There was a time in my contact with the highway safety cause when I was pretty well persuaded that the key to the whole problem was more and more widespread knowledge.

My reasoning was that if the people—all the people—could but know how to live and drive and walk safely, they just automatically would do so.

I thought of man as being a fundamentally rational animal, guided more by impacts on the mind than by impacts on the conscience or soul.

In recent months and years, however, my thinking on this subject has been undergoing some rather pronounced revision. Today the evolution has progressed to this point:

I no longer think that the acquisition of more and more widespread knowledge is the most important element in the safety equation.

What's ever so much more vital is that the rank and file of our people be induced to use the knowledge of which they are already possessed.

The job is one for an evangelist rather than for an expert or a technician.

A way must be found to convert the rank and file of us to the concept that practicing the rules of safety—at home, on the job and on the road—is an individual responsibility.

A way must be found to convert the rank and file of us to the idea that practicing the rules of safety in our every-day life is a form of exemplifying the cardinal tenet of Christianity, namely, "I am my brother's keeper."

A way must be found to convert the rank and file of us to the fact that practicing the rules of safety is an indispensable element of good citizenship.

And this, I insist, is an assignment for an evangelist. The safety cause stands in need of another Apostle Paul, John the Baptist, Martin Luther, John Wesley—or maybe even another Billy Sunday.

We've gone just about as far as we can without our appeal addressed mainly to the mind. The appeal from this point on—if we're to get anywhere—must be directed to the heart and soul and the spirit of man.

In short, the entire motivating force back of the safety program must be lifted to a higher level, given a loftier tone. Man does not live by bread alone.

Fear alone will not suffice. There must be a universal acceptance of personal responsibility for creating conditions of safe living and security. We must make every American in the cause. What would be the consequences of such an approach to the safety movement?

Every citizen in the cause of safety would become more safety conscious. As he proceeded to his hour-by-hour duties, he would be asking himself: "Am I by my acts bringing danger to anybody—not just myself?"

In the working out of this approach, all of us would, I'm sure, be amazed by the extent to which safety and courtesy are synonymous. Of all the ingredients which go to make up this thing called safety, none is quite so important as courtesy—a consideration of the comfort and welfare of others.

While safety responsibility starts with the individual, it doesn't end there. To the question, "What can I do to promote safety?" is joined the question: "What can WE do?" and therein a community safety attitude is born.

There's nothing isolationist about a constructive safety attitude. Just as individuals in a community committed to build safety get together and promote a sound safety program, so communities sold on safety get together and promote safety on a state and nationwide basis.

Moved by a will for safety, we would go to those who have mastered the technical aspects of safety—the engineer, the educator and the enforcer—and ask for help in achieving a safer community or a safer state.

The engineer will speak in terms of safer highways—highways with channelized traffic and separated crossings, highways which reduce traffic hazards to a minimum.

The educator will speak in terms of driver training in our high schools, with preparation for sitting at the wheel of an automobile given the curricular status that geography and geometry now have.

The enforcer will speak in terms of dealing firmly with those who refuse to play the game according to the rules. There will be enforcement without fear or favor.

It so happens that none of these goals—except maybe the last, having to do with law enforcement—can be reached without considerable cost. That's where this safety attitude to which I have referred will enter the picture.

The task of providing roads which are engineered to prevent death and maiming will be approached in something of the same spirit that devotees of a great religion approach the task of erecting a magnificent cathedral.

The task of providing funds for the establishment of courses in driver training in every school in America will be approached in something of the same spirit that devotees of education contribute to the erection of a great college chapel or library.

It can be proved that all of these measures to which I have referred could be for a small fraction of the \$6½ billion annual loss in accidents of all kinds. This waste would more than service our national debt.

But, approached from the humanitarian angle, that isn't the most compelling argument for doing these things that need doing if we're to have a safer America. The big argument is that WE ARE OUR BROTHER'S KEEPER.

In our idealism, however, we need not be wholly oblivious to the facts of life with respect to our highway slaughter. One of these is that alcohol and gasoline just will not mix successfully.

According to the National Safety Council, drinking or drunkenness figures in 1 out of every 5 motorist or pedestrian death on our streets and highways. This can be proved by the statistical records.

But every authority in the field of traffic safety knows that this is not the whole of the story. It is universally understood that drinking is ever so much more important than is suggested by the figures given.

The fact is that alcohol today is the one greatest contributors to America's traffic slaughter. And the signs all point to a worsening of the situation before it gets better.

As is true in many another area of safety, we know the way to reduce this hazard. But we simply refuse to give application to our knowledge.

My reference, of course, is to the scientific tests for determining the degree of an individual's intoxication. At least 3 methods have been developed and found effective to assay the validity of that standardized excuse of the driver or motorist in accidents: "Honest, Judge, all I had was a beer."

By some monstrous distortion of logic, the contention has gained acceptance that the use of the scientific test for intoxication is a violation of the rule that nobody can be made to testify against himself.

In what essential way the scientific test for intoxication differs from the fingerprinting technique in this regard is something never made clear to me. Fingerprinting is universally accepted and used.

Another point passed over lightly by opponents of the scientific tests for intoxication is that they can prove the innocence as well as the guilt of an accused person. They never give false testimony. They never lie.

These scientific tests have been used in several states with outstanding effectiveness. They have served to place the blame for individual accidents and, more important, they have served to remove drinking drivers from the roads.

Michigan's commissioner of public safety appeared before a session of the national safety congress and related an amazing story of the progress achieved in that state through the use of what he called "intoximeters."

Other states, including my own, have been toying with the idea for as many as a dozen years. But progress has been painfully slow. Why?

I think the explanation is to be found in the fact that too many of our good people—perhaps a majority—have not as yet been brought to see the traffic safety problem in its true proportions.

A citizenry sufficiently converted to the traffic safety cause would not stand silently by and let this vastly important tool go unused. The situation is one that could be corrected almost over night by an aroused public.

I've cited the case of scientific tests for intoxication merely to drive home the point that the great mass of our people has as yet been touched too little or not at all by our campaign for highway safety.

Many a legislator would like to give support to this and many another measure designed to cut down on highway accidents. But he has good reason to doubt whether the people back home will "stand for it," as he puts it.

Mass conversion to the traffic safety cause has not as yet taken place in our land. Too many of us are yawning in the face of mounting tragedy. Too many are saying: "It won't happen to me," a malady that can be described as "Otherfellowitis."

That's what leads me to the conclusion that the safety movement has greater need for evangelists than for technicians at the moment. It isn't additional information we require. It's a spur to induce us to apply what we already know.

Evangelism's task is to make every American aware that failure to accept personal responsibility in the cause of traffic safety is failure to measure up to the minimum standards of good citizenship.

Never was it clearer than now that our country is going to have exactly the degree of safety its people deserve and demand.

## Coordinating the Public Support Program (Panel Discussion)

Discussion Leader—JOHN G. MAYER, Assistant Secretary, National Association of Insurance Agents

Participants:

MISS HELEN J. CRAFTREE, Staff Manager, The Advertising Council, Inc.  
CLINTON W. DREYER, Mgr., Eastbay Chapter, National Safety Council, Oakland, Calif.

W. A. HUONG, Chief of Bureau of Accident Prevention, California Dept. of Motor Vehicles

Mrs. FRED KENNY, Pres., Georgia Congress of Parents and Teachers  
DON SAUTZ, Managing Dir., Traffic Safety Assn. of Detroit

MR. MAYER: Coordinated support of highway safety is not worth much until the public understands the program thoroughly, endorses it, promotes it, and obeys it. Yet, until we have accomplished that objective our work is a long way from being finished. This is our job, and the members of the organization which we represent, must better themselves and put forth every effort to accomplish this end.

Considering the accident rate in this country today we can not let up on this work for one minute. As a matter of fact we must prod the public, goad the public, and, yes, even boot the public if necessary to awaken them to their responsibility in the prevention of accidents. That is one of the most difficult assignments ever wished upon man, but it is a job which you and I accept, and gladly so.

What are the obstacles facing us? Carelessness, indifference; however, let us add another element in that picture—the worn-out vehicles on our highways today. Over one million cars ten years of age, and older, and each of those vehicles can be compared to a loaded gun in which careless handling can only result in injury or death to some unfortunate individual.

What are the prospects for the removal of those mechanical hazards cluttering our highways today? One of our statisticians tackled this problem, and based his deductions on a liberal estimate of new car production, and came up with the answer—eight years to replace cars ten years of age or

older. And, during that period five million more will become obsolete.

Our immediate problem is not only to reach the man behind the wheel with our story, but to make him listen. In making that statement I am not unmindful of the actual work done by the people in this room, nor am I discounting the mountains of literature that have been published by every organization represented here. However, we must rely on the memory of the public in regard to all that has been done, and psychologists tell us that "memory" does not exist. You may well ask, what else can be done?

I have given that question a lot of thought and study. One answer came to me the other day, and I am going to pass it along to you for what it is worth.

I am fully aware that these accidents do not just happen. A true breakdown of the National Committee for Traffic Safety gave me a clue. In this analysis it was revealed to me that the composite membership in all of our organizations numbers something like 100,000,000. That figure includes a lot of duplications. However, the fact remains that this organization has over 100,000 chapters or units.

At the gathering of these local units, we slap each other on the back, shake hands, and sometimes sing songs. That, of course, is the spirit of our way of life. Do you not believe that a serious thought might be injected into these meetings: one that considers the well-being of our fellow citizens? In what better or more fertile field could we sow the seeds of safety consciousness? In what better place could we sound a constant note of safety to our fellow citizens?

I, therefore, propose to you that we, the coordinators of public opinion, urge that a pledge of safety be recited at the close of such local chapter meetings. Through that means we can make nearly every adult driver recite our message of safety, and through repetition we may possibly awaken the consciousness of responsibility, thus producing better drivers.

I have prepared such a message, and a copy of it has been placed on your chair. It has been adopted by my association and its

35,000 members, and we are working to have it adopted by the various civic organizations. Just this morning it received the unanimous endorsement of the Executive Committee of the National Committee for Traffic Safety. With your permission I would like to recite it.

"I solemnly pledge to my fellow men that I will faithfully observe the rules of the road. Extend the courtesy of the highway; and, will be ever alert in the operation of my automobile so that whether he be pedestrian or driver he shall enjoy the same privilege as I, with every assurance of safety."

The first question addressed to the panel is "What can local groups do to stimulate safety?"

MR. SLUTZ: In our Detroit program this year we have, for the first time, called for the participation of organizations which never before have played a part in traffic safety. Previously, we could depend upon the newspapers, the radio and public organizations to play their full part. This year we sought the cooperation of fraternal organizations, industrial concerns and such.

We found that it was not difficult to enlist this support. For example, I have here a menu put out by a restaurant organization, the Saunders Company, in connection with our "Watch Out For Kids" program last Spring. This is one phase of our work. We ask the grocery stores and the drug stores to cooperate with us. These stores will usually put large posters in their windows for us, calling attention to the importance of child safety. Utilities and various business concerns all cooperate from time to time.

MEMBER: Who pays for the posters?

MR. SLUTZ: In most cases we do. Some times, if an organization's advertising budget allows, they pay for them, but we always stand ready to pay in case they can not.

MEMBER: I asked the first question, and I will put it differently. If a local service club came to you and said, "We have six hundred dollars which we would like to spend on a specific safety project in cooperation with your organization," what would you tell them to do?

MR. SLUTZ: It depends upon the program. A matter of child safety would vary from a matter of speed. Ordinarily we do not ask fraternal or service organizations to spend a dime. We usually ask them to provide for

speakers at their luncheons or meetings. Normally we ask organizations to cooperate only in terms of their regular program, whatever it might be. If it is a drug company we suggest a window display. If it is an organization which advertises a lot we ask them to include promotion of our safety program in their regular advertising budget. Is that an answer to your question?

MEMBER: No, it is not, because clubs do not advertise. Business firms are the advertisers, and my question deals with clubs. The Rotary Club does not advertise, so would you tell them that you could not find a way to use the six hundred dollars?

MR. SLUTZ: No, I would not say that, because we could probably use the money. Frankly, we have not had that experience.

MEMBER: I would like to ask Mr. Darlington that question, perhaps he could answer it.

MR. DARLINGTON: I do not think there is a local safety council manager who could not put six hundred dollars to work, and very effectively.

It just depends upon your local community, the size of it, and what you have available, and usually your local managers know that.

For example, if it is a child safety program when the schools are opening and you had enough notice that six hundred dollars was available for this program, you could set it up well in advance. You could have the outdoor posters made, and those run well into the money.

Then, perhaps, the teachers in the elementary schools might want a visual teaching aid which they could use for a period of three or four years.

I think the limit on this problem depends upon your own imagination. There are many things that can be done with this money to improve safety education programs. The trouble is, we do not have enough money for our projects—we usually have too many projects for the amount of money available.

MEMBER: Why not have the Rotary Club offer a prize of a hundred dollars for developing a program to spend five hundred dollars?

MEMBER: In Kansas, we go into the small communities and try to get the cooperation of all concerned. We conduct safety programs at the various schools; and we also try to get the various ministers to cooperate with us by talking about safety from the pulpit.

We conduct contests in the schools, and through the local safety councils, and maybe they offer a five dollar prize or twenty-five dollar prize. We also found that it cost very little money to conduct safety contests or safety week, as we call them in Kansas. We now have thirty-three local safety councils in Kansas.

MR. SLUTZ: In Detroit, the Kiwanis Club has cooperated by getting out a letter to the parents calling their attention to the careless habits of their children, the habits which cause accidents. This is done with the cooperation of the Detroit Police Department. It goes something like this: "Dear Mrs. Jones: One of our officers saw your child, (naming the child) almost struck and perhaps seriously injured by an automobile the other day. This happened on, (so-and-so) street when (the name of the child) went into the street in front of a car." Then the letter goes on to say, "Your Police Department is very anxious about this child's life, and could you possibly help this child to develop more careful habits in crossing the streets?"

This is one of the things the Kiwanis Club of Detroit is doing, and it is one thing the Rotary Club can do.

MR. MAYER: That is a splendid suggestion. Another thing they might do, if they have the money to do it with, is to supply the school safety patrol with raincoats. The safety patrol kids are out in all sorts of weather, and often they do not have the proper protection against the weather all the time. This would be a lasting benefit. The coats would be owned by the school, and distributed by the school to each patrol.

MEMBER: Why could you not kill two birds with one stone, and promote some kind of safety essay contest where the winner would be given a scholarship. In many cases young people who would like to continue their education can not afford to do so for financial reasons. It is a lot better to teach them than seduce them when they get older.

MEMBER: I might tell you what we are doing in this respect in my home county—I come from a place just a little distance from Pittsburgh, Pennsylvania. We had the same problem of trying to raise money for our safety program, and at the same time convince the people that they could do something about the situation, and that they should go along with us.

The first thing we did down there was to appoint a safety committee. We assembled a group of men who were really interested in safety work. Their first job was to get the city officials interested, to sell them on the idea. Once they were sold we then suggested how the money could be raised without "humbbuggery." I use that expression because every time you approach the business men for money in my district they say they have been hit hard in this respect—they want you to see them next week or some other time. We hit upon an idea, and won those interested officials. Here is what we did:

We had those officials talk to the school board officials. The school officials gave us the use of their football field and everything that goes with it, free of charge. We arranged a football game between the two top teams of the area. When the two rival hometown teams play it is good for ten thousand dollars. In this way we never hit the same communities twice in consecutive years (they get hit once in every four years) for there are enough teams in the district and the top rival teams are the only two that play.

Then we hold a midnight show at which we do not ask any person to contribute anything. We advertise the fact that if they go to this midnight show they do so in order to help our program, and that the expenses of the show are not being paid for by any individual.

We divide the money three ways. One-third goes for safety equipment of all types that we can get. Second, we provide speakers for clubs, for service group meetings. We do not wait for organizations to come to us, we go to them. We put loud speakers on cars, take them to the dangerous sections, and advertise the hazards, and so on.

Now, the third part of the money is used in what we believe is the most effective method. Each police organization down through our state has a so-called pension fund. We donate to those pension funds when we think the police departments are going along with us in the enforcement of the traffic laws. If we do not think they are cooperating, we do not donate to their fund. Generally, they go along because they want that donation.

That is our program, and it's one that has been in use for several years.

MEMBER: May I raise this point in regard to the public support program? Is it

the program we refer to professionally as the President's Conference?

MR. HUGGINS: I think the mere fact that we have had some ideas suggested here today on how to activate the President's Program is positive proof that Earl Hall was right in his statement that we do need mobilization and coordination of the public's effort if we are going to win this fight.

We are all seeking answers to the questions that come up continually in our minds as to how to make our streets and highways safer. And, you men from Ohio, Texas, Montana, Oregon, and California, and from all the other states in the Union, are wondering how we can tackle that Plan of Action, that program of life saving which came out of the President's Conference, and apply it to the problems that exist in the respective communities.

The Plan of Action born at the President's Conference was merely the accumulation of the "know how" of a great many men and women who have been working in the field of accident prevention for many years. That was the first expression of a united approach; a united opinion in behalf of the mobilization of public opinion for something that was really needed, really necessary.

That plan came back to us first on a state level. As you know, of course, the Federal governmental departments were organized to do the job from a Federal angle. Next, the ball was passed down to the states, and the governors were asked to organize official coordinating committees on the state level composed of men who were charged with the responsibility of seeing that the laws and regulations pertaining to enforcement of traffic safety were carried out.

Then the next step was to go down to the counties, and the communities, going right to the very grass roots. To do this, we know, was just plain horse sense. And, furthermore, that is where all this coordination comes in.

In order to do a state wide job we must have public support. And, the question is: How are we going to bring that about? First, we must activate, then we must integrate, and then we can do our coordination.

MEMBER: I would like to get some specific help out of this if I can get it. I want to know from the panel how they have taken the specific recommendations of the President's Conference in their cities, and have evaluated what their cities are doing or not

doing in respect to the President's Conference.

MR. SLUTZ: In Detroit we feel that we have done an important job in as far as drunken drivers are concerned. We talked to the traffic judges in Detroit about the importance of drunken drivers. As a result of our conferences, and the President's Conference, we have found that 86 per cent of drunken drivers in Detroit are sentenced to jail without the alternative of paying a fine. We have developed a program around that, and we use the slogan, "Drunken Drivers Go To Jail." They do in Detroit.

MEMBER: How do you do it?

MR. SLUTZ: Well, it is a matter of conversation and calling in the traffic judges and police officials.

MEMBER: Do you have chemical tests for intoxication?

MR. SLUTZ: We have no state law. However, in Detroit we use chemical tests and persons who are adjudged intoxicated by these chemical tests are sent to jail.

Similarly, we had a problem with the speeder, and finally the speeders were losing their licenses. We developed a program around that. It is a matter of taking each program specifically, as we see it.

MR. MAYER: I should like to call on Mr. Dreyer to tell of his experiences in connection with the work he is performing.

MR. DREYER: In Oakland we have what we call the Mayor's Traffic Safety Committee, and that differs somewhat from the usual run in that the Mayor's Traffic Safety Committee was originated at the request of the safety council, the police department, and others in the community.

We asked the mayor to call together at least one representative from each of the various organizations in the community. I would say about 85 people came to the meeting and every person attending was put on a committee—eight committees were set up.

I will tell you about two of them and what they have accomplished since being established last November.

Of course, an election came along last May and we had a new mayor, but because of the work that had been done and because of its constructive nature, the new mayor continued the organization, worked with it, and even gave it an appropriate budget. Many of the people wondered if the safety council's functions would not be taken over by the Mayor's

Committee. I informed those people that if they wanted a job done they should not care who got the credit for doing it; and that is the way we feel about it.

One of the two committees to do a good job to date is the Police Committee, which studied the records and found the need for pedestrian training in the community. We analyzed our accidents and found that in the year 1946 out of 70 traffic fatalities, 50 were pedestrians.

The police department started in on small scale arrests. Of course word was passed around to all the organizations and the newspapers, and the public was prepared.

The police department, the judiciary, and all the other departments were set up for this program. The police department issued about thirteen or fourteen hundred tickets during the first couple of weeks and, needless to say, the rate of pedestrian accidents dropped off immediately. When I left home on the first of October, out of 27 deaths, 15 were pedestrians.

The other active group was a Parking Committee. There has been a lot of quibbling and discussion about the installation of parking meters, and this committee helped the police department and the traffic engineers in the installation of parking meters.

One of the things we set up with the judicial or police judges at that time was a fee of three dollars for every violation. There was considerable evidence of political pressure brought forth on this question in regard to other cities having a fine of fifty cents for violations. The maximum fine of most cities was one dollar for these violations.

Well, the Mayor's Committee, through the Parking Committee, held their line and we have the fine of three dollars still standing.

All of our committees are working at the present time, and I believe they are doing wonderful work in bringing about safer traffic conditions in our city. One of the committees is working on a model traffic ordinance, and the city council, at the present time, is working on the adoption of a "no ticket fixing" ordinance.

MR. HALL: As one who had a small part in the writing of the Public Support Section of the President's Action Program, I can say that the ultimate objective of that whole section is the formation of a local safety organization and program doing just exactly the things that this gentleman has mentioned.

We do not care what you call your local safety organization, the point is, it must be an organization set up for a frontal attack on the problem.

In most cases in creating this organization you are going to have expenditures, and that is one of the most important reasons why you must have the public in back of you, and one of the reasons why it must be a representative group.

I know that in creating this organization you have a tremendous job, and I do not know of any group that has completed their job; I know we have not in Mason City.

MR. SLUTZ: More specifically, we have had traffic judges in Detroit who have been "soft touches" and, one in particular, who would let the people off with light sentences or suspended sentences. Finally the editor of a Detroit newspaper talked with this judge and told him that he was not doing a good job. This judge voiced the opinion that it was a little difficult to send people to jail, taking away their driver's license, and such. This particular editor told the judge that they would never support him in an election until he got tough with these offenders, and that he was not thinking of the drivers nor of their families nor of their friends, but of the people who were killed or injured due to the reckless drivers, and drunken drivers. That judge reformed. See, what I mean?

MEMBER: I am from Seattle, and our traffic courts are not as severe as they are in Detroit, but I feel that we have made great improvements in recent years. The safety council, in cooperation with the police department, has cut down our fatalities approximately fifty per cent, and our pedestrian fatalities about fifty-five per cent in the last year.

We have also corrected our "ticket fixing"—if it was ever present. In giving traffic tickets, one goes to the mayor, one to the police department, and one to the violator, and at the end of the month each one of the tickets must be accounted for. Through this manner of operation we believe this problem has been solved.

MR. MAYER: I have a question which I think should be explored at this time and that is: What can the various organizations do to bring about the formation of a traffic safety program in a state where no such program has been started?

I believe we have a person qualified to give an answer to that. Mrs. Knight, Presi-



dent of the Georgia Congress of Parents and Teachers, will tell us what the FTA can do to develop public support for an accident prevention program.

MRS. KNIGHT: Perhaps the best place to start the educational movement is in the schools. Today a program is underway in Georgia, which is already functioning in many other states, of driver education in the schools. The Georgia Motor Club is furnishing dual controlled automobiles to the high schools who will sponsor such classes and who will provide a qualified instructor, who has received proper training at a special school at Georgia Tech. This has been a project of the Georgia Congress of Parents and Teachers, who have been concerned with the problem of child safety for 50 years.

The horror of death on the highway should be brought home to every community—no matter how small. The public attitude must be changed from one of apathy to one of positive war on every individual who refuses to have a simple regard for his fellow man. He should be treated as those former victims of small pox—as a social leper to be shunned and avoided. Public disapproval is the only control which will work for the adult population and such public disapproval must come through local support groups—churches and civic groups which we have mentioned.

Our traffic officers are doing a good job. There are not enough of them. Their jobs are often made difficult because of political interference. The job will never be done as long as a penalty can be avoided or a ticket be fixed. The job is nation-wide and should be treated as a national problem. It seems to me that a problem which involves as many casualties annually as a major war should be a problem of the nation—a problem for Congress, if it cannot be handled otherwise.

We need enough traffic officers to make it impossible for people to murder other people on the highways. We need stiff enough penalties—on a national and uniform scale—to make it unpopular to do so. With some of the best citizens languishing in jails for awhile, it would become unpopular. It is criminal to murder, to destroy other people's property, to maim and injure others willfully. The penalty for such on the highways, however, is too often a hushed-up affair that is discarded with a shrug of regret.

We need a program of traffic education, supported by civic groups—all civic groups—

for adults in every community which has an automobile therein. We need to make it socially unacceptable to take liberties with other people's lives and to disregard the rights of others.

We need a program of traffic control in every community where there is an automobile—with sensible regulations and laws which have teeth in them. We need enough traffic officers to enforce these regulations and laws. The saving in property losses would more than pay their salaries.

We need a system of uniform traffic regulations and uniformly built highways, designed for traffic safety, as a national project.

We need a further extension of the system of school boy patrols in all high schools, of traffic safety training in schools and colleges.

Above all, we need, as a nation of 140,000,000 people, to realize as 140,000,000 individuals, our individual responsibilities to ourselves, our state, our nation, and our fellow.

None of these will come about unless every state, every municipality, every county, starts a concerted drive through local organizations, to see that the job is done.

MEMBER: We have the Managing Director of the Inter-Industry Highway Safety Committee here, and I do not think he has participated in the discussion, as yet. I wonder what this Inter-Industry Safety Committee is doing or planning to do? I know of one instance where they have done an outstanding job, and I wonder what they are doing on the state and national level.

MR. DARLINGTON: From the discussion here this afternoon, I do not think that any of us need to be concerned about projects because, as we all see, there are any number of projects that need to be undertaken. We should all support these action programs.

Our organization was formed after the President's Highway Safety Conference, in which the President stated that he would like to see the automotive industry take an active part in helping curb traffic accidents. As a result of that Conference we were formed of three industrial groups: the automobile industry, the petroleum industry, and the tire industry, and have added National Automobile Dealers' Association. Two members from each of those groups constitute our national committee. Each of these men is president or vice-president of his respective organization, so we have it at the top level.

We are now in the process of organizing the dealers of those three industrial groups on a state and local level. Our purpose is to help the public officials put the action program into effect, and to work with other organizations on the local level in doing that job.

The automobile, petroleum, and tire industries are very much interested in seeing this program actively put into effect, for highway safety has a direct bearing upon their work.

We go to the public officials and find out what part of the action program needs assistance. Then we take two or three projects and assist in putting them into effect on the local level. We limit to not more than three projects because we believe if we try to cover the waterfront we will accomplish nothing. We believe in taking as few as possible, and doing a good job with them.

Our next procedure is to organize county and local Inter-Industry committees, to go to them and to work with them in getting the job done.

MEMBER: I have been a public official for twenty-five years, and I have learned a few things. Some parts of this program can be carried out by your public officials, and some parts of it can not. That should be kept in mind. When the public officials reach a point where they have to stop, then, the program needs to be carried out by the public with private help needed to complete the program.

MR. MAYER: We have another member of our panel here who has made great progress in carrying out the recommendations of the President's Conference, and that is Miss Crabtree of the Advertising Council. I would

like to have her say a few words as to what the Advertising Council is doing to carry out the program.

MISS CRABTREE: The advertising phase of the safety program consists in preparing a lot of advertising that can be used locally. When you take on that kind of job you run into a lot of problems. We divide promotional activity into three phases—the radio, the newspapers, and the graphics.

On the radio, we have as a contribution to the Advertising Council one commercial on each of the three network programs. That commercial can be in support of safety, or other public service work. To date, the network programs have been carrying safety advertisements at least one week out of the month. These messages go into the home and are repeated over and over again, so we do have a terrifically large audience for these safety programs.

With newspapers we have prepared advertisements on three phases—traffic, farm, and home safety aimed at local press use. These advertisements have been sent to newspapers, county seat weeklies, farm journals, and so on. There are over eight thousand of those advertisements running now, and before the year is over we will have over twelve thousand. I am hoping this will go to twenty-four thousand next year.

We are working on a national basis with the graphics, billboards, three sheets, 24 sheets, and magazines. We are not doing anything with local publications, except as they can use the advertisements. So our program in this respect is mostly on a national basis. Here is one of the slogans we are putting across to the public, "Be Careful, The Life You Save May Be Your Own."

*Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME XXV

WOOD PRODUCTS SECTION

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## Foreword

**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

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## MONDAY AFTERNOON SESSION

October 6, 1947

Presiding: LOUIS GLAZER, Insurance Manager, Dierks Lumber and Coal Company

## No Safety Today—A Radio Show

Directed by: WILLARD C. BOTTOMS, Personnel Manager, Farley &amp; Loetscher Manufacturing Company

Featuring: THE AVENUE PLAYERS  
Bob Goehals—Director  
George Mallory—AssistantCharacters: Narrator  
Nutley—the man to be sold on safety.  
Cookson—the man who sells him.  
Mary—Nutley's secretary.  
Superintendent—the man who brings the bad news.

Announcer: The program originally scheduled for this broadcast period will not be heard. In its place, we present a dramatic story in the public interest. It originates in the Wood Products Section of the 35th Annual Safety Congress, being held in Chicago, under the auspices of the National Safety Council.

Sound: The Phone Rings

Nutley: Hell-oh. (Angrily) Now, look! I KNOW there's been a lot of street accidents, but let me tell you—I've never been in one in my whole life. I haven't time to serve on committees, and sit in on councils. If people would bring their brains up to look both ways, and not use the streets for playgrounds, they wouldn't get hurt. Good bye!

Sound: Receiver Banged Down On Cradle

Sound: Buzzer

Nutley: Come in!

Sound: Door Opens

Nutley: Well, what is it?

Mary: Your file on Parkinson. There's a gentleman to see you.

Nutley: Show him in.

Mary: Yes, Mr. Nutley.

Sound: Door Opens

Mary: Mr. J. D. Cookson.

Nutley: Ah, good morning there, Mr. Cookson. . . . Now that name's mighty familiar.

Cookson: Of course. J. D. Cookson, President

of the Cookson Chair Company. We were on the Industrial Committee in the Victory Bond Drive, together.

Nutley: Of course, of course. We sure put that one over. But you know, frankly, I'm glad the whole thing's over. Blood banks, bond drives, community chest, U.S.O. . . . seems every day had something different. . . . something extra to do.

Cookson: I sort of got to thinking that all those things enlarged my viewpoint. I got to see people, hundreds of people, thousands of people. . . and I began to see things in terms of people. And now that it's over, we have another fight on our hands.

Nutley: Another fight?

Cookson: Yes. I'm talking about the fight against accidents.

Nutley: (Grunts)

Cookson: For instance, that fellow Holland who used to work for you—  
Nutley: Sid Holland was always crabbing about guarding machines, trying to tell me this place was unsafe. Why I've worked on every machine in the shop. Sure I've had accidents, minor ones, but that's part of the game.

Cookson: But is it? Sid hasn't had an accident since he started working for me—he's a darned good worker. There's one thing some of us lose sight of—and that is production efficiency and accident prevention go hand in hand in a well managed industry.

Nutley: Wait a minute! Are you trying to tell me that I haven't got a well-managed plant?

Cookson: Cool down! What I'm trying to tell you is that you can cut your production costs, speed up your volume, and keep a better class of workers on your payroll by an

organized safety program in your plant—men like Sid Holland.

Nutley: Did you read that somewhere or are you talking from experience?

Cookson: You're darned right I'm talking from experience. Three years ago, I decided that accidents were an economic waste and that it was up to me to do something about them, at least as it affected my plant.

And did you? (sarcastically)

Nutley: Look here—(pointing to a sheet) figures don't lie. Notice how my production per man hour has gradually increased, while costs have remained static—and here, notice my cost of insurance—\$5000 saved last year, and I expect to make an even greater saving this year.

Nutley: Let me see that a minute. \$5000! Well, now you're talking my language. But how did you do it?

Cookson: Well, I was green at this game when I first started out, but on the advice of the insurance inspector, I joined the National Safety Council, and for a week I studied the literature they sent to me on how to organize for safety. Then I had a talk with my men, and, believe me, they were all for it. We started looking for dangerous places, poor lighting, sloppy housekeeping, unguarded machinery. I was amazed. Wonder we hadn't been having more accidents.

Nutley: But all of that costs money and takes time.

Cookson: So what! You spend money to make money, don't you? Here's the pay off—the next time the insurance inspector came around he recommended a reduction in my rate—just a few cents, yes, but it was a step in the right direction. Now my rate is \$2.17—check that against your \$5.97.

Nutley: You may have something there. Do you think I could do it?

Cookson: Why, of course, you can—provided you are 100 per cent sold on a safety program. Unless you are sincere, your men will soon find it out, and the whole thing will flop. Every successful safety program

must start with top management. I'd like to think it over. Would you object to my visiting your plant to see for myself just what you did to make it safer?

Cookson: Not in the least. But there's no time like the present to get started—frankly, I came over here today to try to sell you on safety, first, and secondly, to get your application for membership in the National Safety Council.

Nutley: I knew you were up to something, Cookson—I'm definitely interested all right, but—

Cookson: Here's an application form, sign it now, and I'll hold it until you give me the green light.

Nutley: High pressure stuff, eh!

Sound: Door Opens

Supt: Bill, there's been an accident!

Nutley: Well, why tell me? Get the guy to the first aid room and call a doctor.

Supt: Bill, . . . it's Jack.

Nutley: Jack! My son! What happened?

Supt: He cut his hand in that dado machine. I know it ought to have a guard.

Nutley: Is it bad? Will he lose it?

Supt: I don't know. But I think you ought to see him. He's pretty badly shocked.

Nutley: (Crushed) I guess I had it coming. Where's Jack now?

Supt: I called an ambulance and sent him to the hospital. We're not properly equipped to handle anything like that here, you know that.

Nutley: I know. This licks me.

Cookson: It needs't.

Nutley: You don't know. You don't know the half of it. The boy's mother. She'll have a fit. She didn't want him here. I guess I better call her.

Sound: Phone Rings

Nutley: Answer it, somebody. Tell them I'm out.

Supt: Nutley Wood Products. Office of the President . . . Yes, I'll put him on. (To Nutley) The hospital. They want you.

Nutley: (Tired) Hello . . . What's that?

. . . He won't . . . Great! Wonder-

full . . . He says what? . . . You tell him for me I'll take care of it right away. Tell him I'll do better than that . . . She did? . . . That's a relief . . . Gee . . . thanks a million . . . Thanks two million . . . Yup. G'bye.

Supt: Well?

Nutley: Cookson, Gimme that blank.

Sound: Pen On Paper Writing.

Nutley: We're going to have the safest, most accident proof plant in twenty states. (Calling) Mary!

Sound: Door Opens.

Mary: Yes?

Nutley: Get my insurance men on the phone. Tell him I want a complete

survey of the plant, all facilities, and all personnel. I'm on a safety crusade.

Mary: Yes, sir.

Sound: Door Closes.

Cookson: About Jack?

Nutley: He won't lose his hand. This is my lucky day. Cookson, I owe you a lot.

Cookson: Skip it. Skip it. You see, I got what I wanted.

Nutley: And that was?

Cookson: I got my member for the National Safety Council. You got something, too.

Nutley: Don't I know it, brother, don't I know it?

## Hazards and Remedies in a Wood Products Operation

(Panel Discussion)

Discussion Leader—C. ARTHUR BRUCE, Executive Vice-Pres., L. E. Bruce Co.

Participation:

JOHN A. BUTAS, Safety Dir., Brunswick-Balke-Clender Co.

JACK DUNMAN, Safety Eng., The Mengel Co.

L. W. HAGERUP, Safety Eng., Lumbermen's Mutual Insurance Co.

CHARLES R. ZEMBY, Jr., Chief Eng., T. H. Mann & Co.

MR. BRUCE: The first question is: "How do you know if a high frequency gluing machine is off or on?" I believe those machines do not make any noise, and you cannot tell whether they are on or off.

MR. DUNMAN: Gluing with high frequency is using an electric current and cycle frequencies stepped up to millions of cycles. I will not attempt to name the number, because I do not know, and I firmly believe the inventors of the machine do not know. We do compare the high frequency machine with a radio transmitting station.

Now, how can you tell when the high frequency machine is off or on when the press is situated at the side, back, or in front of the machine? I would like to go a little further and say that the voltage on the machine may be entering at 110, and it may be coming out at several million, and there is defi-

nately a hazard there. There is, therefore, a reason for wanting to know if the machine is off or on.

The machine has small pilot lights, the size of the top of an ordinary pencil, red, off; green, on.

In our company we have installed lights in series with these small pilot lights. They are 85 watt lights, easily visible, and mounted directly on top of the press, up in the air, so the operator or helper or any other person around the machine will know if that machine is off or on.

MR. BRUCE: Another question. "How about radio interference from high frequency machines?"

MR. DUNMAN: At the present time the Radio Commission or the Communication Commission of the United States Government asks for a test on these machines when they are installed in plants. In regard to the so odd machines which we now have in use, we have sealed them with copper scale or aluminum scale so as to cut down the interference with radios.

The companies manufacturing those machines have testing trucks, approved by the Radio Commission, that go out into the territory around your plant, and actually tune in on your machine to see if the frequency

is interfering with the radio frequency of a particular station.

We go a step further, by enclosing in copper ducts the lead from the low voltage side of the machine, and the lead from the high voltage side, the one that runs into millions of volts to the press. These ducts are grounded to the water pipes; therefore, we do cut down the current that might go out over the air and interfere with radio circuits.

It is not only necessary, but a radio commission rule, that that particular job will have to be watched when you install it.

MR. BRUCE: How do you get the stock into the machine?

MR. DUNMAN: Now, we are getting away from the high frequency machine into the press, itself. Remember, the high frequency machine is nothing but a radio transmitter sitting on the floor.

The presses, so far as I know, are not manufactured commercially. We manufacture our own presses. We use what we call a "shotgun" feed operated by compressed air, and as our material comes from the saw across the glue spreader, it automatically goes into the press.

In any edge gluing, you place the stock in clamps, line them up, and forget about it for about four or five hours. In this operation your stock goes into the press horizontally, the pressure come down, and within 24 seconds you do the same job you have been doing in four or five hours.

The "shotgun" feed I mentioned is only a plunger feed and shoves the material in under the press itself.

MEMBER: Is this transmitter sealed in lead, the same as your x-rays in hospitals?

MR. DUNMAN: No, there is a difference between the radiations from this machine and those from an x-ray machine.

MEMBER: Is there a danger of sterility of any persons working around those machines?

MR. DUNMAN: The man who invented that machine was married a week before he started working on it, and he has been working on it for eight or ten years. He has five children!

MEMBER: I have been told there is a great danger of being burned, and that because this is a high frequency burn, it would not be felt at first?

MR. DUNMAN: That is a very definite hazard. When they were first experimenting with it, and when the machine was in an

experimental stage, one man was killed. He was killed due to the fact you do not feel the burn—all you feel is the heating of your arm from the inside. It will take a medical man to explain that to you. However, if you were to put your hand between the electrodes on that machine, you would not feel any burn at all on the skin; you would feel the heating from the inside; and, probably, by the time you felt it, you would have received a very severe burn.

We must have ways and means of preventing these burns. The machine now has doors, interlocked with electrical switches. When the machines were first invented, anybody could walk up and take a look inside. Now, if any door opens, the current is cut off.

We go one step further by building a cage around the press, and this cage is so arranged that the door the operator raises to go in and out is also inter-locked, and when this door is raised the current goes off.

We have another crude way of testing the presses to see if they are hot—remember, they have got to get as hot as any machine—by taking an ordinary fluorescent lamp tube, and walking around with it in your hands. It lights up at certain places around the machinery. We try to seal these machines so that the fluorescent tubes will light up only about six or eight inches away from the machines. These bulbs are not attached to any wires at all, you just hold them in your hands.

MR. BRUCE: Mr. Dunman, is it important in the installation to ground the frames of the machine?

MR. DUNMAN: It absolutely is necessary as it is in all electrical installations. We insist that the machine frame be grounded, and we insist that the press be grounded, and I mean a positive ground. I do not mean by this that somebody should go in and take a clamp and screw it on the machinery. We mean a positive ground sweated to a water line some where.

We mount the machinery on steel plates on the floor, so that the operator and helper are, at all times, standing on a steel grounded plate when the machine is in operation.

MEMBER: When the material comes out of the machine, is the glue line hot enough to burn a person?

MR. DUNMAN: The glue line is not too hot to handle with bare hands.

MR. BRUCE: As I understand it, there is

no actual contact between the high frequency machine and your press, itself, it is merely the rays—

MR. DUNMAN [Interposing]: No, there is a contact. There are two electrodes, one on the bottom and one on the top, or there could be several; so, the rays pass from electrode to electrode through the material.

So, your hazard is, first of all, contact with the high frequency waves.

MR. BRUCE: Is there heat any where?

MR. DUNMAN: The only place you find heat is when coming directly in contact with it, and it is seldom very hot.

MR. BRUCE: Many of us have had experience with the so-called diathermy in medical treatment, and we all realize those treatments produce a sensation of mild heat, it is not uncomfortable, and, yet, it is the same situation as here—the heat is going on internally, and then your bones start to aching when you get too much of that sort of heat.

MEMBER: What is the cure, if any, for these burns?

MR. DUNMAN: I am happy to say we have not had to find one. As I said before, the only had accident that we know of was the death of the man in Baltimore.

I will say that the engineers who are working on these machines are working constantly with safety engineers in making them just as safe as possible. I believe it is the safest machine that we have in the entire plant. The things we have to watch for are the things our people do.

MR. BRUCE: And, as against the old way in which you used to glue, and the accident record, you have got a machine now which will cut down your accident rate in the operation of gluing; is that your opinion, Mr. Dunman?

MR. DUNMAN: Absolutely.

MEMBER: Is it ever necessary to exhaust the machine?

MR. DUNMAN: There are no fumes there. The only fumes you get are from the formaldehyde from the glue, which is a problem at any time.

MEMBER: Is your operator guarded against electrical shocks?

MR. DUNMAN: Yes, he is guarded due to the fact he stands on this steel plate under the press, itself.

MEMBER: Do you have many failures on your products after they have gone through

the press?

MR. DUNMAN: Failure on the products is negligible.

MEMBER: Did you say that you cut down the stray rays to the point where a fluorescent bulb would light up only six inches from the wood?

MR. DUNMAN: That is right. It is merely a matter of shielding; if it will light up five feet away, you have got rays coming from that machine, and you are in a bad shape.

MEMBER: Then, it is a matter of shielding in order to prevent these stray rays?

MR. DUNMAN: That is correct, shielding and grounding all the way through.

MEMBER: He said the operator stood on a grounded metal plate. I wonder if it would not be better for him to stand on a non-conductor such as a wooden platform?

MR. DUNMAN: Well, that brings us that old argument the public utilities have been fighting over for many years—you remember, standing on an insulated platform to throw a switch.

We stand on steel grounded plates, and I am not going to try and answer that question.

MR. BRUCE: I wish we had a utility man in here, because he could probably give us some ideas why it is safer to stand on a grounded plate than on a non-conductor.

MEMBER: I am away behind on this matter, and I brought up this point because we are doing that in our plant—we are putting wooden platforms under switch boxes for the purpose of being non-conductors, and if I am wasting money I would like to know about it.

MEMBER: I think you fellows are having trouble because you are talking about different things. Surely it is proper to insulate yourself for protection against currents passing through conduction, but what we are dealing with here is radiated energy passing through the air or through any substance that is present. Here you ground yourself so that your body will have the same potential as the ground, very much as you ground yourself to keep from accumulating a static charge.

MR. DUNMAN: That expresses it very well.

MR. BRUCE: We will move on to the subject of lift trucks.

MR. ZESKEY: These trucks are coming into more and more general use in the plan-

ing mills, and also in the woodworking mills in the South. Wages are going up, cheap labor is a thing of the past; and, therefore, we have got to do more things mechanically.

In our place we use a great number of lift trucks, and we found that there is a hazard connected with those that we did not have before, when we used the slower moving lumber buggies to transport our stuff from one part of the plant to the other.

One of the worst accidents we have had this year involved the use of a lift truck. We had a girl operator on this lift truck; she was going down an incline ramp, and was apparently not paying much attention to where she was going and what she was doing; she made a sharp turn and turned the thing over, crushing her foot, and as a result, lost four toes.

Now, another problem we have had is the over-loading of lift trucks—they build up the load too high, and the lift truck operator can not see where he is going.

They usually try to run faster than they should. An operator gets into one of these lift trucks, and he gets a kick out of driving it at a rapid rate of speed down the tramway or through an aisle.

Those are some of the problems we have tried to overcome.

When you use a fast moving vehicle like this, you should definitely establish certain aisles for these trucks, because you do not have time to dodge in and out. If you have a cluttered floor, your lift truck will not operate efficiently, and one of its advantages is, of course, that it moves quickly. You do not want it to move too quickly, but fast enough to get your stock to where you want it to go, and with no unnecessary time lost.

We have tried to establish definitely marked aisles for the use of our lift truck operations, and we try to keep all material out of those aisles. In some plants these aisles are pretty much congested, and it is a problem, but this is the only way you can get efficiency out of your lift truck. You should have definite areas in which this truck operates, and nothing should be placed in the way of it.

MEMBER: This might seem to be a minor problem, but is there any paint that will stay on the lower prongs, to avoid the hazard of picking up somebody when crowding the roadway? We have tried to strip ours, but the paint wears off in about twenty hours. We go across a highway with ours, and the

lower prongs when the lift is empty are scooting along about a foot from the street, and people have a tendency to run into it.

MEMBER: We use chrome paint in our tanneries, where there is a great deal of acid.

MR. BRUCE: Does it stand the abuse?

MEMBER: Very much so; if it will withstand animal fats, it will withstand anything.

MEMBER: Would you recommend the load be below the line of visibility? Most loads do obstruct the view. Do you think it would be safe to look around the side?

MR. BRUCE: I think definitely the load should be kept below the line of vision of the operator. You know you can put your load away up in the air, if you want to, but when you travel it is difficult to see, and it was designed to be carried at the low point. If the operator can not see where he is going, he is in charge of a very dangerous machine. He has to depend upon the other fellow's getting out of his way. I definitely think the load should be kept below his line of vision, and in driving it should be to the lowest point where the prongs will go.

MEMBER: How about making the truck run backward when it is loaded? They run just as well backward as they do forward.

MR. DUNMAN: The seats on these trucks are made so that they will turn around.

MR. BRUCE: I also like to mention the fact that in expensive equipment of this sort, you do not want just any employee operating it. You should have special employees operating this equipment.

We also have the problem of the speed of these machines as they move around, and operate in relation to the load. There are many problems in this connection which must be taken into consideration.

We have made a careful study of the conditions in our plants in which we have these lift trucks, and as a result, we have had no serious accidents, as yet, in the use of this equipment.

MEMBER: We made a study sometime ago on electrically operated hand trucks in relation to accidents, and we found in our study that a good deal of trouble is encountered when you have change of personnel operating one truck, and then put them on the other trucks. There is a great need in the standardization of lift trucks as well as in all other electrical trucks.

MR. BRUCE: We use lift trucks around

dip tanks where we use a chemical for sealing the wood against moisture, and it also has toxic qualities. The solvent used with that chemical has a flash point about that of kerosene, and we have been somewhat worried about these lift trucks operating around these tanks where the fumes and vapors might possibly become ignited through backfire or sparking; so, we have equipped certain trucks that are used around the dip tanks with what the manufacturers call a protective assembly—the exhaust goes through water, and I think there are rubber caps placed around the sparkplugs. There is a real hazard there of an explosion caused from the backfire of one of these trucks.

MEMBER: There is a decided hazard there, depending upon conditions, of course. We do not allow any sort of lift with a gasoline motor or electric truck into an explosive area where there is a possibility of a backfire or any sparking. One must study the conditions under which you are operating. If these dip tanks are in an open building where the fumes are not confined, I would say that you are rather safe.

MR. BRUCE: Here is a question that has been handed to me: "Do you guard the trucks for protection of operators in case the load falls back in the truck?" I suppose that means to guard the operator or driver?

MR. ZESKEY: That question may have been asked because there is a tendency when some of the smaller lift trucks are used inside the plant to pile packaged material higher than the standard on the front of the truck. Of course, the only answer in preventing the load from falling backward on the operator in case he goes under a suspended bridge or something is to place a guard over the machine itself; that is easily done by welding pipes on the front of the machine in an arch over the operator so that he can sit under it all the time.

MR. BRUCE: There is the question of employees riding the forks. Of course, the answer to that is that it is a dangerous procedure and should not be permitted.

MR. HAGERUP: I would like to know if any of you members of the audience have had any experience of driving the gantry type carriers on the streets, and, in this particular connection, I know of several cases of jeeps and motorcycles going underneath these unloaded carriers, and it has driven the drivers

about crazy. Do you have any solution to that?

MR. BUTAS: We do have a solution to the problem. We have a suspended rail in back of these carriers, and when it is unloaded, it swings between the wheels.

MR. DUNMAN: Yes, we have the same solution and it is being used in Louisville on all the carriers.

MEMBER: Has any person had any serious accidents with gantry-type lumber carriers? We have had a couple of small accidents.

MEMBER: We have never had any accidents with them.

MEMBER: I know from reading the accident reports there have been a great many fatal accidents from them, people being run over by them.

MR. ADAIR: We do have thousands of those carriers operating in our lumber mills on the West Coast, and we have had a lot of serious accidents. I know of one case where a dock 90 feet above the ground gave way, and the operator and a couple of other persons working in the area plunged to their death in the river below. We have lumber docks where they possibly drive these carriers too fast, and possibly slide on wet floors, and tip over into the river or the sound. We have a lot of cases where the drivers go too fast in narrow passage ways, around the corners of the mills and buildings, and head on into other lumber trucks, and similar equipment. All of those things are simply due to improper methods of operation.

MEMBER: I know of one occasion last year where a carrier operator applied his brakes suddenly, causing the carrier to tip forward, throwing the operator to the floor. It so happened all he got out of it was a very sore spot on the seat of his pants, but it could have been very serious. I talked to the fellows about this, and of course, they all declared there were always chances of accidents.

MEMBER: It sounds like a case of faulty brake adjustment.

MR. BRUCE: We will move to the subject of accident and health hazards which are related to the handling of gloves.

MEMBER: Do we have any particular information in regard to dermatitis caused by these gloves. Can a man who is perfectly clean get this or is it caused by a previous skin condition? Our experience has been mostly that of a previous skin condition.

MR. ZESKEY: I have encountered a lot of different kinds of dermatitis in our particular business. We have found that many different types of chemicals can cause dermatitis on some one. I think it might be a question that comes up in connection with lumber dips. We have found that the safest lumber dip will cause a dermatitis on one person, and not on another.

Our solution to that problem is to put the dark skin persons on those jobs that might cause dermatitis, and also try to keep those people clean.

And, in answer to your questions, specifically, I think we can safely say, regardless of how clean a person is, we are liable to encounter dermatitis with any industrial chemical.

I would like to hear some more specific experiences on that because it is something I think we are all particularly interested in.

MR. DUNMAN: I think the best solution, regardless of what the salesmen and the catalogs tell you, is to provide hot and cold water, and good soap at the actual operating points. I mean in the particular area where the men are working. See that your supervisors instruct the men to wash their hands, faces, and arms three or four times a day; it will not hurt them; and it certainly will cut down on your dermatitis.

Now, coming to the man who is allergic to it. We put two men on the job; one is allergic to it; and the other is not. You can either transfer the man who is allergic to it or send him to a skin specialist, which we do to find out the cause of the rash.

In some cases you would be surprised to find out what causes the rash. We had one man who was the source of trouble for years to the first aid department, and we finally had him take a skin patch test, and strange to say nothing happened; we then sent him down to the central clinic and found the answer, syphilis.

MEMBER: What property in your glue are you having the most trouble with, and how are you handling it?

MR. ZESKEY: Formaldehyde, as far as we are concerned. You will find this dangerous, not in the mixing, but in the heat—formaldehyde will not give off fumes until it is heated to a certain point; so we devote a lot of time and money to this problem, and we have put vents over the presses to pull the fumes up.

You can take some people working within three or four feet of those formaldehyde fumes, and a rash breaks out on their faces.

MEMBER: Is this only true when the formaldehyde is hot?

MR. ZESKEY: Yes, only when it is hot.

You heat the stuff, and that causes fumes, and that is when your trouble starts.

MEMBER: I would like to ask a question about protective gloves. We have a problem around the dip tanks. We are using a neoprene glove, and the life of those gloves is just about two days. The chemical seems to soften the protective coating, and another thing is a certain amount of abrasive action when they are handling the levers that control the elevators which lower the stock into the dip or raise it. I have been wondering if any person knows of a protective glove that stands up and gives service for a reasonable length of time. We finally hit on the idea of putting a canvas glove over the neoprene to take out the abrasive action, but usually the stock size of the canvas glove is so small and the neoprene glove is usually pretty large, and when a canvas glove is pulled over the neoprene glove it has a tendency to curl the neoprene glove and makes it uncomfortable to wear. We tried to get an over-sized canvas glove, but they are not made, and the manufacturer we contacted was not interested.

I wonder if any of you who have provided rubber gloves for your men around any operations, have found one that stands up under abrasive wear, and chemical reaction?

MEMBER: The only thing I have found that would help in a situation of that kind is to provide a simple piece of hand leather which the person could slip on when he had to use the gloves. When he is handling material of any kind, he simply lets the hand leather drop down and uses that. It is a little bit cumbersome until the operator gets used to it. We also tried the glove over the rubber glove idea, but that did not work for us either.

MEMBER: Our experience with the canvas glove was similar to that which you experienced. However, we simply made a die and cut out some gloves; that was the best we could do, cut them and make them ourselves.

MEMBER: We furnish a canvas glove impregnated with neoprene, and we get good results with that.



MEMBER: In making wood boxes we get a lot of penetrations in the hands from the wire used in making these boxes, and I would like to know if there is any type of glove that could withstand the penetration of this wire?

MEMBER: There is an armored glove, and it has little pieces of steel woven into it; it seems to me that would serve the purpose.

MEMBER: What kind of glove have you been using in this work?

MEMBER: We haven't found a glove that could be used on this job as yet.

MEMBER: Well, a good, tough leather glove would work about most wire cuts.

MEMBER: We are thinking of putting safety shoes on our plants, or, rather, we are thinking of trying to get the fellows to buy them. I wonder if any firm in here has had any experience on that?

MEMBER: One firm in Louisiana has, in their contract, that the employers will buy and wear safety shoes.

MEMBER: Some firms pay a dollar or two dollars toward the purchasing of these shoes, and I think that is very helpful because it gets the fellows to buy them.

MEMBER: I know of one firm that maintains they cannot force their employees to buy safety shoes, but, when the men are

hired, they are informed that they must protect their feet. The company will supply them with steel foot guards. However, if they do not want to wear these guards, they can buy the safety shoes. I am informed the men buy the safety shoes.

MEMBER: In Utah, we have a state law that requires the employer to furnish all the necessary safety equipment. In many of our mines it is mandatory that the miners wear safety shoes, and, of course, the employer must purchase the shoes. However, we have had some trouble on that score also. I have found cases where the employer purchased the first pair of shoes, but the employees were found to purchase the shoes thereafter. This has never been brought to the Industrial Commission, and if it was, I think the employer would be liable for all the shoes that were necessary on job.

MR. BRUCE: Gentlemen, our time is up and we'll have to stop this very interesting discussion even though there are many questions that have not been considered. The sort of meeting exemplifies the original purpose of the National Safety Council—that it is a cooperative organization in which members help each other. I hope you will all continue this talking and answering throughout the week and that we can have more meetings of this sort at future Congresses.

### WEDNESDAY AFTERNOON SESSION

October 8, 1947

Presiding: LOUIS GLAZER, Insurance Manager, Dierks Lumber and Coal Company

### The Place of Engineering, Education, and Enforcement in a Wood Shop Safety Program

By W. B. MCSORLEY, JR.  
Vice-President, Huttig Sash and Door Company

The subject of the "place of engineering, education and enforcement in a wood shop safety program" covers a lot of ground and I feel that only the surface can be scratched here. Engineering may be defined as "the art and science by which natural forces and materials are utilized in structures or machines."

I would like to add to this definition of engineering the heading of "Human Engineering" because it has been our experience and possibly yours also that successful engineering of anything must be correlated with human engineering because if the latter fails, the former is useless.

The woodwork operation that will be re-

ferred to this afternoon covers a combined mill and jobbing manufacturing operation. This consists of both a special millwork factory that turns out custom made sash, doors, trim, cabinets, etc. and also a warehouse that assembles sash and miscellaneous millwork from cut or random length stock.

Briefly, we feel that the engineering as far as the mechanical safe-guards are concerned could follow out a program, something along the following lines:

(1) The installation of the most efficient guards that are available on the open market, or through your own resources, such as saw guards, jointer guards, etc.

(2) The guarding of such machines as shapers with satisfactory guards that will safely guard the point of operation on the work to be done. Shaper guards, of course, were widely in woodworking shops. As has been pointed out in all National Safety Congress Meetings, the satisfactory disposal of chips and saw dust as a safety measure, is highly desirable.

(3) The safe guarding of such machines as belt sanders, especially in the older shops, of machines where guards have not been built around the pulleys at each end of the machine.

(4) In various operations we used a number of fast operated cut-off saws and were unable to purchase what we felt was a desirable guard on the open market. Accordingly our maintenance department in working with the Safety Committee devised a very simple guard that is very satisfactory to us and is easy to construct.

(5) In the cases of old equipment of any kind, especially where belt driven or semi-belt driven, it is necessary that a complete review be made of this type of operation to see that every unguarded belt or moving part of any machine that can be guarded is guarded.

(6) In order to give a firm, safe, and non-skid footing around all machines we have found that a definite plan must be followed in regard to the placement of the material used at or near machines. Some firms prefer the newer safety walk footings, some like ordinary felt roofing, other firms have had good experiences with some of the many compounds.

It is our feeling that each operation in the respective plants should be studied as to what is actually a satisfactory means and

this will, of course, depend on the type and kind and age of your floor together with the handling conditions involved.

I do not know whether our experience with grinders has been different from yours. We have a saw filing room where much of our saw filing and knife grinding is done.

However, in different parts of the operation we also have grinders that are set up for the convenience of those machine operators who grind their own knives or who have occasion to touch up their knives, etc. We considered very seriously the matter of having all grinding done in our saw filing room, but because of the distance and the time loss involved we arrived at a compromise in which any work that is not immediately needed is sent to the saw filing room.

We have never been satisfied with the type of grinders that have been available on the open market for the reason that there is not room between the bearing and the wheel or the motor bearing and the wheel. The head of our maintenance department together with our safety committee got together, and made an improved grinder. One of the big advantages of this type of grinder is that it allows the grinding of practically any type of saw or knife that is used in a woodworking shop with ample room for the part of the saw that is being ground plus ample room for the operator. We feel that it is especially desirable when using very thin wheels, i.e. 1/4", 3/8", 1/2", etc. The cost is relatively low because in practically every woodworking shop some satisfactory wood or iron base can be found. All that is necessary is the purchase of suitable ball bearing bearings, the necessary shaft and guards.

Another advantage of this type of grinder in our opinion is the fact that the speeds can be varied without too much difficulty by changing the drive. Against that, of course, is the loss in symmetrical appearance that one gets from a self-contained grinder.

In connection with grinder guards, one of our maintenance men came up with the idea during the war of using old brake drums from automobiles. We found these highly satisfactory, and it was very simple to completely enclose the wheel by adding one more side through the means of boring through the circumference of the brake drums and fastening the opposite side guard by means of angles.

Possibly such grinders are available on the

market, but we could not locate any in our area or from any of the suppliers or manufacturers with whom we deal.

It is most necessary for safety that the safe speeds as given by the manufacturers are not exceeded, and that the guards fully conform to the current safety standards set out.

(7) Material hazards include the miscellaneous receiving, handling, storing and shipping hazards that are encountered in any woodworking operation.

Most of us have had accidents when unloading material from cars. Try as we can, we have been unable to eliminate accidents when material is unloaded. We have had employees back off the loading platforms even though our instructions say to always face the drop-off on the platform. We have had iron loading plates fall on employees' toes and bodies resulting in all cases in injury to the employees and sizable compensation. I have noticed in several woodworking plants that the temporary and sometimes permanent unloading skids or platforms in connection with lift trucks are made up with a strong wooden base at the four corners of which are either 2 x 4's or 2 x 6's, sometimes with or without braces. In a few weeks or a few months one or more of these legs is apt to give way with a resulting accident.

It is money well spent to eliminate such unsafe skids entirely and replace them with steel leg platform skids.

I imagine we have all experienced accidents or near accidents when using dollies on uneven floors. Many wood shops still use some of the small wheel dollies, possibly for the reason that they have not had a serious accident with them and also because of the scarcity of casters until recently. It is our feeling for the safe operation in handling material on dollies that a thorough review should be made by anyone using them and a definite oiling and inspection procedure be set up. This procedure should also include the careful watching of floors regardless of whether they are concrete, wood, mastic, etc.

(8) Like all other companies we have had our difficulties in handling and stacking lumber whether it be in storage racks, or stacked in the open or stacked for use for the dry kiln. It is a relatively simple matter to safe guard inside storage of moldings, etc. when they are stored horizontally by having safe ladders to reach the right levels and safe

platforms when these levels are reached.

It is not so easy to use this procedure when storing lumber in semi-closed outside storage racks. We have had many accidents when storing lumber.

For those companies who operate their own dry kilns in connection with their woodworking operation there is an added hazard. This hazard is just as great as is the amount of lumber and the height to which it is hand piled before going into the dry kiln.

The remedy for accidents resulting from piled lumber is to install a wood barrier, which also acts as a guide and which is built and anchored to the concrete loading platform.

It extends approximately 30" beyond the highest point at which lumber can be used in the dry kiln and at a distance of approximately 1' from the finished pile of lumber. At the particular loading kiln under discussion, there are four loading tracks so it was necessary to build these guards at both ends and in between the loading piles.

(9) Under the heading, material handling, it would seem desirable to consider the easy and safe operation of all door openings and the condition of these openings especially if any of the doors are fire doors and are faced with sheet metal. We have a hernia claim that was supposed to have originated from the alleged difficulty in opening one of our doors.

We have also had minor hand injuries occasioned by cuts and abrasions due to sharp or open edges of wood or metal covered doors.

Good housekeeping is probably as important or more important than some of the foregoing. We feel that good housekeeping is necessary for safety both from the personnel standpoint, the material standpoint, and the fire standpoint.

(10) If you are one of those unfortunate operators like us that are faced with a multiple story operation, we feel it is well to include the proper maintenance care of all stairways, landings, and rails, etc. including the installation of non-skid or non-slip material wherever it is possible that a slipping accident can occur. We have notices posted on stairs about the dangers of running down the stairs, etc. but there are still employees who will do this regardless of warning and the only recourse seems to be to lay them off. But when an accident occurs their story

is always that they were walking slowly and carefully.

Horseplay is something that comes up in practically every operation and it is needless to say that those who indulge in it should be discharged immediately. Many serious accidents have and will continue to occur because of horseplay.

Compressed air can be a hazard and we feel should be restricted to the use only of those employees who are authorized to use it. Under no circumstances should any employees be allowed to use air for brushing off their clothes, etc.

The subject of goggles has bothered a lot of us. We have been through several phases, some of which include the examination of all employees toward the end of finding out what condition their eyes were in and whether they should have glasses to aid them in their work.

To those employees who wanted to purchase safety eye glasses we were willing to absorb the prescription cost of the lenses. I am sorry to advise you that none of our employees accepted this proposition.

We also tried having goggle stations located near various grinders, shapers, etc. with cleaning materials, etc. Our experiences were unfortunate as many employees refused to wear goggles belonging to someone else.

Sometime ago we came to the conclusion that it was simpler and better for the company to furnish the necessary goggles to any employees who had need for them. These goggles theoretically belong to the company but are left with the employee at all times. In the event he leaves the company he is supposed to return his goggles. This may not make sense to some of you, but it was the best arrangement that we could work out and happily the majority of our people who need goggles in their work wear them.

Human engineering enters into the education of all of your employees. I imagine all woodwork operators have been through practically all of the phases of attempting to educate their employees to the point, that each and every employee finally realizes his own obligations and his obligations to his fellow workers to be a safe worker. That, of course, is the ultimate, and we don't know of anyone yet who has achieved it but as we have all heard so many times, we must keep hammering away on this point using as

many variations as we can to accomplish the desired result.

The shop safety committee is composed of (a) All foremen of all operation and shipping and receiving departments. The following are standing members of the safety committee: (b) one safety committee representative worker from each operating department or floor, (c) the superintendents of our general operations, (d) our employee in charge of our dispensary and first-aid room who is the chairman of the safety committee.

Those employees who are not foremen or superintendents but who represent each operating floor or department serve on the safety committee for the period of one year. After six months as a sub-member and six months as a safety committee member, they are then made ex-officio members.

All safety recommendations received through the safety committee must be approved or rejected within thirty days by the management committee. If rejected the safety committee is given a full explanation.

In addition to the safety committee outlined above, we have a fire brigade that consists of all of our safety committee plus employees from each floor and from every operation who have received training in the basic fundamentals of fire control and also in the special operations covering the use of the three types of extinguishers also stair and elevator guards, side exit guards, and hoistmen.

The Safety Council of St. Louis in cooperation with the fire department and the police department and certain large industrial companies inaugurated a fire school several years that has been very successful and we have sent all of our fire brigade to one or more of these meetings and in addition each year have several key-men take refresher courses.

We have found the bulletin and posters and the splendid messages from the National Safety Council to be of invaluable assistance in educating our employees.

For years we operated without a centralized first-aid and dispensary room but several years ago came to the realization that it was better to center all first-aid in one first-aid room, so that one man or his assistant could do all of the treating of minor injuries. We had to get a little bit hardboiled about this and after many warnings about employees removing splinters themselves and applying first-aid to minor cuts, etc., we deliberately

raided all of the men's lockers and got almost enough material to start another first-aid room. The result of this move, however, was to almost eliminate the series of unexplained infections from splinters, etc. that we had been having.

It is desirable that as many employees, both safety members and others take one of the first-aid courses under the Red Cross or under the company doctors. Our experience in expression from employees after taking these courses was more than enough justification for giving the men time off to take this course.

Our first-aid men do not attempt to treat any more than minor injuries but we do insist that any injury be it a small splinter, scratch, etc. must be treated in the first-aid room where a record is kept of the type and kind of each accident, the hour that it occurs, etc. and of course, if it is a more serious accident, a complete written report from the foreman and the safety committee member in that area.

During the war our company in common with all other companies, suffered excessive accidents due to the type and kind of employees available. For many years we have always had a pre-employment physical examination, however, during the war had to back down somewhat on our physical requirements.

The net result was a host of back injuries, hernia cases, etc. Now that we can have some choice in the selection of some of our employees, we are more and more apprehensive about those employees whom we expect to do laboring work and in those cases where the doctor's examination shows any past history relating to a back case or a hernia, we try to be extremely careful and take, if necessary, back x-rays before we employ this person.

Not to be facetious, but some of us looked at one of our departments recently that is supposed to do heavy work and found that about 50 per cent of the people in that one department were marked for light work only.

We do not know how we can operate our business by having employees fit to do light work only. I brought this matter up because I think it is a serious matter for all of us who handle wood products, as we frankly don't know the final answer.

In the case of old employees, i.e. bench hands, who have relatively light work, lay

out men, etc., we do not have much cause to worry because the majority of these employees are middle-aged or older and we have to be rather lenient on their physical condition.

As a word of warning, I believe most companies have had bad experiences when they employ young men, I mean up to twenty-one years of age, in any receiving or shipping operation where heavy goods must be handled.

They have the strength but they do not know how to use it and we have not found as yet a young man who, once his foreman's back is turned, will not attempt to lift or carry or haul something by himself that he should not do.

We have found that the motion pictures and slide films that are available from many sources are of considerable assistance in our safety program. We attempt to vary our meetings and have some with pictures and some without. Some meetings are held strictly within our own family group while for others as mentioned before, we have outside speakers.

We have suggestion boxes in each operating department and our safety man always requests suggestions from all employees. These can be signed or unsigned by the writer.

In addition to the information he will receive through the hiring office, a new employee must be thoroughly acquainted with his duties and this information should be given him by his foreman or his supervisor and even though the job may be simple, a lot of companies have found that a new employee especially in the lower job classifications, does not absorb information very rapidly. The foreman or supervisor should follow up this new employee religiously, especially in the early hours and days of his employment and instruct him how to do his job safely and efficiently.

The hiring-in office, as each applicant is sent to the examining doctor with his card, advises the doctor on a mimeographed form as to whether the job will be heavy work, light work, machine work, etc. in an effort to secure the doctor's recommendation as to the type and kind of work.

It is my conviction that enforcement is possibly much more difficult to achieve than engineering and education. Sometimes a man can be sold on using a safety device as

a precaution, whether it be safety shoes or goggles or a new type guard and some times you will think he is sold; the next time you hear from one of the safety men that John Doe is not using his new safety device.

There are other times when it is necessary to crack down, and get hardboiled with "either this is it or else" attitude. We have all had examples of the above. When you are faced with a possible loss of one of your oldest and best men that won't wear goggles while grinding except when he knows someone from the safety committee is standing near him, I realize we have a problem on our hands.

We have found out, however, that some of these die-hards do finally come around especially if something happens, not serious, to someone working near them or in a similar job and especially so if they have a narrow escape themselves.

We have had difficulty in getting employees in loading and shipping departments to wear safety shoes. I have talked to several of my friends on this subject and find that some companies furnish safety shoes to their em-

ployees and some do not. We will give him the necessary time off to get the shoes and have samples of the various shoes on display in our personnel office.

As close as we can figure it out, our men do not object to the cost of the shoes but they object to the looks of them and to the weight of them even though we all know that some of the better designed safety shoes look just like other shoes and are no heavier than other shoes. Practically all of our foremen wear safety shoes as an example, and in many instances it has helped considerably. Frankly, we do not have the right answer on this and we would like to find out how to successfully sell this idea because even in those companies that donate the shoes, accidents have happened to the employee because he did not wear his safety shoes that day.

In summing up, we do not know of any hard and fast rule for enforcement. We know it is sometimes necessary, but we know too, that if management does a good and thorough job of engineering and education it is seldom necessary to resort to it.

## Safety in Southern Logging

By JOE T. DUNLOP

Safety Supervisor, Dierkes Lumber & Coal Co.

According to the National Safety Council, the accident frequency rate in logging from 1942 to 1944 was 83.56. This is almost six times as great as the average frequency rate for all industry. This is not a favorable comparison.

Even though my company is working at the accident rate daily and has a frequency rate of 53 plus in the logging division for the period of 1944 through 1946, we still feel that we have only scratched the surface. However, since the accident problem of other type industry has been largely brought under control, we have hope that we too, by working together, can make steady improvement. We venture to say, if two hand tools—the chopping axe and cant hook—could be eliminated, accident frequency could be held to a minimum in southern logging.

I shall use the experience of my company for a five year period as an example—to show

how and where the accidents occur, and explain our approach for preventing them.

Basically, our safety program for loggers includes:

- 1—Keeping work groups and work teams separated in the forest.
- 2—Interesting and educating the supervisor in accident prevention.
- 3—Safety education for the workers.
- 4—Keeping a check on conditions of tools and equipment.

In order for each individual here to get a better picture of the overall problem, I have checked through our accident record files for a five year period and prepared a report. From this report you can get a bird's eye view of where and how our loggers are injured. We have divided the logging department into four divisions—log cut, track service, train service, and miscellaneous. This report indicates the trouble spots and gives us some

idea of where and how to apply corrective measures. Log cut is our hot spot. Here we have 16 per cent of our total logging personnel and 47 per cent of our total accidents. The ratio is out of proportion. In truck service we have 55 per cent of our workers and 41 per cent of the total number of injuries. This ratio is more in line. The ratio of the other two divisions is satisfactory.

We contend that unsafe acts, or unsafe practices are responsible for most all of our log cut cases. Conditions in the forest are beyond practical control, so far as the log cutter is concerned.

The log cutter must accept conditions—safe or unsafe—as he comes upon them. The reason, of course, is that he passes a given way only once. The conditions around the base of a tree may be hazardous, but the cutter will be there only long enough to tell the tree. Therefore, nothing is done except perhaps "brush out" to make conditions safer. So it is in felling the tree, when other timber must be reckoned with, conditions can be changed very little. Furthermore, in cutting the tree into saw logs, it is impracticable to remove all tripping hazards, level the work area and otherwise make the work area safe.

We are told and we believe that the basic causes of accidents are unsafe acts and unsafe conditions. Consequently, accident prevention programs are designed to prevent unsafe acts and prevent or remove unsafe conditions. In substance, that is what we are all trying to do. But, if conditions in the forest are beyond practical control, so far as the log cutter is concerned, we must rely solely on the prevention of unsafe acts to protect him. What I am trying to say is that our safety problem here is largely a personnel problem—a training, supervisory, and educational problem. Of course, we can and do keep a check on conditions of tools and equipment. But, this alone is not the answer. The worker must be trained in the basic fundamentals of his job. We must instill in him the proper "know-how" to protect himself and a lasting desire to do the job the safe way. In addition, the supervisor must be interested and educated to the extent that he will fulfill his duties and obligation in this connection.

We have assigned each accident to an agency, or accident source and also to the main unsafe act connected. The chopping axe accounted for 46 cases out of a total of

98—almost 50 per cent. Since the axe is a pre-historic hand tool that evolved from stone to steel and is not unsafe in itself we must assign each personal injury to something the worker did, or something he failed to do. So, it seems to me that he either assumed an unsafe position, such as placed his foot or leg in the line of cut; failed to grip the handle properly; misjudged the material being cut; failed to observe the surroundings; or, placed the axe in an unsafe position. The reason for such unsafe acts, in my opinion is due to two things—speed and a lack of "know-how." An example of improper gripping of an axe handle is a chopper swinging the axe with one hand at a bush or vine. The axe glances, and control is impossible.

An example of misjudged material is the worker assuming a rotten limb so he saws and swinging the axe accordingly. The axe passes through freely and carries on to strike the ground or his foot or leg. Failure to observe surrounding sometimes results in the axe being caught by a limb or vine, behind or overhead, which deflects the axe. Control of the axe is lost. It is likely to land anywhere within the radius of the handle. So again I say, if the axe could be eliminated, the accident frequency rate in southern logging could be held within reasonable bounds. I am not optimistic enough to think that the axe is on its way out. It will be used next year and during many years to come. Here is a challenge and an opportunity for the manufacturer or the Safety Council, to prepare educational material on the safe use of this menace.

The agency with the next highest toll is falling trees, limbs, etc. This accounted for about 30 per cent of our log cut cases during the past five years. There is a rule in our safety rule book (a copy of which is issued to each new worker) which reads, "when the tree starts to fall, sawers should step well to the side and backwards, then look for falling limbs."

In studying the relationship of accidents to "on the job experience" we note that the majority of cases occurred to workers with less than one year experience. One would think that a log cutter, after 3 months at the job, would have obtained enough "know-how" to protect himself.

We make some special effort to protect our log cutters, such as:

- 1—Separate each saw team by zoning the

cutting. This prevents overcrowding and reduces the chance of a worker being struck by a tree cut by another saw team.

- 2—Provide them with equipment for handling tools safely in transit from camp to work area, etc.
- 3—Distribute safety rule books to new workers covering the principal hazards of his job.
- 4—Provide first-aid kits at all times and salt tablets during hot weather.
- 5—Offer to provide them hard hats and recommend they wear safety shoes with rubber or composition soles.
- 6—Occasionally, have safety meetings, on the work area, discussing previous accidents, accident trends, etc.
- 7—Insist that foremen keep a watchful eye over them at all times.

In the Truck Service division we have a different situation from the Log Cut division. Here a great percentage of the accidents are caused by controllable conditions. Unsafe conditions, mechanical and physical hazards, enter into the picture. So, to get the job done, we must rely on our proven safety program of preventing unsafe acts and removing unsafe conditions.

To begin with the condition of tools, equipment, roads, bridges, and banking area is important. A glance at the report should be of interest. Here the cases are assigned to an agency and type of accident. Unloading a log truck with cant-hook accounted for 23 cases out of a total of 115. This gives weight to my former statement in regard to eliminating the use of the cant-hook. Fourteen of these workers (truck drivers) were struck by falling or rolling logs, eight struck by flying objects such as cant-hook, skid poles, etc., and one fell or was thrown. Training in the safe use of the cant-hook is recommended. But it does not insure safety. Unloading logs from a vehicle with a cant-hook is very dangerous at the best. The size and condition of logs has a bearing on the hazards. Often a worker must expose himself to danger when a large, crooked log, perhaps with protruding knots is encountered. Mechanical means for unloading have proved much safer.

My company has developed a rig which is nothing more than a bulldozer with a pushing assembly attached. In fact, we now have two in operation and could use others. We call it a "push-off-rig." Prior to its develop-

ment, we tried other mechanical methods which did not work out well. The push-off rig is maneuverable and can take care of a rather large fleet of trucks. It saves truck time and will prevent the type accidents caused by the use of the cant-hook. Incidentally, the 23 cases listed, occurred at points where the push-off-rig was not in use. It is not practical, however, due to initial and operating cost, where a small fleet of trucks is used.

Defective trucks and dangerous roads were charged with only five cases in this division. Steering mechanism, brakes, rear view mirror, etc. are the portions of a truck that interest our safety department. Normally, the operating department will take care of other matters without assistance. Each truck driver is required to make a written report on the condition of his truck at the end of each work day. If the truck is okay, he so reports, otherwise, he lists the conditions needing attention. This places the responsibility where it should be, and it also furnishes the truck repair crew with valuable information. The report is countersigned by the shop foreman when the truck is again placed in condition to roll. We credit the good experience here to this activity and to the use of government on trucks.

Passing rapidly through the other agencies and type accidents, we notice that the loading and unloading of truck trailers were charged with six cases. Comparatively, this is not considered a dangerous task. The coupling pole, however must be watched, or it is likely to swing to the side in an arc, or fall on a worker's hand.

When in the process of hooking tongs on a mechanical log loader where "A" lines, or end tongs are used, the hooker must guard against being caught by the guide lines. Entanglement can be avoided, if they will keep the loose ends of lines from under their feet and if the operator will observe closely. Team work between the operator and hooker is important. Last year, after we had one hooker killed and another whose leg was broken by being caught in the loops of tag lines, we prepared our own safety poster and used other means of educating those not yet in the hospital or cemetery.

Another hazard is the skidding cat which has proved to be more dangerous to the helper (choker hooker) than to the operator. The helper, or choker hooker is injured

in numerous ways. For example: he is struck by, or his foot is caught under cat, broken strands in cable and sharp points of hooks injure his hands; and, he is struck by limbs, logs, etc. Incidentally, like the log cutter, here is another case where conditions can be improved very little for his safety.

Part of the workers of this division use the axe and saw. Ten workers were injured by the unsafe use of these tools.

Twelve workers were injured while engaged in the work of repairing equipment. The unsafe acts connected were—failure to wear eye protection, unsafe use of hand tools, used wrong tool, failed to get first-aid, etc. The acts committed are common to the average garage, or repair shop.

Aside from the measures already mentioned, we carry on a few others for the physical protection of our workers. They are:

1. The safety department publishes the Co-operator, the company house organ, monthly.
2. Intra-division contests, based on accident frequency, are run monthly. The award is the privilege to fly a safety banner until lost to some other division. This banner indicates to the workers that they have made the best safety record during the previous month. Its purpose is to create interest.
3. About 50 personal prizes are given away monthly. Drawings are held to determine the winners. To be eligible for the drawing, a worker must have worked a given number of days during the previous month free of accidental injury. Here again, the purpose is to stimulate and hold interest.
4. Safety posters from the National Safety Council are used.
5. Film-slides and motion pictures are also used.
6. Pre-employment physical examination, to weed out those who are not physically fit, is a standard practice.

7. Investigations of accidents are made in order to learn the causes, so that recommendations for prevention will be sound.

So far as we know, there is no short cut to preventing accidents. We are dealing with people and no given two are alike in age, experience, temperament, and personality. Therefore, safety programs are designed to reach them all. The process might be shortened if we had "safe practice" pamphlets on the safe use of common tools, and on the safe performance of common jobs. The preparation of such pamphlets is within the province of the Safety Council and the members of this Section. There is a dire need for more and perhaps better educational material. Preaching safety to the employees is like talking to a parade—your audience is never stable.

I note that the Northeastern Forest Experiment Station of Philadelphia is preparing a Northeastern Logger's Handbook. Fred C. Simmons is the editor. He has the following to say about the matter: "If you want to be a mechanic, you will easily find plenty of good books which will tell you what you want to know. You will also find plenty of instructors and training shops. What about the young man who wants to make his living by logging? For him there is no good source of information to which he can turn. The books and courses on logging are for the logging engineer—not for the fellow who uses the axe and crosscut. Why shouldn't there be a simple illustrated handbook which will tell the young woodman not given woodman) what he needs to know about the care and use of his tools and the best of the old and the new techniques for logging. He needs to know the 'tricks of the trade' as much as anyone."

We agree with the editor and are in sympathy with his project. It should be my business and your business to give this and similar projects our full support.

### The Safety Problem of Logging in the State of Washington

By DAN ADAIR

Supervisor of Safety, Washington State Department of Labor & Industries

The State of Washington has the largest reserve of high grade timber in the U. S. it

has the largest timber and lumber equipment in the world, and in Longview the

Long-Bell Lumber Company has the largest sawmill in the world. Washington has also the roughest terrain, in which logging is done, in the U. S. and the highest frequency rate of any industry in the world.

The casualty toll in this State's logging industry is out of all proportion with the toll in other industries. The logging industry comprises approximately 3.5 per cent of the total industrial man-hours worked in the State of Washington but accounts for over 27 per cent of the total fatalities in the State.

The following columns indicate a certain trend toward a lessening severity. It is significant that the low in fatalities (1948) is 56.3 per cent of the high (1942) and that the low in man-hours (1948) is 80.3 per cent of the high (1942). It is also heartening to note the trend of steady decline in fatalities from 1942 to the present. In the last week of September the number of fatalities reported in logging for 1947 totalled 50.

| Year | Fatalities | Man-Hours  | Frequency* |
|------|------------|------------|------------|
| 1930 | 89         | 23,164,112 | 160.03     |
| 1941 | 94         | 24,245,353 | 161.04     |
| 1942 | 96         | 24,937,426 | 157.11     |
| 1943 | 66         | 24,474,192 | 126.13     |
| 1944 | 68         | 23,659,019 | 126.41     |
| 1945 | 59         | 18,549,713 | 142.50     |
| 1946 | 51         | 19,864,428 | 147.10     |

The logging payroll in the State of Washington for the year 1946 was \$32,859,414.00. A man equal to 5.3 per cent of this payroll was used in meeting the various direct industrial insurance costs incurred by injured in this industry. To meet this cost, logging carries one of the highest rates in the State.

Direct industrial insurance costs, for the year 1946, totalled \$1,779,090.34. Introducing the generally accepted four-to-one ratio, the logging industry in Washington is footing an annual bill of \$1,779,090.00 in direct industrial insurance costs and approximately \$7,146,360 in indirect or hidden costs which total \$8,925,450.00. At the present average hourly logging wage this sum would be sufficient to meet the payroll of all logging operations in the State of Washington for approximately three months. It is also a sum sufficient to give to each employee in the logging industry, a 25 per cent raise in wages while not costing the employer an additional dollar.

Logging employees during the year 1946 worked a total of 19,864,428 man-hours. Dur-

ing this same year employees in the logging industry lost, because of industrial injuries, an estimated 6,592,419 man-hours. At the current hourly logging wage their man-hours represent \$10,899,177.00 in wages which employees did NOT get. When reviewed in the light that compensation awards to injured employees are \$0.445 per hour and the average logging hourly wage is \$1.58, the loss to an employee accrues at the rate of \$1.555 for every hour his injury absents him from his work. The amount of wage loss to employees is a sum equivalent to one-third of the total logging payroll in the State.

In like manner the employee's dependents are affected by decreased income on a comparable scale. As of December 31, 1946, there were, in the logging class, 1578 pension cases comprising 274 permanently injured workmen, 619 minors, 133 dependents, 236 widows and 16 attendants.

Buckers and fallers are the occupations which most frequently incur injuries sharing 47.3 per cent and 16.4 per cent of the total respectively.

### Number of Logging Injuries by Occupation—Year 1946

| Occupation                             | Compensable Injuries |
|----------------------------------------|----------------------|
| Buckers                                | 1,031                |
| Fallers                                | 357                  |
| Chokermen, choker-setters, rigging     |                      |
| slingers, skiddersmen                  | 276                  |
| Loaders and tongmen                    | 176                  |
| Teamsters, truck and car drivers       | 111                  |
| Hook-tenders                           | 77                   |
| Chasers                                | 50                   |
| High-riggers                           | 35                   |
| Donkey engineers and firemen           | 15                   |
| Dragmen                                | 12                   |
| Pumpmen and handymen                   | 8                    |
| Whistle-punks and signal men           | 7                    |
| All others                             | 5                    |
| Section crew and graders               | 4                    |
| Railroad brakemen                      | 3                    |
| Machinists and mechanics               | 3                    |
| Railroad engineers and firemen         | 2                    |
| Foremen, superintendents, owners       | 2                    |
| Boom-men                               | 2                    |
| Powdermen                              | 1                    |
| Bull cooks, cooks, kitchen help, flers | 1                    |
|                                        | 2,178                |

(Additional tables were presented showing types of accidents and nature of injuries in the several occupations. Complete copies of these tables are available in the library of the National Safety Council.)

The Northwest is the only remaining frontier in the United States where a man with an axe, an adze and a saw, and the urge of adventure, may tap the reserve of green gold in his country with little more than the will and the industry to make it pay. True, many large firms have adopted broad and comprehensive policies of forest conservation and conservation of human life and limb which have resulted in a surprising reduction of their accident record. However, the two, three, four, five and twenty man logging operations are little influenced by policy and they continue, in the line of the pioneer tradition, to hew their livelihood out of an economy which has considerably changed since to day of his forebears.

To assist the logging operators of the state, the Division has recently completed preliminaries of a revised logging safety code in which the educational features of firm committee organization has been stressed. This proposed code has been also adapted to cope

with the great mechanical and equipment advancement which this industry has seen over the last few years.

In line with the conviction that the first step toward improving accident rates is the realization of the problem the Division has, through its logging periodical, urged the firms of the state to adopt a "community of effort" approach toward the solution of the logging safety problems.

Within the limits of its personnel facilities the Division has also extended, with considerable success, special foreman training classes. It has, through its available channels, also urged that management evaluate, and insofar as practical, standardize job methods.

Many large firms in the State of Washington have made great contributions to the field of safety through their studies and through the perfection of their organization spirited by an advanced safety policy, but the field of the problem is great and a satisfactory solution is not yet in sight.

Mr. Adair presented the motion picture film *State Logging* produced by his department.

\*Frequency is the number of compensable injuries per 1,000,000 man-hours worked and does not include injuries resulting in 3 days or less disability.

## Transactions

### 35TH NATIONAL SAFETY CONGRESS



VOLUME XXVI

FARM SAFETY SESSION

NATIONAL SAFETY COUNCIL, INC.  
20 NO. WACKER DRIVE • CHICAGO 6, ILL.

## Foreword

**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

### **THE NATIONAL SAFETY COUNCIL**

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## Farm Safety Sessions

Farm Conference—National Safety Council, 1947-1948

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*Chairman*—KIRK FOX, Ed., "Successful Farming," Meredith Publishing Company, Des Moines, Iowa

*Vice-Chairman*—RANDALL C. SWANSON, Farm Safety Specialist, College of Agriculture, Madison, Wisconsin

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## TUESDAY MORNING SESSION

October 7, 1947

Presiding: G. L. NOBLE, Managing Director, National Committee on Boys and Girls Club Work; Vice-President for Farms, N.S.C.

**The Progress of Farm Safety Work**

By T. A. ERICSSON

Consultant, Rural Services, General Mills, Inc.;  
Chairman, Farm Safety Committee, N.S.C.

Accident prevention on the farm and in the farm home is a comparatively new feature in the national safety program. Much effort has been put forth for many years to reduce and prevent loss of property and human life and to make city life more secure by transportation agencies, industrial groups, and all urban work activities. The industrial program is 40 years old and the traffic program nearly that old.

Until just a few years ago, people generally thought of life on the farm as a calm, quiet, and secure life, free from the dangers of the factory, mill, railroad, and public highway. The farm home was often referred to as a "haven of safety" and free from dangers.

In a comparatively short time the gentle ox and hand plow, the hand cradle and sickle for harvesting our grain, and the hand and peg for picking our corn has given place to the most complicated machinery—the tractor, the combine, the corn picker and others.

This mechanization of the farm had come so quickly that we failed to appreciate its full effect on farm activities. But even before the advent of the new complicated farm machinery and the power of gasoline and electricity, the farm and farm home had many accidents. For some strange reason we had paid practically no attention to the fact that the farm home caused many accidents and that falls in the house caused many deaths. No effort had been made to prevent accidents.

In the same way, for the farm home the dangerous gasoline became a common fuel. Gas and electricity, with more complicated home equipment, brought new hazards.

Our farm mothers and their daughters welcomed these new labor-saving aids but didn't fully appreciate that these new forces must be understood and handled with care.

New responsibilities were placed on the housewife.

The first definite farm safety program was announced about 13 years ago. About that time the Agricultural Extension Service, through its 4-H clubs in two or three states, announced farm safety activities. Minnesota added the farm safety activity to the 4-H program in 1934. It was felt that avoiding accidents is largely a matter of education and that it fitted in very effectively in the 4-H work, FFA, scouting and the rural school.

Mr. A. V. Rohwedder, a member of the National Safety Council, was probably the first man to be instrumental in bringing the farm safety activity of the 4-H clubs to the attention of the National Safety Council and the need of a nation-wide farm safety program. He succeeded in having 4-H leaders and other youth workers appear before the council to tell about the 4-H safety activity and how it was calling attention to and helping effectively in the accident situation on the farm. This was 1935.

These special reports aroused interest of the National Safety Council in the need for farm safety work. One result of this created interest was the adding of a farm safety conference to the National Safety Congress. Interest in the farm and home program continued to grow so that in 1942 Mr. Stanley Kirshaw was engaged to direct this special project of the National Safety Council.

Mr. Kirshaw invited representatives of various groups interested in rural life to meet in Chicago. The first such conference was held in the National Safety Council office in 1942, which was attended by delegates of the 4-H clubs, boy scouts, public schools, farm press, and others. The home was represented by Miss Dorothy Fischer Canfield of *Good Housekeeping*. This conference discussed a possible program, the value of a national

conference, and decided to hold a second meeting.

The first regular farm safety sectional meeting of the National Safety Congress was held in 1942. At the suggestion of Mr. Rohwedder, an advisory committee on national farm safety work was appointed that same year, which held its first meeting that same year in connection with the National Safety Congress in Chicago. It is interesting to note that several members of the present Farm Safety committee Mr. Pontius of Ohio, Mr. Peterson of Iowa, Mr. Mohler of Kansas, Mr. Lehman of Illinois, and your speaker were members of this first committee. The first committee had interesting meetings and talked about the need of farm safety. It was a purely advisory committee.

Mr. Harold Miner of the Dupont Company, a vice-president of the National Safety Council, acted as chairman of the first sectional meeting.

Mr. Mohler was chairman of the second conference in 1943, conducting a panel on farm safety. This was a very interesting panel discussion because it presented a picture of farm safety at the time.

In this panel Mr. Pontius emphasized the fine safety work carried on by the farm bureau and by FFA members in Ohio, the writer told of 4-H farm safety activities in Minnesota, Mr. Mohler presented the Kansas program, Mr. Lehman the Illinois plans, and others told what else was being done.

The beginnings of definite farm and home safety work were made in about 1934 and 1935 by the 4-H clubs in Minnesota, some of the first adult work in Kansas, FFA groups in Ohio, and Illinois in various ways seem to have been the states to make beginnings as suggested along lines in the above panel.

In 1942 Mr. Kirshaw suggested and directed the first state-wide farm safety conferences in two of three states with success.

Mr. M. H. Coe, for 20 years the 4-H state leader of Kansas, was appointed director of the national farm safety program of the National Safety Council in January 1944 and has guided the work very efficiently since then. Mr. Coe had cooperated with Mr. Mohler in developing an effective farm safety program in Kansas, which included both adults and the 4-H clubs. Mr. Coe was unusually well qualified for the work as director of a national program, because of his experience in Kansas.

The farm and home safety program has made outstanding progress in many ways since Mr. Coe became its director.

In the first place, it has been given recognition as an important division of the National Safety Council so that two members of the farm safety committee are members of the National Safety Council and the farm and home safety section.

Mr. G. L. Noble, director of the National 4-H Club Committee and a member of the farm safety committee, was elected to the National Safety Council and was made vice-president in charge of farm safety. In 1946 Mr. Kirk Fox, another member of our committee, was made a member of the general council.

The farm safety committee is the guiding group which, under Mr. Coe's direction, helps to build the national farm safety program. This committee has been enlarged so that it now in a very effective way represents farm organizations, the agricultural press and radio, the agricultural extension service, farm youth programs, farm equipment interests, rural health groups, and others.

As a matter of record, the names of committee members are attached. The committee plans to meet four times per year and has several sub-committees which make a study of various features of safety work during the entire year—so our farm safety committee is a permanent all-the-year acting force to assist the director.

The greatest single plan of progress the last four years is the conducting of a National Farm Safety Week each year. The week selected for this purpose was the third week in July.

Each year the President of the United States has issued a special proclamation for the week and many state governors have followed the same plan. The National Safety Council has issued and distributed special literature on farm safety. The press and radio have given much publicity to the plan.

Reports indicate that nearly all of the states have used this week to make both urban and farm people safety conscious. It is a week when by the press and radio, at most rural meetings by speakers, by the distribution of timely safety literature, by farm equipment dealers and businessmen the importance of accident prevention on the farm is brought before all the people—both urban and rural.

One of the outstanding features of the na-

tional farm safety program was the plan of employing full-time specialists to direct the work on a state-wide basis.

Wisconsin was the first state to take this step in employing Mr. Randall Swanson in 1945 with funds provided by the state legislature. New York, Ohio, Indiana, Michigan, Illinois and Iowa have followed the example set by Wisconsin, with funds provided on different plans. The Minnesota Farm Bureau employed Mr. W. A. Dickinson several years ago on the plan of spending much of his time on farm safety work—at present, practically full time.

Pennsylvania seems to be ready to employ a farm safety specialist.

The present state farm safety specialists are:

|                |                     |
|----------------|---------------------|
| Wisconsin..... | Randall Swanson     |
| Ohio.....      | W. E. Sturkey       |
| New York.....  | Katherine Olmsted   |
| Minnesota..... | W. A. Dickinson     |
| Indiana.....   | F. R. Wilsey        |
| Michigan.....  | Fred Roth           |
| Illinois.....  | W. Wendell Whitlock |
| Iowa.....      | Norval J. Wadde     |

The 4-H clubs must be given credit for having begun the farm safety work and for having put over the most "Doing" safety programs. Several states, as already noted, began this activity more than a dozen years ago and have done much to bring the importance of the work before the public. The 4-H safety work has grown so that during the last four years a national contest has been conducted under the direction of the National 4-H Committee.

In 1944 the Mennen Company of New Jersey sponsored the contest and provided funds for a prize money award, including national trips and farm scholarships. The last three years General Mennen has supported this plan in the same way. This plan is now used by a majority of the states with a large enrollment of 4-H members.

Each year a farm and home safety conference has been carried on in connection with the National Safety Congress with very interesting programs. As an illustration of outstanding features on this program, the lecture of Dr. Young of the Mayo Clinic, Rochester, Minnesota, may be cited from the 1946 meeting. His lecture received front page notice in Chicago dailies. In 1946 the panel discussion by the state farm specialists also illustrates the outstanding features.

The farm safety committee has a regular meeting at this time. The conference brings together the outstanding leaders in this work.

An important feature of the safety program is the literature distributed. The department cooperated with Sears Roebuck & Company in producing a very interesting and helpful safety film entitled, "A Stitch in Time," which has been used a great deal in many states and has created much safety interest.

The first important booklet on farm safety was issued by the International Harvester Company. This booklet has had a very wide distribution and is still available. In 1944 T. A. Erickson prepared a booklet, "Safety Guide for the Farm and Home Front," especially for boys and girls. This was published by General Mills and had a distribution of 675,000 copies with every state represented.

The Farm Division of the National Safety Council has prepared many posters and leaflets and distributed these throughout the land.

The Farm Division has also published a semi-monthly magazine, *The Farm Safety Review*, for five years. Interest in this magazine has steadily grown and is one of the very valuable connecting links with rural leaders and the national program.

Mr. Coe's department is now working on a plan whereby industrial firms, farm equipment companies, farm organizations, banks, etc., purchase a large number of subscriptions to distribute to the patrons. As an illustration the Minneapolis-Moline Power Implement Company recently ordered 2,000 copies so that their field employees will each receive the magazine.

Mr. Coe and his assistants are trying to develop a field program—working on the basis that a certain amount of field work is necessary in order to be in close touch with the needs and development of a national program.

Mr. Coe has attempted to visit as many states as possible to give talks, hold conferences, and to assist state and county programs in various ways.

Organized agriculture, the Agricultural Extension Service, the Grange, Farm Bureau, Farmers' Union, and Farm Co-operatives have co-operated in helping to build this farm safety program. Farm safety work offers organized agriculture great opportunities to be of service to farm people.

State and local health associations have had

an important share as illustrated by the work in New York.

The general state, county, and local safety committees of councils have responded in an effective way to help. One of the most important steps in the progress made has been in the help given for organizing community, county, and state safety councils and committees. Real progress is made by a community when a special farm safety committee is selected.

As an illustration of a strong county farm safety program, the plan used in Yellow Medicine County, Minnesota can be given. This county has a regular county all-safety council. The farm safety committee is a part of this council. The committee is made up of one representative from each farm group in the county. This committee holds separate meetings, and the whole council helps with the work.

What these groups have done to help is only an indication of the importance of the accident prevention in their activities.

A new idea is being suggested in the national farm safety program. This is a plan for setting up a definite membership in our nation-wide program. If this idea is carried out, the various groups having a relationship to the national program would have a regular membership and pay a small fee. This fee would be comparatively small and vary with the size and importance of the group represented.

Those who favor this plan feel that the groups holding a membership in this way would be more interested and more active in the program. This plan also may add a substantial part to necessary funds for the national work.

The National Safety Council depends on voluntary contributions for carrying on its work. The farm section has made a beginning in developing sources of financial support and methods of securing it. A substantial amount has been raised in this way during the last year.

We owe a special vote of thanks to the farm equipment interests for the heavy response they have made to this plan.

This brief presentation has suggested the origin and early growth of farm safety as a definite program. It has suggested plans carried out which have helped build a fairly

successful national farm safety program. The most important part of this report is that it suggests the great opportunity there is in helping to save the lives of some 30,000 farm men, women, and children, the number killed by accidents each year, and to reduce and prevent the great unhappiness, suffering, and economic loss caused by needless farm accidents.

The most promising feature of this report is that we can very emphatically state that rural people have been made aware of this needless waste and that many of them are taking part in the safety work.

The important progress in farm safety work made so far is not altogether in the definite things which have been done in accident prevention as in interesting and organizing rural and urban people and in helping them build programs for accident prevention in the future.

The Agricultural Extension Service with its more than 7,000 county agents and several thousand state specialists, all ready to make use of features which would be helpful to rural life, and the farm organizations would seem to be the important forces to carry on this safety work.

The 4-H clubs, the FFA, rural scouting, and other voluntary youth groups are ready to carry on safety work but must have adult leadership.

Every rural school should be interested. What we need in order to meet the challenge of farm accident prevention opportunities is to strengthen national and state direction.

Some unusually interesting items appear in a statistical report by the Extension Service of the U. S. Department of Agriculture of activities in safety and health during 1946:

1. An average of 2% of all county extension agents' time was devoted to this work.
2. 294,530 4-H members had participated.
3. 519,173 4-H members reported helping in removing fire and accident hazards.
4. 1,944 counties participated in this feature.
5. 2,496 counties reported safety work and health a feature of their program.
6. 65,218 local leaders reported helping with these activities.

### Contributions to Farm Safety by the U. S. Department of Agriculture

By M. L. WILSON

Director of Cooperative Extension Work, United States Department of  
Agriculture

The national farm-safety program, in which the Department of Agriculture, the State extension services, and numerous business and institutional friends of agriculture join hands, is one of the more effective cooperative educational programs I know of. Those connected with the Farm Safety Division of the National Safety Council can take particular pride in the success they have had in correlating the various cooperative efforts.

Farm-safety activities of the U.S. Department of Agriculture must conform to the legislative authority and the appropriations made by Congress. Specific authority and appropriations have not been given for conducting a program of farm safety in the sense of a coordinated action program. However, many research projects and action programs carry inherent authority for including related farm-safety considerations. The Forest Service also has specific work for fire control in cooperation with states on private forest lands, as well as in the national forests. The general authority of the department, particularly in information and cooperative extension work, has long been used to make available to farm people and the general public the research findings, knowledge, and experience of its scientific and technical staffs. A very considerable contribution to farm safety has also been made by safety engineers, the Office of Personnel, and others concerned with the safety of United States Department of Agriculture employees.

The Department's contribution to farm safety may be divided into two types of activity. First, those essential to the Department's own work affecting farm people; and, second, those in cooperation with other organizations working together for an effective nation-wide program for farm safety. With reference to the first, the Department has a good record in safeguarding farm people and farm property wherever safety has been an essential factor in the release of information from research or investigations, or in the conduct of its action programs. The Department's experience in the field of general pro-

grams carried on cooperatively with other organizations is relatively new, having begun vigorously during World War II.

In this connection it may be well to recall that efforts to conserve manpower during the First World War were later stepped up as accident statistics were compiled and the country became statistically conscious of the serious cost of accidents. Various industries, such as mining, transportation, construction, and manufacturing, became safety-conscious and took steps through research, education, and enforcement measures to safeguard workers and the public. The National Safety Council has given inspiring leadership in this humanitarian and economic service, and many public as well as private organizations have been anxious to do all they could to cooperate. We now have a similar opportunity to advance safety not only in agriculture as an industry but also in farm and rural living.

Agriculture, of all the great industries of this country, has required the longest time to go through the technological revolution. Agriculture is now daily aware of new implications of this age of steel. Although the modern steel plow and the self-reaper were used in more than 100 years ago, along with the steam locomotive, the steamboat, and the telegraph, the one-mule plow is just becoming obsolete. Farm field work is now largely motorized, and electricity on every farm is a goal not unattainable in our lifetime. Safety research education and codes must keep step with this progress. Our mechanical ingenuity must be matched by equal imagination in innovating safeguards for farm families. We are gratified that the National Safety Council is furnishing such imagination and making available its leadership in this field. If we all work together we can render the greatest aid to our 6,000,000 farmers, their families, their workers, and the entire rural population.

Six Major USDA Contributions  
What are the Department's major contribu-

tions? Let me outline them under six main headings: (1) Employee safety; (2) agricultural safety surveys; (3) research and investigations; (4) public safeguards in action programs; (5) information and cooperative extension work; and (6) coordination.

(1) *Employee Safety.* A public agency contributing to farm safety should practice safety itself. The Department does. The director of personnel for the Department and the personnel officers of all agencies in the Department, each has some person or persons concerned with promoting safety among employees and maintaining the reports and records of accidents and compensation. But that is employee safety work, not farm safety. The significance of employee safety activities is twofold. First, the field workers of the Department are kept in touch with the farm program and kept safety-conscious for farm people as well as for USDA employees. Second, safety engineers and others concerned with employee safety greatly strengthen the farm-safety program.

(2) *Agricultural Safety Surveys.* In January of this year the Bureau of Agricultural Economics included a section on farm accidents in the nationwide economic sample survey of about 15,000 farms in 814 counties. Modern sampling methods were used to provide a sample of farms and farm operators that would be representative of all types of conditions in all parts of the country. The period sampled was the last three months of 1945. The data on farm accidents obtained by some 400 interviewers are probably the most reliable compiled to date. The results have been officially released and published by the National Safety Council. Applying the sample to the total farm population over the three-month period, we find there were approximately 214,000 accidents among people living and working on farms. The direct cost of medical, dental, and hospital services required totaled approximately \$8,750,000. The time lost from usual activities totaled 4,500,000 days.

The Bureau is planning to make a similar nationwide survey in April 1948. If this survey is taken, a section on farm accidents will be included for the period of January through March. This will provide figures on farm accidents for the first quarter of a calendar year. Surveys like these are a source for reliable statistics on farm accidents. The provide a sound basis for planning farm safety

programs. Unfortunately, adequate resources have not been made available to the Department for providing the figures on farm accidents that are so badly needed at the present time.

(3) *Research and Investigations.* The Agricultural Research Administration has widely publicized researches and investigations into safety measures. Precautions to safeguard life and property are included in the publications of the Department so consistently that this day-by-day on-the-job safety instruction is hardly recognized as such, and yet it is probably most effective in getting millions of farm people started on jobs new to them.

A few subjects along these lines include the use of insecticides and fungicides, home equipment, and farm machines. There are special publications such as, on wind bracing in the construction of buildings, fire-retardant construction, safe stairs, lightning rods, and safe wiring for electricity. Safety in food preservation, household tasks, and clothing have all been greatly emphasized. Precautions about animals, especially bulls, and about poison plants, and hazards to health from insects or unsanitary environment, are given frequent publicity. Among special studies are some on dust explosions in flour mills and fires in cotton gins. Altogether, the list is too long to treat creditably here. The Department has provided this service, so useful to farm people, for a long time.

The safety benefits of research could be made available to more people quickly if the facts were separated from other subject matter and distributed definitely as research contributions to farm safety.

Farm and home safety and fire-prevention publications of the Department, such as "Watch Your Step" and "Fire Fighting on Farms," are too few in number. More are needed, based on research to reduce the accidents of greatest frequency and severity, and to remove or minimize farm fire hazards.

(4) *Safety in Public Programs.* Space will not permit description of public safety programs here, but I believe they are well known to this audience. The Forest Service not only has a vast program of fire control, protecting a large portion of the private forests of the nation cooperatively with the states as well as all the national forests, but it also conducts a program of safety for foresters, woodsmen, and others. Training organized forest fire fighters is a well-known part of this work.

The Production and Marketing Administration was principally concerned with the safety of imported farm labor during the war, but has a much wider responsibility for safety in connection with its agricultural commodity work. The FMA, through its warehouse inspection, not only makes sure that the inventories are there but that the commodities are stored properly and fire hazards eliminated. Another responsibility has to do with the proper labeling of poisons and flammable liquids in the marketing of fungicides.

The Soil Conservation Service has a vigorous employee safety activity which comes into daily farm use through its trained technicians assisting the nearly 4,000 soil conservation districts located all over the nation.

The Rural Electrification Administration deals actively with safety of electric lines and linemen, farm and home wiring, and every kind of farm and home use of electricity. It deals with safety through code enforcement, training of workers, and publications.

The Farmers Home Administration has long been concerned with the safety of its borrowers as an essential to protecting farm family enterprises. FHA has observed safe construction codes and promoted safety in all the farm and home, highway, and fire-prevention aspects. Its records of accidents on farms have been extremely useful. They have been made widely available to farm people through all USDA agencies.

The Farm Credit Administration has had both a direct and an indirect effect on thousands of farm families by urging the observance of sound construction codes and safety precautions. National farm loan association employees personally advise and counsel with borrowers regarding insurance coverage required by the land banks. Through these and other contacts it is possible to direct borrowers' thinking toward fire safety.

(5) *Information and Cooperative Extension Work.* Press and radio releases prepared by the Office of Information are used in three annual campaigns, which are widely publicized as Spring Clean-Up Week; National Farm Safety Week; and National Fire Prevention Week. Established contacts between the Office of Information and farm papers; between the Department's radio service and radio stations; and also between state extension editors and the farm and daily press with wide circulation in rural areas, contribute

materially to these campaigns. The USDA Safety Council organizes the material for this and similar use.

Moreover the Cooperative Extension Service of the Department and the state agricultural colleges cooperate with the National Safety Council and the National Fire Protection Association in organizing and distributing farm packets for use by state and county extension workers. These release packets are prepared for county use to facilitate local use of the press, radio, and posters, and the participation of farm people in the activities of these campaigns. A significant measure of results last year is shown in the 1946 statistical summary of cooperative extension work. Approximately 99,000 4-H Club members received training in safety and fire prevention; 519,000 farm families checked up and removed accident and fire hazards from their homes; and nearly 600,000 farmers cooperated in the prevention of forest fires.

(6) *Coordination.* Early in the war period, the Department of Agriculture faced serious manpower problems on farms. Safety and fire prevention were recognized as part of the program for insuring sufficient farm labor to reach wartime food goals. All agencies were urged to promote conservation of labor resources. The Cooperative Extension Service, for example, was designated to conduct a nationwide program for the prevention of destructive fires on farms. The Emergency Farm Labor Program included all farm and home safety as well as farm labor safety in its work as an essential step to conserve manpower and use it efficiently.

Safety exhibits and demonstrations were featured in the Farm Labor Program. A real drive on safety was made in connection with the inexperienced workers, particularly city youngsters, both boys and girls. The appeal was a dual one to both employer and worker. Special safety publications for the youth program were prepared each year in cooperation with the National Safety Council. Employers were encouraged to protect themselves and their workers by taking out adequate insurance coverage and taking part in state workmen's compensation programs. Arrangements were made with the Health and Accident Underwriters' Conference for a special insurance policy covering accidents sustained by youth and women in farm work.

Coordination, of course, followed the customary administrative channels. However,

the Director of Personnel, aware that the diminishing number of safety engineers in the employee program had to be used most effectively, issued a memorandum calling the safety workers of the Department together. The result was the formation of the USDA Safety Council, a voluntary organization to promote cooperation and coordination of the mutual efforts. This group became very useful to the Department in wartime farm safety work. It continues to take deep interest in the farm safety work of the Department and the program of your Council.

The federal government's interest in safety was emphasized during the past 12 months by the President's Conferences on Highway Safety and Fire Prevention. In harmony with the spirit of these conferences, Secretary Anderson designated Assistant Secretary Charles F. Brannan to further the work of the Department in farm safety with a view to developing a Department program for farm safety. Mr. Brannan invited the USDA Safety Council to provide four working committees for the farm safety program. These deal respectively with farm work safety, home safety, automotive safety, and fire prevention. Two more committees cover, respectively, employee office safety and field operations. Employee safety is also included in the automotive and fire-prevention committees.

The USDA Safety Council is doing an excellent coordinating service as a voluntary organization. It recognizes, however, that it must rely on considerable grass-roots activity by agencies, public and private, that are in immediate touch with the rural public. The 48 state extension services, and those of Puerto Rico and Hawaii, are working very closely in both the farm safety and fire-prevention campaigns. And it is extremely gratifying to note the wide and constructive interest taken by American industry in farm safety.

For example, last week in the Department we had a premiere showing of a motion picture on farm safety. It was produced by the General Motors Corporation, sponsor of the National 4-H Safety awards presented at the National 4-H Club Congress each year. This picture, "Make Safety Your No. 1 Crop," should greatly help to increase safety-consciousness among rural young people. It was produced in cooperation with The National

Committee on Boys and Girls Club Work, the Farm Division of the National Safety Council, and the Cooperative Extension Service. There are no actors in this movie. The people shown are real people—Maryland 4-H Club boys and girls; Maryland extension workers; and National Safety Award Winners from North, East, South, West, and Middle West.

#### Summary

To summarize the Department's position in conducting farm safety work: It has general authority, but not specific authority or funds, for conducting a specific, coordinated farm safety program. It is increasing its activities in farm safety, but cannot do so at the expense of other assignments of work for which funds have been appropriated. A program in proportion to the gravity of the accident records among farm people would require the balanced coordinated effort of all agencies of the Department with specific appropriated funds for conducting farm safety work along the basic lines of (a) fact finding concerning all aspects of accident and fire losses on farms, (b) research and related development to safeguard farm people; and (c) action through education, training, and safety recommendations and codes.

In the past 30 years other great industries have been reducing their accident losses. In the past 15 years the accident rate in manufacturing has been reduced 51 per cent. Estimates of accident fatalities which occur during farm work are 33 per 100,000 workers, as compared with 15 for manufacturing—a ratio of four to one. The agricultural industry, with an accident rate in excess of all other industries, needs to redouble its efforts. Farm accidents and fire losses are economic as well as humanitarian losses of national importance.

The Department is cooperating with federal, state, and private agencies in its safety efforts. Many states are giving special support to farm safety work. The Department is aware of the great need and is willing to discharge such responsibilities as the nation may place upon it to enable the agricultural industry to better serve the general public through safeguarding the lives and property of farm people. The continuing need for the highest rate of food production emphasizes the urgency of public interest in farm safety.

### Pooling Resources for Farm Safety (Outline of Talk)

By CHARLES B. SHUMAN  
President, Illinois Agricultural Association

Paper Presented by  
FLOYD MORRIS  
Vice-President, Illinois Agricultural Association

A farm safety program involves many phases of activity and it must recognize the wide diversity of interests in agriculture. Farming today is not only a way of life—it is a modern, competitive business. Therefore, we must look upon accident prevention both as an essential to efficiency and as a measure to lessen human suffering.

The groups that must work together on farm safety programs have diverse and, in many ways, conflicting interests. Farmers are working for better income standards, are interested in purchasing production supplies and equipment as cheaply as possible and at the same time selling their products to consumers at highest possible prices and with low cost of distribution. Manufacturers, deal-

ers and handlers of farm commodities are usually on the other side of these issues. When it comes to a farm safety program, all groups can work for a common end, as all are interested in greater efficiency.

Today in America we need to find more ways in which we can work together. With the growth of the strong industrial, labor and agricultural organizations, it is more and more important that we find some common ground. A well planned safety program can be part of this common ground. To be effective, it must be carried down to each rural community. If we can work together at national, state and local levels on a safety program, we should be able to find other common interests.

### TUESDAY AFTERNOON SESSION

October 7, 1947

Presiding: HARRY M. PONTIUS, Safety Director, Ohio Farm Bureau Federation;  
Member, Farm Safety Conference, N.S.C.

### Safety as Related to Farm Labor

By W. D. MURPHY

State Supervisor, Extension Farm Labor, State of Illinois

Farm labor may be defined as the work, labor or activity relating to the production of farm products. It includes the work done on farms by the operator and other members of the farm family; by year-round workers, both single and married; and by seasonal workers, whether they are paid on a daily, hourly or piece-work basis.

During January and February, 1946, Extension Farm Labor at the College of Agri-

culture, University of Illinois, in cooperation with the Department of Agricultural Economics, conducted a state-wide farm labor survey. One of the objectives of the survey was to ascertain the total labor input for all classes of labor on Illinois farms. You may be interested to know that we used a relatively new method of sampling known as the Master Sample, which was developed by the Bureau of Agricultural Economics, U. S. Department

of Agriculture. The Master Sample is designed so that averages obtained from all the samples are representative of the state. We obtained 896 sample surveys from farms of 30 acres and larger. An analysis of these samples reveals that for farms 30 acres and larger the total labor input amounted to 17.6 months per farm. Farm operators furnished 11.3 months and members of the farm family furnished three months, or a total of 30.4 per cent of the total labor input. Hired labor furnished 3.4 months of the 17.6 months total.

I wish to add a few more figures from an activity we have been carrying on, tie them

to some I have already given and then draw a conclusion.

Last January, we in the farm labor office at Urbana were interested by Professor E. W. Lehtonen, head of the Department of Agricultural Engineering, in the relationship of our problems to those of farm safety. We thought his suggestion was good, so we asked all the farm advisers to send us each week, with their weekly farm labor reports, a report of the accidents to farm people during the week. The report included the number of farm people killed, the number injured, the estimated number of man days lost by those injured and a brief description of the acci-

### SUMMARY OF ACCIDENTS BY TYPE AND FREQUENCY

| Type                                  | Average days lost per accident | Number injured | Man days lost | Killed |
|---------------------------------------|--------------------------------|----------------|---------------|--------|
| Auto and truck                        | 8.7                            | 399            | 2871.5        | 31     |
| Falls                                 | 18.9                           | 158            | 2881          | 4      |
| Tractor                               | 18.8                           | 148            | 2782.5        | 17     |
| Falling accidents                     | 20.6                           | 43             | 987           | 1      |
| Falling objects                       | 19.0                           | 30             | 570           | 2      |
| Motor                                 | 25.0                           | 28             | 705           | 1      |
| Burns                                 | 15.0                           | 19             | 288           | 0      |
| Bull                                  | 17.8                           | 15             | 268           | 1      |
| Mower                                 | 35.7                           | 15             | 536           | 0      |
| Combine                               | 18.0                           | 15             | 271           | 2      |
| Cow                                   | 30.5                           | 14             | 288.5         | 1      |
| Wagon                                 | 25.4                           | 10             | 254.5         | 2      |
| Swine                                 | 11.4                           | 9              | 103           | 1      |
| Saw                                   | 38.1                           | 9              | 343           | 0      |
| Axe                                   | 17.0                           | 9              | 153           | 0      |
| Grinder                               | 28.4                           | 7              | 195           | 0      |
| Sheller                               | 10.6                           | 6              | 64            | 0      |
| Corn picker                           | 25.0                           | 5              | 125           | 0      |
| Knife                                 | 7.2                            | 5              | 37            | 0      |
| Manure loader                         | 12.2                           | 3              | 36.5          | 0      |
| Storms and lightning                  | 3.0                            | 3              | 9             | 4      |
| Butchering accidents                  | 7.5                            | 2              | 15            | 0      |
| Cuts                                  |                                | 0              | 0             | 2      |
| Miscellaneous machines <sup>1</sup>   |                                | 45             | 595.5         | 0      |
| Miscellaneous hand tools <sup>2</sup> |                                | 9              | 50            | 0      |
| Miscellaneous animals <sup>3</sup>    |                                | 2              | 2             | 0      |
| Other <sup>4</sup>                    |                                | 61             | 1099.5        | 9      |
| Total                                 |                                | 993            | 15880.5       | 78     |

<sup>1</sup>Hammer mill, threshing machine, elevator, silo filler, welding equipment, mechanical milking equipment, wire stretcher.

<sup>2</sup>Chisel, hammer, drill, shovel, crowbar, pick axe, nails.

<sup>3</sup>Sheep; dogs; goats; geese; snakes; all creatures other than pigs, cows, bulls and horses.

<sup>4</sup>Drowning; poisoning; explosions; other unusual accidents, such as insect bite infections; splinters, cinders and eye in eye.

dents. Most of the farm advisers cooperated wholeheartedly and some of them made a determined effort to give us complete and detailed reports.

We have a summary of accidents to farm people for the period beginning February 1 and ending September 27. This summary obviously does not include all the accidents to farm people since the method of reporting cannot pick up every accident. It does, however, give us a good picture of the situation as it exists in Illinois.

#### TOTAL ACCIDENTS BY MONTH FOR THE PERIOD FEBRUARY-SEPTEMBER, 1947

| Month     | Number<br>injured | Men<br>days lost | Killed |
|-----------|-------------------|------------------|--------|
| February  | 122               | 1191             | 7      |
| March     | 107               | 1216             | 5      |
| April     | 107               | 1868.5           | 11     |
| May       | 123               | 2107.5           | 14     |
| June      | 120               | 1545.5           | 12     |
| July      | 208               | 3572             | 12     |
| August    | 126               | 2609.5           | 7      |
| September | 80                | 1210.5           | 9      |
| Total     | 993               | 15860.5          | 78     |

Let me make it clear that all these accidents did not occur while the persons were engaged in farm work. Many who were killed or injured in auto or other accidents were not

actually engaged in farming at the time the accident occurred. Nevertheless, they were just as dead or badly hurt. They were lost to the working force of their farm.

During eight months of 1947 the farms of Illinois lost 78 farm people by accidental deaths and 15,860.5 man days of work as a result of injuries from 993 accidents. To reach a calculated man days lost by those who died, I have calculated the seven deaths in February as lost to the farm for 10½ months, those in March for 9½ months, etc. The result is 15,873 man days and a total loss to the farm labor force of an appalling 1,168 man months of labor. Now recall, if you please, the 17.6 months of labor input for an average Illinois farm, and with a rapid calculation you will find that the equivalent of 67 180-acre farms were completely out of production for a year as a result of accidents. These accidents took place during eight months of a year. No doubt the losses for January 1947 were and those during October, November and December will be at approximately the same rate and severity as for the eight months. If this is true, the loss in 1947 will not be 67 Illinois farms but 102, a conservative estimate.

Even with all the mechanization on farms, the labor of men, women and children is needed to make farms productive. Far too much of that labor is wasted. Nutrients, badly needed foods are not produced.

#### Preliminary Report on Survey of Farm Accidents

By DR. CHARLES F. SABLE

Bureau of Agricultural Economics, Dept. of Agriculture, Washington, D. C.

One person was injured during the last quarter of 1946, for every 28 farms included in a sample survey made by the Bureau of Agricultural Economics of the U. S. Department of Agriculture. The injuries ranged in severity from a fatal burn to a mangled finger.

The survey, made in January 1947, included about 15,000 farms in 814 counties. The method of selection was designed to obtain figures representative of the entire nation. Although subject to later revision, the figures thus obtained are the most complete yet available on farm accidents.

The accidents reported included all injur-

ies to persons living or working on farms covered in the survey, regardless of whether the injuries occurred on or off of the farm. Medical, dental and hospital expenses resulting from these accidents amounted to a little more than \$40 per person injured. The time lost from usual activities (work for adults and school or play for children) was reported to be about three weeks per farm person injured.

If the farms included in the survey were typical of the entire country, the results would indicate that from October through December there were roughly 210,000 accidents that injured people living or working on farms;

that the injuries cost a total of \$8,750,000 for medical, dental and hospital expenses; and that the time lost from usual activities totaled 4½ million days.

The survey indicated that about 8 percent of all the injuries were in the Northeastern States, 10 percent in the Western States, 38 percent in the North Central States, and nearly 44 percent in the Southern States. Although the number of injuries was closely related to the number of people living or working on farms in each area, the rate was a little above average in the highly mechanized North Central States. Only 19 percent of the injuries involving costs were covered by any insurance, and these were covered to an extent of only 15 percent of the total costs to those insured.

Falls injured more farm people than any other type of accident, and falls on stairs and steps or from vehicles were the most common. Falls on ice and falls involving home furnishings also led to a number of serious injuries. Many of the common falls resulted from carelessness and the disorderly condition of stairways, shops, alleyways and barns. Machinery was involved in over 14 percent of the accidents, and tractors in a third of the accidents caused by machinery. Corn pickers were the second most common cause of injuries from machinery. Of the other accidents caused by machinery, combines, circular saws, mowing machines, corn shellers and grain elevators were reported most frequently. Farm animals caused 12 percent of the accidents reported. Horses and mules were responsible for 60 percent of these.

Nearly 60 percent of the people injured were adults between 25 and 64 years old. This age group represents about the same proportion of the total farm population. Between the ages of 14 and 64, there were about four times as many boys and men injured as there were women and girls. Of the youngsters under 14, nearly 65 percent were boys.

About 98 percent of the accidents to farm people were the result of farm work, while only 8 percent occurred in connection with housework. Recreation and other activities accounted for the rest. About half the accidents occurred outside the home, but on the farm. One-quarter were in the home, and one-eighth were on the road or street.

More farm people had accidents in October than in either November or December, probably because of the large amount of harvest work in October.

About 45 percent of all accidents were to farm operators and in 7 out of every 10 accidents the operator was doing farm work. In contrast, although accidents to members of operators' families amounted to nearly 45 percent of the total, only 4 out of 10 were performing farm work.

In general, these data are not considered adequate for making national estimates of the number of accidents by types. Also, the sample used was not large enough to answer certain fundamental questions—such as giving an adequately accurate estimate of fatal accidents out of all accidents on the nation's farms. Nor was it large enough for reliable State accident estimates or for more detailed study of the causes of accidents to farm people.

#### DISTRIBUTION OF ACCIDENTS ON FARMS BY AGE GROUPS OF PERSON INJURED

| Age groups       | Percent of total<br>accidents |
|------------------|-------------------------------|
| Under 14 yrs.    | 14                            |
| 14-24 yrs.       | 17                            |
| 25-44 yrs.       | 30                            |
| 45-64 yrs.       | 28                            |
| 65 yrs. and over | 10                            |
| Age unknown      | 8                             |

\* Less than 1 percent.

ACCIDENTS ON FARMS: PLACE OF ACCIDENT BY TYPE, BY PERSON INJURED  
AND BY TYPE OF ACTIVITY, OCTOBER-DECEMBER, 1946<sup>a</sup>

| Type of accident                     | Place of accident |         |                |            |         | Totals  |
|--------------------------------------|-------------------|---------|----------------|------------|---------|---------|
|                                      | Home              | Farm    | Road or street | Else-where | Unknown |         |
|                                      | Percent           | Percent | Percent        | Percent    | Percent | Percent |
| Machine                              | 1                 | 10      | 1              | 2          | •       | 14      |
| Falls of persons                     | 9                 | 11      | 1              | 3          | •       | 24      |
| Animals                              | 1                 | 9       | •              | 1          | •       | 12      |
| Burns or shock                       | 4                 | •       | •              | •          | •       | 4       |
| Hand tools                           | 3                 | 6       | •              | •          | •       | 10      |
| Handling objects                     | 1                 | 3       | •              | 3          | •       | 8       |
| Falling objects                      | •                 | 2       | •              | •          | •       | 3       |
| Stepping or striking against objects | •                 | 3       | •              | •          | •       | 4       |
| Motor vehicles                       | •                 | •       | 9              | •          | •       | 11      |
| Other                                | 1                 | 3       | •              | 1          | •       | 6       |
| Unknown                              | 1                 | 2       | •              | •          | •       | 4       |
| Totals                               | 21                | 50      | 13             | 14         | •       | 100     |
| Person injured                       |                   |         |                |            |         |         |
| Operator                             | 8                 | 25      | 6              | 8          | •       | 48      |
| Member of family                     | 11                | 18      | 7              | 6          | •       | 45      |
| Hired worker                         | •                 | 6       | •              | •          | •       | 7       |
| All others                           | •                 | •       | •              | •          | •       | 2       |
| Unknown                              | •                 | •       | •              | •          | •       | •       |
| Totals                               | 21                | 50      | 13             | 14         | •       | 100     |
| Type of activity                     |                   |         |                |            |         |         |
| Farm work                            | 8                 | 42      | 5              | 3          | •       | 58      |
| Housework                            | 7                 | 2       | •              | •          | •       | 9       |
| Recreation                           | 4                 | 3       | 3              | 3          | •       | 13      |
| Other                                | 4                 | 3       | 7              | 8          | •       | 22      |
| Unknown                              | •                 | •       | •              | •          | •       | •       |
| Totals                               | 23                | 50      | 15             | 14         | •       | 100     |

<sup>a</sup>Based on 633 reported accidents.

\*Less than 1 percent.

ACCIDENTS ON FARMS BY MONTH AND TYPE OF ACTIVITY

| Month      | Type of activity |            |            |           |         | Totals  |
|------------|------------------|------------|------------|-----------|---------|---------|
|            | Farm work        | House-work | Recreation | All other | Unknown |         |
|            | Percent          | Percent    | Percent    | Percent   | Percent | Percent |
| October    | 23               | 3          | 5          | 9         | •       | 40      |
| November   | 17               | 3          | 3          | 6         | •       | 29      |
| December   | 16               | 3          | 4          | 8         | •       | 31      |
| Unknown    | •                | •          | •          | •         | •       | •       |
| Totals (%) | 56               | 9          | 12         | 23        | •       | 100     |

\*Less than 1 percent.

ACCIDENTS ON FARMS BY TYPE OF ACTIVITY AND BY PERSON INJURED

| Type of activity | Person injured |                  |              |            |         | Total   |
|------------------|----------------|------------------|--------------|------------|---------|---------|
|                  | Operator       | Member of family | Hired worker | All others | Unknown |         |
|                  | Percent        | Percent          | Percent      | Percent    | Percent | Percent |
| Farmwork         | 32             | 17               | 6            | •          | •       | 56      |
| Housework        | 2              | 6                | •            | •          | •       | 9       |
| Recreation       | 2              | 11               | •            | •          | •       | 13      |
| Other            | 10             | 11               | •            | •          | •       | 22      |
| Unknown          | •              | •                | •            | •          | •       | •       |
| Totals (%)       | 46             | 45               | 7            | 2          | •       | 100     |

\*Less than 1 percent.

LOSS OF TIME FROM REGULAR ACTIVITIES DUE TO ACCIDENTS  
ON FARMS BY GEOGRAPHIC AREAS

| Geographic area | Accidents reporting loss of time |                   | Average days lost per accident | Percent of accidents by number of days lost |          |           |                 |
|-----------------|----------------------------------|-------------------|--------------------------------|---------------------------------------------|----------|-----------|-----------------|
|                 | No.                              | % total accidents |                                | 1 day or less                               | 2-7 days | 8-30 days | 30 or more days |
|                 |                                  |                   |                                |                                             |          |           |                 |
| Northeast       | 78                               | 78                | 28                             | 15                                          | 27       | 32        | 26              |
| North Central   | 185                              | 84                | 19                             | 19                                          | 31       | 28        | 23              |
| South           | 209                              | 91                | 23                             | 8                                           | 27       | 31        | 33              |
| West            | 72                               | 22                | 19                             | 18                                          | 37       | 23        | 23              |
| U. S.           | 537                              | 86                | 22                             | 13                                          | 29       | 29        | 28              |

ACCIDENTS ON FARMS BY TYPE OF ACCIDENT AND SEX OF INJURED

| Type of accident                        | Accidents             |                           |                           |
|-----------------------------------------|-----------------------|---------------------------|---------------------------|
|                                         | Total number reported | Male                      | Female                    |
|                                         |                       | Percent of total by types | Percent of total by types |
| Machine                                 | 88                    | 91                        | 9                         |
| Falls of persons                        | 155                   | 69                        | 31                        |
| Animals                                 | 74                    | 81                        | 19                        |
| Burns or shock                          | 26                    | 48                        | 52                        |
| Hand tools                              | 67                    | 84                        | 16                        |
| Handling objects                        | 46                    | 81                        | 19                        |
| Falling objects                         | 30                    | 90                        | 10                        |
| Stepping on or striking against objects | 23                    | 65                        | 35                        |
| Motor vehicles                          | 68                    | 72                        | 28                        |
| Other                                   | 28                    | 50                        | 50                        |
| Unknown                                 | 26                    | 88                        | 12                        |
| Totals                                  | 633                   | 78                        | 22                        |

## ACCIDENTS ON FARMS BY TYPE OF ACTIVITY AND SEX OF INJURED

| Type of activity | Total number accidents reported | Sex                                  |                                      |
|------------------|---------------------------------|--------------------------------------|--------------------------------------|
|                  |                                 | Male                                 | Female                               |
|                  |                                 | Percent of total by type of activity | Percent of total by type of activity |
| Farm work        | 358                             | 90                                   | 10                                   |
| Housework        | 53                              | 29                                   | 71                                   |
| Recreation       | 76                              | 72                                   | 28                                   |
| All other        | 144                             | 70                                   | 30                                   |
| Unknown          | 2                               | 100                                  |                                      |
| All accidents    | 633                             | 78                                   | 22                                   |

## ACCIDENTS ON FARMS BY TYPE OF ACCIDENT AND AGE GROUPS

| Type of accident                        | Age groups               |                          |                          |                          |                          |
|-----------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                                         | Under 14 yrs.            | 14-64 yrs.               | 65 and over              | Unknown                  | Total                    |
|                                         | Percent of all accidents | Percent of all accidents | Percent of all accidents | Percent of all accidents | Percent of all accidents |
| Machine                                 | 1                        | 12                       | 0                        | 0                        | 14                       |
| Falls of persons                        | 5                        | 16                       | 3                        | 0                        | 24                       |
| Animals                                 | 1                        | 9                        | 2                        | 0                        | 12                       |
| Burns or shock                          | 2                        | 2                        | 0                        | 0                        | 4                        |
| Hand tools                              | 1                        | 8                        | 0                        | 0                        | 10                       |
| Handling objects                        | 0                        | 2                        | 0                        | 0                        | 2                        |
| Falling objects                         | 0                        | 2                        | 1                        | 0                        | 3                        |
| Stepping on or striking against objects | 1                        | 3                        | 0                        | 0                        | 4                        |
| Motor vehicles                          | 1                        | 9                        | 1                        | 0                        | 11                       |
| Other                                   | 0                        | 3                        | 0                        | 0                        | 3                        |
| Unknown                                 | 0                        | 3                        | 0                        | 0                        | 3                        |
| All accidents                           | 14                       | 76                       | 10                       | 0                        | 100                      |

\* Less than 1 percent.

## WEDNESDAY MORNING SESSION

October 8, 1947

Presiding: T. A. ERICKSON, Consultant, Rural Services, General Mills, Inc.;  
Member, Farm Safety Conference, N.S.C.

## Coordinating Safety Efforts

By VIOLA ARMSTRONG

Director, Women's Activities, Indiana Farm Bureau

For several years now we have had our state Farm Committee which is made up of representation from all of the organizations in the state that work with rural people. Some of these are Farm Bureau, Grange, F.T.A., 4-H Groups, Rural Youth, Petroleum Asso-

ciations, Farm Equipment Associations, American Red Cross, Home Economics and County Agents, schools, churches and many others of which you are familiar as we know that each state has similar state organizations working with rural people. This committee has met regularly during the years since it was organized.

About four years ago there seemed to be a great need for someone to keep all of these organizations working on a definite safety project to create safety consciousness. It so happened that Larry Brandon, secretary and treasurer of the Indiana Farm Bureau and chairman of our Safety Committee for a number of years and Mr. Schenck, President of the Indiana Farm Bureau, conceived the idea that since our work as manager of the Home Department of the Cooperative Association took us all over the state, meeting not only with the social and educational leaders of the Farm Bureau but with Home Economic, 4-H, Rural Youth and many others that it might be well if we could give some of our time in trying to stimulate interest in a farm safety program. We accepted this responsibility for a period of two years, or may we put it this way, long enough to prove to the organizations represented on the state committee that this program was important enough to justify a full time safety specialist, someone who could give not only all of his time but all of his thinking to the development of such a program. How did we convince the members of the committee that this was necessary? By proving to them that our township and county leaders over the state were willing and ready to give some time and thought to doing something on a local basis if they had some help in the way of materials, suggestions for discussion, derivations, plays and so forth. When the funds began to come for the above mentioned items along with the request for speakers was not hard to convince anyone that there was a need for this full time specialist. In our state we have always had a very close working relationship with Purdue University. Director Hoffman, Director of Extension, expressed his desire for such a program and let it be known what they could do in the way of office facilities and other assistance.

There were not quite enough finances for the beginning but this was even made possible by some rather generous contributions on the part of some of the organizations represented on the state committee. So at the end of a two year period where an attempt had been made to make people safety conscious we had a safety specialist on the job full time. We think you have witnessed that he has done a splendid job as you have listened to the Wayne County group review their experiences while making the survey in their county last year and that is only a part of what has been done.

How did we get all of these groups working together? We have seventeen county committees along with other organizations who call representatives from these same groups together in the county to plan special safety programs. So you see these groups are not only working together on the state level but they work together in the county and other local community meetings.

Our Rural Youth have given assistance by collecting accident reports. The 4-H is doing some very outstanding work in that they have a safety chairman in each of their clubs whose job it is to plan safety programs and encourage 4-H members to participate in a safety project. The home economic groups have carried some special programs on safety measures for homemakers, also through the schools and of course there is some work directed to safety in our own organization, the Farm Bureau. In a series of district meetings we had the liaison officer from the American Red Cross appeal to our women the importance of having accident prevention classes in the county, also first aid and home nursing courses. Many counties did participate. Our Farm Bureau women have set aside the month of July as safety month and in their yearly program packet safety material is sent out, also through news letters they are reminded from time to time that a minute or two at each of their local meetings might be the means of keeping someone safety conscious.

We have seven sub-committees within the state committee. They are education, women's activities, financial, statistical, legislative, publicity, and awards. Each of these sub-committees are asked to give a report at each quarterly state meeting. You see they are kept on their toes because no chairman of a sub-committee likes to come up without a report and in order that they may have something to report means they must keep busy. Each sub-committee has done a very good job.

As a member of the Farm Committee we



have kept our state committee informed as to the activities of the Farm Division of National Safety Council by making reports after each of our national committee meetings. We also try to impress upon them that they have a responsibility to this national farm committee and it can render greater service as we coordinate our efforts within the state and we trust in the future more financial support.

We first must begin on the local level by getting groups of people to do something. If nothing more than group action to clear a hidden cross roads or remove a hazard within a given community by first of all talking about it and then actually removing it. This will accomplish two things: first it will remove the hazard, and second it will make a larger number of people safety conscious.

When you can get county groups doing things such as Wayne County you are not only stimulating a lot of interest within that county but you have figures and facts from your own state to use. It is surprising how many people in other sections of our state are using the findings from Wayne County to prove the need for doing something in their respective counties.

This job will not be done by one organization in the local community or on the county level for you have witnessed how the people from Wayne County by working together as a committee which represented a number

of organizations have concentrated their efforts on a special program with very worth while results.

The same is true with our state committee. Any one group will never be able to do the job but by all the organizations coordinating their efforts, their thinking, and their finances they will do a better job. Then going the next step and that is making each of our state committees realize that they have a responsibility as well as a contribution to the Farm Division of National Safety Council and by working closely with the members of the Farm Committee which means a coordinated program from the farm home all the way up to the national level and back down again to the local community.

We dare not allow a break anywhere along the way if we are to reach the goal which was so well expressed in a meeting in our state a few years ago by Mr. Pontious when he said, "Our job is to make people safety conscious and to remove all the hazards that can be removed and to learn how to live safely with those that cannot be removed."

Our efforts must be not only for a safety program as it pertains to the farm and farm home but also to the highway and any place where lives may be endangered. We should each of us take very seriously the theme of this National Congress, "Be Careful—The Life You Save May Be Your Own."

### Electrical Safety

By EVELYN EVERT

Wisconsin Electric Power Company

Three years ago the Wisconsin Utilities Association accepted an invitation from the State 4-H Club office to provide a faculty to teach four, one hour classes on safe and efficient use of electricity at the five district leadership training camps. Subsequently, a series of lessons to demonstrate the basic needs for adequate wiring and safe fusing was developed.

The wiring and fusing story is told visually with eight charts, a simple demonstration wiring panel and common household appliances. Demonstrations are always presented informally and audience participation encouraged. During the entire course we

stress the correct way to handle electricity and electrical equipment. We point out that the correct way is the safe way. We explain what proper fusing means and show various types of household fusing protection. With the demonstration equipment it is easy to show the inefficient performance of appliances and how wiring heats, causing insulation deterioration, when a circuit is overloaded and permitted to become overloaded.

The basic information for developing the charts was taken from a University of Wisconsin bulletin "Electricity in the Home." The demonstration equipment is composed of two wiring panel boards, each equipped

with two convenience outlets and decorated to represent the base section of a kitchen and bathroom wall. A piece of BX cable with No. 14 wire connects the panels to a distribution cabinet on an easel. Heavy duty cable connects the distribution panel to the main service. A thermometer is inserted in the top of one panel to register change in temperature of wiring as the circuits become overloaded. A better light lamp is connected at one end to show drop in light output when a circuit is overloaded. The light output is measured with a light meter and the reading matter is projected on a screen so that the audience can watch the reduction in light. The three appliances we used are an automatic toaster, an automatic iron, and a 1500 watt space heater with fan.

In starting a demonstration, the toaster is connected alone to represent a normal circuit load with a 15 ampere fuse. The toast comes out a nice golden brown. Audience attention is also directed to wire temperature and light output. Next, all three appliances are connected and the 15 ampere fuse blows out. Then we show the correct way to replace a fuse. The 15 ampere fuse is replaced with a 25 ampere fuse so that we can show what happens to appliance performance and why

overfusing creates a serious fire hazard in the home. All three appliances are connected again so the drop in light output, and the rapid rise in wire temperature can be shown. More toast is made, and the slower performance is noted. The satisfactorily browned toast made on the adequately wired circuit is compared with the pale toast made on the overloaded circuit. The toast and the lamp are visual proof that appliances are "blowed up" when they do not get the electricity they need to operate properly. The iron and heater are also affected but visual evidence is not as readily apparent.

We have used this equipment quite extensively to tell the safe wiring and fusing story to our customers in southeastern Wisconsin. Mr. Carl Neitzke, Extension Agricultural Engineer, University of Wisconsin has a duplicate set, which he uses for farm meetings throughout the State. Similar equipment is being considered by other rural electrification groups in the state. Farm people understand this toast and light story because it gives them a visual appreciation of the relation of proper wiring and fusing to satisfactory performance of electrical equipment in the home and on the farmstead. This appreciation can save lives.

450-2-48-N

*Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME XXVII

HOME SAFETY SESSIONS

NATIONAL SAFETY COUNCIL, INC.  
20 NO. WACKER DRIVE • CHICAGO 6, ILL.

## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

**THE NATIONAL SAFETY COUNCIL**  
20 North Wacker Drive  
Chicago 8, Ill.

PRINTED BY W. S. A.

## 35th National Safety Congress Transactions

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Complete set of Transactions (29 volumes)—\$5.00

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## Home Safety Sessions

TUESDAY MORNING SESSION

October 7, 1947

### Publicity and Promotion for Home Safety

Presiding: W. EARL HALL, Managing Editor, Mason City Globe-Gazette; Vice-President for Public Information, N.S.C.

### Like Accidents—Most Radios Are in Homes

By ELIZABETH HART

Director, Women's Activities, Public Service Dept., National Broadcasting Co., Station WMAQ

The problem of people in the field of safety and of those in radio is alike in one respect—our message must be heard to sell, whether it is selling safety which is your aim or selling soap which is ours. Even those of us who are in radio seldom realize the powerful influence that radio has on our American habits. The message that is heard and acted upon can change our food habits and even our health habits. This mass power of radio is felt in fields of public service. Surely public opinion can be shaped by information or propaganda which comes to us in homes by way of radio.

There are good and bad ways of utilizing radio time. Let us see how you may best sell your message of safety thru our medium, radio. For clarity let us divide operations into local station systems and network operations. Ordinary band operators have time at their disposal. They have a low talent rate, they have competent production men, they have an organ on hand and are extremely community minded. They literally have time on their hands.

Go to the station manager. Do not ask "What can you give me?" but go with a specific suggestion. Your idea may be rejected, but by the same token may be used. Provide script if you are requested to do so.

Give the station manager spot announcements. I believe safety is sold best by a message which is short and given often. A child has to be told to brush his teeth 3000 times, and all at once he catches on. I believe it is better to keep on repeating, "John, brush your teeth", than subject him to a 15 minute

explanation of why teeth brushing is good. See the director of women's activities in your station. The Association of Women Directors under the National Association of Broadcasters is known throughout the nation. There are 650 women with a large and loyal following conducting programs on the stations throughout the United States. These women sell clothes, household equipment, cosmetics, washing machines, and they can sell your safety. Ordinarily women conducting such programs have a great deal of leeway in the selecting of material used in their allotted time. Often these women are mothers, with family duties in addition to their radio activities, so problems of home and safety for the members of their homes are dear to the women commentators.

At the present moment no one is more safety conscious than I, as we only recently brought my son home from the hospital after an outboard motor had cut his hip severely. Just a ring on the telephone to me right now, and I would devote my whole 15 minutes at WMAQ to a safety message. Since children are constantly on the brink of disaster usually a woman commentator will be more than happy to use safety messages regularly.

Again in your aim for time send material to sports broadcasters and by all means to the disc jockeys. They have probably as many listeners as any other broadcasters in the country right now. A brief safety message, and I mean brief—thirty to forty seconds—is just about the best possible way to get your

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## CORRECTION

The preceding document has been re-photographed to assure legibility and its image appears immediately hereafter.

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PRINTED IN U. S. A.

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There are good and bad ways of utilizing radio time. Let us see how you may best sell your message of safety thru our medium, radio. For clarity let us divide operations into local small stations and network operations. Ordinarily local stations have time at their disposal. They have a low talent rate, they have competent production men, they have an organist on hand and are extremely community minded. They literally have time on their hands.

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explanation of why teeth brushing is good. See the director of women's activities in your station. The Association of Women Directors under the National Association of Broadcasters is known throughout the nation. There are 650 women with a large and loyal following conducting programs on the stations throughout the United States. These women sell clothes, household equipment, cosmetics, washing machines, and they can sell your safety. Ordinarily women conducting such programs have a great deal of leeway in the selecting of material used in their allotted time. Often these women are mothers, with family duties in addition to their radio activities, so problems of home and safety for the members of their homes are dear to the women commentators.

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Again in your aim for time send material to sports broadcasters and by all means to the disc jockeys. They have probably as many listeners as any other broadcasters in the country right now. A brief safety message, and I mean brief—thirty to forty seconds—is just about the best possible way to get your

message across. Listeners won't be tired of the subject. They will listen in spite of themselves if the copy is short, readable and dramatic. Have copy available for the station which is: (1) dated to be used during a special week, Fourth of July Accident Campaign or Fire Prevention Week, and (2) timeless copy to be used any day in the week.

Such organizations as the PTA, Red Cross, American Legion and so forth help in presenting programs. Here is what I mean. Often times stations will have a set period each week for public service programs. One week PTA, the following week American Legion, then Red Cross and so on. Generally messages given on one of these programs can carry weight. Also I think you should take full advantage of the work being done by the National Safety Council by the use of transcriptions. I refer particularly to the Council's production of records featuring outstanding radio personalities, such as "Superman," the "Lone Ranger" and "Tom Mix" in children safety programs; "Mr. District Attorney" in traffic safety announcements; "Ma Perkins" in safety announcements for home; and Jack Owens of "Breakfast Club" fame in a highway traffic series in "Hi Neighbor." More than 460 stations have used "Hi Neighbor." As you may know these are six, five-minute musical programs featuring Jack Owens. If we could get this series on all local stations—there are nearly 1800 in the country at the present time—we could really sell safety.

Now one other field which I would like to mention is the field represented by the National Safety Council's "Rhythm and Reason" program, a fifteen minute program written by the Council around electrical transcriptions especially prepared for radio use. "Rhythm and Reason" is written for five different musical libraries—that doesn't mean much to you, but your radio people will know what you mean. "Rhythm and Reason", I am told, is now being used by 353 stations.

Interviews will be helpful in selling your safety message. I believe an audience is more receptive to an interview program than to a straight talk. No matter how beautiful, there is something about one voice going on and on that cuts down on listening interest. Two voices or even three add enough variety to keep your listeners interested. After an interview program is booked by you, sending cards to prospective listeners, getting news-

paper mention, or advertising the performers will say "thank you" to the station for its time. Another way of getting on the air is with genuine news. The National Safety Council does this now with monthly traffic reports, accident stories, special campaigns and the like. Legitimate news always has the right of way over some published statement which merely expresses someone's opinion.

Advertising agencies are doing a fine and even better job than radio stations in the selling of safety. I believe the reason for this is that "selling is their business". Their writers are excellent and well paid. Large important sponsors are anxious to identify their product with home happiness which includes safety. So appeal to the advertiser. Ask him to sell your message for you.

The Leo Burnett Company located in Chicago is responsible for the commercial copy on Mr. Kaitenborn's evening program sponsored by the Pure Oil Company. How's this for selling safety on a popular network evening program which will reach millions of listeners? "... You won't believe this—unless you've had the thrill lately of driving an old Model A Ford, a Dodge or Chevrolet of early vintage, or a modern Jeep, and then settled down again behind the wheel of your own old, but relatively so luxurious, car. But if you have done that then you will believe this: The larger modern car, may take less out of you physically, but it demands more from you mentally. That's a fact. You more or less fly by the seat of your pants in those little close-coupled four-cylinder babies. Your steering is 'right now,' you're up where you can see the road, and you're up and down with every bump in the road. You stay awake at the wheel. In a modern car you relax. But you're in great danger if your mind does. Your vision of the road calls for more imagination, more foresight, more memory. You can't turn on a dime or stop on a dime. You have to think more to be safe. And we'd all better think more when we're at the wheels of these modern and getting-more-modern cars of ours, if we want to stay safe..."

While we are showing the magnificent job done by advertising agencies the Derby Foods Corporation (Peter Pan Peanut Butter) used this commercial on Friday, August 1, 1947: "There's a right way and a wrong way to ride a bicycle. The wrong way is dangerous. The right way is safe. Now, here are a few things to remember if you are going to be a

safe bicycle pilot. First of all... approach all railroad crossings and road intersections slowly, so that you can stop quickly if necessary. Be sure to look both ways at all crossings and intersections. Another thing, don't edge in between standing vehicles. Stay behind them. If you are behind them, they can't turn into you when they start moving. Many fellows and gals are killed every year because they forget this very important rule. Railroad crossings and intersections are dangerous spots. You have to be on your toes and you have to play safe if you want to live to play games. Remember now, approach these danger spots slowly. Stay behind standing vehicles. Look both ways before proceeding. Obey these simple rules and you won't get hurt. Forget them and you may be killed. Don't take chances." And the standard closing tag of the commercial, mind you, is this: "All the time... Be careful... Everywhere... Be careful... Be careful... Be careful... Take care."

About the only difference which comes readily to my mind between small independent stations and network operations in selling your safety message is that transcriptions are not ordinarily so popular on the larger stations and dramatic scripts are not feasible. Their restrictions as to talent, musicians, sound effects men, script writers and so forth seem to rule this kind of program out.

Perhaps a few do's and don'ts might bring this discussion to a close. We'll take the don'ts first. Don't forget a name, address, and telephone number on all material submitted.

Don't include hard to pronounce words in your copy. Perhaps I say this because it embarrasses a radio performer to be stumped on a word, but it is also true that even some of the best performers grab copy on their way to the studio. Don't (and the National Safety Council would never be guilty of this) discriminate against a manufacturer. For instance: "Automobiles are dangerous," would be okay, but beware of "Rolls Royce Automobiles are dangerous." Let me repeat, the National Safety Council would not err. Don't use too many statistics. I believe a listener remembers "Almost 10 million people" better than 9,648,811. Round figures we think are better. Don't take picks on any political group.

When we come to the Do's I must pay a compliment to the men with whom I have worked at the National Safety Council here at Chicago. My friend Dan Thompson, Paul Jones, Mr. Tom Fansler and Mr. Maynard Cox. No National Safety Council announcement has ever come to my desk, which can not immediately go on the air... unheeded and unedited. The statistics are accurate. The printing is good. The message is pointed. The lines are dramatic, but the sense is there.

There are many demands for our radio time so with each day or each week we probably cannot allocate time to you. Ask for just enough not too much, chances are that you will get it. It would be hard for me to deny anyone of you, even if I were booked solid.

## Home Safety in the Window

By GRACE HORNADAY

Secretary, Woman's Division, Newark Safety Council

I am a great believer in and demonstrator of putting "home safety in the window" where it will show. I am sure you go along with me in believing earnestly in the great value of publicizing and displaying home safety in as many ways as possible—as often as possible and as prominently as possible. It is the only way to reach the general public living in homes where the majority of accidents occur.

But it is no small task. We need color, light, design, humor, dramatics, and every

other powerful weapon in the kit bag of the publicity field. There is nothing so sad as a drab display. A home safety display must (1) arouse interest, (2) create a desire to mend careless ways and (3) be safe.

We, in our Woman's Division of the New Jersey State Safety Council, use all sorts of avenues to reach our public, the homemakers of New Jersey just as you do: radio, lectures, plays and skits, leaflets and booklets, check lists, movies, forums, displays and puppet shows.

In all these avenues we try to avoid the obvious without departing too far from the safety tradition, and to employ the methods of other fields that have put messages across successfully. In other words, we try to attract attention in every way we can, as economically as we can.

In our New Jersey window we have put our money on three mediums to put home safety across. They are (1) the leaflet and booklet, (2) displays, and (3) the annual forum. We try to coordinate these three. The subject or theme of the forum is repeated in the dramatic display for conventions and window, and this year at least in two illustrated leaflets on accidents for children and older people.

Last year we used as a subject for our annual Home Safety Forum "Fatigue—Factor in Home Accidents," and we made a display to go with it. Fatigue is an important factor in home accidents. A tired housewife is an accident waiting to happen.

This may be a new idea to many women. It is too easy to blame accidents on other things. But who is to say that an exhausting day of housecleaning, cooking, caring for a baby, washing, ironing, waiting in line at a grocery and taking hubby's brown suit to the cleaners wasn't the reason she fell on the cellar stairs.

I believe in the necessity for occasional relaxation so strongly that I think even soap operas serve a useful purpose if they bring a pause in the day's occupations for the over-tired housewife.

Industry has long recognized the fatigue factor in work accidents. Workers are given occasional rest periods. But a woman's work is never done.

We like a dramatic display on home safety best of all because we think it attracts and reaches more women. We discriminating women like color, idea, line and texture.

We use our displays in windows—at conventions and meetings—at state fairs and libraries.

In a general way, here are the yardsticks for our home safety displays:

1. What is our aim?
2. What is exhibit supposed to do?

We must inform people—not instruct. We also hope for broad acceptance of ideas in presenting the display. We must break down this general public we are trying to reach. It's just a husband, wife and children with possibly grandmother and grandfather living in an apartment or suburban home. All with quite obvious home accidents on their hands. Some of them serious.

In our displays we try to stress the home accidents which occur most frequently—falls, cuts and burns etc. We segregate by age groups. We try to appeal to types of women (the mother of small children—the modern young housewife).

A good display has color, line, design—it should have figures of people or things. Ideally it should have motion, light and sound. The location of display is important—the size of the space. A small display can be as important as a large one if properly set up—and properly balanced.

We also believe in home safety publicity (which includes displays—posters—booklets) of keeping statistics to a minimum and stressing ideas.

Good exhibits are illustrated headlines. Let's Bill the Windows!

### "Look Who's Lucky"—Wasn't Luck

By RYAN B. HALL

President, Hamilton Safety Council (Ohio)

That is the record of the Home Safety division's project, which achieved more good will for the Hamilton Safety Council and did a better job of visual education, than any other project which the Council has undertaken since its inception.

The Home Safety division of Hamilton Safety Council had been searching for several

years for a practical method of approach to the public. One which would reach all walks of life and people of all ages. A message was needed which would forcefully, and yet in an entertaining fashion, drive home the story of safety in the home. To concoct a sugar coated safety pill that people would actually ask for was the problem. A colored slide

film with a simple but appealing safety story and a snappy, entertaining script seemed to be the answer.

Accordingly, late in the year, Robert M. Clark, chairman of the Home Safety division, and Ryan B. Hall, president of the Safety Council, buckled down to the job of developing such a film and story. First step was to boil down all the ideas given them and to select a central theme. It was decided that the picture should follow an average composite Hamilton family through one day's normal activities in the home illustrating the common home hazards in the process.

It was recognized that just the plain habits of every day living caused most people to ignore home hazards. They more or less trusted to luck to get them by. From that thought came the title of the film "Look Who's Lucky". As the picture and story developed it was decided to point out that all those people who did trust to luck were, consciously or unconsciously, running dangerous risks and were really not lucky at all. Only those who were aware of the hazards in their homes and did something to correct them could actually consider themselves lucky.

From this skeletal beginning a full scale scenario was drawn. Each picture was carefully discussed and laid out in detail. Shots were planned both from a story continuity standpoint and from the angle of the various common hazards in the home which the two men wanted to illustrate. Only when this complete shooting schedule was drawn up did Clark begin the actual work of photographing.

After the shooting schedule was completed, the films were arranged in proper sequence and ran off. As each picture was flashed on the screen, Hall dictated the script to a stenographer, who also volunteered her services. Two re-writes of the script were made to punch it up! When this was done the entire production was assembled and a private showing given.

It had been the intent of the Home Safety division from the beginning to present a film and story which would interest all ages, and would be suitable for showings to groups of women, of men, of children and of mixed audiences. To be certain that the production met this standard, the preview audience was very carefully selected. Some changes resulted in the script and sequence of films because of reactions at the preview. "Look Who's

Lucky" was then ready for its initial public showing in February of 1947.

To acquaint the public with this new film, a full-page ad in the local newspaper, The Journal-News, was printed. An accompanying full-page spread describing how the picture was made, announcing the cast and setting forth numerous home safety hints was published.

Showings of the film were booked over a span of four months. During that period, 28 performances were given before 5,012 persons. This represented an average audience of almost 180 persons per showing. The originators of the film carefully planned its length to be twenty-two minutes. Thus, with an additional little verbal message on the part of the narrator concerning Council activities generally, a one-half hour program was made available. This fitted ideally into the program schedule of most organizations. A narrator was used to lend a personal touch to the program which could not be obtained through the medium of recording.

Those who saw the production were amazed by the fact that it was produced for the very negligible cost of \$68.75. Had the many hours of volunteer labor which went into the development of the film and the story been counted at even the rate of \$1.00 per hour, the cost would have been much, much greater. A constant stream of publicity has been kept flowing relative to the production. Here, again, the Journal-News, as well as Radio Station WMOH of Hamilton, have played major parts.

Perhaps much of the success of "Look Who's Lucky" can be attributed to the fact that, in preparing the film and script, Clark and Hall tried to put the production on an entertainment as well as educational basis. Every effort was made to stay away from the usual dry safety facts. The script was colored as much as possible and humor was introduced where feasible. At the same time the safety theme was kept ever prominent.

Overwhelming, favorable response from the public has been the result. The Home Safety division has felt that the tremendous amount of time and effort which was expended is more than compensated for by the picture's reception. Such things cannot always be measured in terms of dollars and cents. If the film has saved one life or prevented one serious injury, the Hamilton Safety Council has been amply rewarded.



TUESDAY AFTERNOON SESSION  
October 7, 1947

### Home Safety Projects That Succeeded

Presiding: LEONARD M. BOARD, United States Public Health Service.

#### Why a National Conference on Home Safety?

By DEWITT SMITH

Chairman, National Conference on Home Safety and Vice Chairman,  
American Red Cross

The members of this audience undoubtedly know that in 1946 there were 35,000 accidental deaths in the homes of the United States and that nearly 5,000,000 persons suffered disabling injuries in home accidents, of whom 130,000 were left with some permanent impairment. Thus, the homes of the nation rival its streets and highways as a potential source of danger to the individual.

The impact of similar statistics on those able to appreciate their significance had already aroused the concern of many national organizations even before 1945. An astonishing number of agencies had felt impelled to include some sort of home safety measures in the programs they sought to promote.

When, in 1945, the National Safety Council and the American Red Cross undertook to get information about the number of such agencies and the nature of their interests in the subject of home safety, everyone was surprised to learn that more than 60 national organizations could be readily identified with an infinite variety of approaches to the promotion of home accident prevention.

Obviously there existed a need for a coordinating device that would pool the experiences of the various agencies for the information and guidance of the group as a whole. Such coordination would also give added emphasis to any conclusions that might be agreed to by a majority of the agencies.

The National Safety Council and the American Red Cross therefore invited 31 of the agencies that seemed to be most definitely engaged in some form of home accident prevention to participate in what has since come to be known as the National Conference on Home Safety. A first meeting was held in March 1945; the conference, as such, assembled for the first time in January 1946,

and met again in January 1947.

One of the first activities of the new organization was the compilation and distribution of the results of a questionnaire on which each member agency reported on the scope of its interest in the problem and the resources and facilities at its command. Thus, for example, it became apparent to all that the National Commission on Safety Education of the National Education Association and the American Junior Red Cross provided a direct means of communicating safety education to children in the schools; that the Camp Fire Girls, the Girl Scouts, and similar organizations could reach large numbers of adolescent children; that the National Institute of Architects, the National Committee on Housing, and the National Fire Protection Association were interested in having modern houses so planned that accident hazards could be reduced or eliminated; that the American Home Economics Association, the American Women's Voluntary Services, the Consumers' Co-operative Association, the Farmers' Educational and Cooperative Union, the General Federation of Women's Clubs, the National Board of the Y.W.C.A., the National Congress of Parents and Teachers, the National Grange, and other similar agencies had access to vast ready-made audiences of adult homemakers whose interest could be aroused and directed toward the achievement of home safety; and that the National Safety Council and the American Red Cross had personnel trained in safety who were available to assist in the development of community enterprises directed toward the same end.

A program designed to enlist the active participation of each individual of school age or above in each of the 35 million homes in this country has need of every conceivable

approach to the individual citizen. This means that every one of the agencies that profess an interest in the promotion of home safety, and hundreds more that may be unaware at present of such an interest, must be shown the need for effective propaganda designed to make everyone accident conscious.

The National Conference on Home Safety is not intended in any sense to replace other agencies or to lessen their influence. On the contrary, it is designed to facilitate the more effective and intelligent promotion of such of their aims and purposes as may lie within the scope of a comprehensive program of home safety. It is hoped that the stimulation of the conference findings and recommendations may extend far beyond the spheres of influence represented by its own membership.

The conference exists to provide a forum in which the representatives of all agencies actively interested in the prevention of accidents in the home may meet at least annually to promote mutual understanding and goodwill, to develop an awareness of the programs of each of the cooperating agencies, and to formulate a national home safety program designed to enlist the active participation not only of conference members but of all other agencies and individuals concerned.

The conference exists to promote the making of special studies of accident hazards in the home and of specific recommendations pertaining to their elimination or curtailment. In some instances, such studies are conducted by the standing committees of the conference.

The conference exists to give leadership and direction to its member agencies in their efforts to attain such objectives as:

- More adequate statistical and technical research.
- More adequate presentation of the need for home safety measures through promotional and publicity media.
- More effective guidance and assistance in the development of local home safety programs.
- Promotion of educational programs in schools, colleges, and other educational agencies.

At its second annual meeting in January 1947 the conference received formal reports from four of its standing committees:

- The Committee on Home Accident Statistics recognized the notable lack of reliable statistical data in this field and concluded that three developments were essential before accident reporting methods could be deemed to be on a level with other epidemiological studies:

- Standardization of definitions
- Standardization of methods of collection and analysis of facts, and
- Development of interest among health officers in a reporting and analysis program.

Practical plans were proposed for the utilization of the full resources of the conference and its constituent members in bringing about substantial improvements along the lines indicated.

- The Committee on Home Planning and Construction, having summarized certain home hazards that might be lessened in properly designed dwellings, undertook on behalf of the National Conference on Home Safety to enlist public support in a cooperative effort to insure a greater degree of safety in the homes than are yet to be built.

- The Committee on Home Maintenance and Operation formulated a number of projects for consideration by the conference:

- To interpret the word "home" in accordance with the broad concept: "Home is where you and your family are".
- To develop a cooperative approach to the problem built upon some such slogan as "The Family Cooperates for Safety," and a specified list of the responsibilities assigned to each member of the family group—son, daughter, father, mother, grandparent—in the achievement of home safety.
- To prepare or assemble bibliographies of materials appropriate for different economic levels, different types of homes, and different geographic locations.
- To indicate where research on the causes of home accidents is most essential: environmental or managerial.
- To encourage advertisers of equipment to emphasize the safety features of their products and to recommend and explain the safety measures to be observed in the care and use of the equipment.
- To plan needed visual material for teaching units on home safety at different educational levels.

4. The Committee on Education and Public Information submitted an outline of a report that will be printed for extensive distribution and will attempt to define the scope of the problem and the area of responsibility in home safety education and promotional activities, including:

- Statement of objectives and need for home safety education.
- Teacher preparation for teaching home safety.
- Responsibility for home safety in the school program.
- Adult education.
- Promotional activities.
- Needed emphasis for home safety education.
- Recommendations for home safety education.

The consideration of these and similar committee reports by the representatives of the agencies comprising the National Conference on Home Safety will help to focus nationwide attention on some of the more pressing problems of home safety. Effective publicity given to the findings of these committees will suggest to the widest possible audience practical ways of coping with home accident hazards.

The conference is in a position to release more varied and more comprehensive publicity material pertaining to home safety than any of its constituent agencies.

For instance, *A Man's Castle*, of which 40,000 copies have already been released through member agencies, was published jointly by two member agencies of the conference. It is a well executed pamphlet, in color, with striking illustrations and captions dealing with many aspects of the home safety program and outlining in the briefest terms a community approach to the problem.

The same two member agencies again collaborated a few months later in the production of a less elaborately illustrated pamphlet entitled *There Is Safety In Numbers*, of which 37,000 copies have been distributed. This pamphlet addresses itself to the task of informing local agencies and individuals how to initiate, develop, and maintain within each community a functioning organization that is capable of enlisting every constructive force in a unified, comprehensive effort to prevent home accidents.

The selection by the United States Children's Bureau of Accident Prevention as the theme for the Annual Child Health Day in 1947 was due largely to the fact that Dr. Martha Elliot, Associate Chief of the Bureau, became more than ever impressed with the need for nationwide activity in this field as a result of her participation in the recent annual conference on home safety.

It is generally believed that the most valuable single project that could be devised for testing possible methods of promoting home safety would be a series of experimental or demonstration over a period of one or more years in typical communities where conditions before and after the demonstration could be surveyed and compared. Only such controlled conditions various techniques for promoting and maintaining a community program could be tried out and observed with due regard to the results actually obtained.

While it is unlikely that the consumer will be able to command sufficient resources among its own member agencies to finance such demonstrations, plans are under consideration to make the best possible use of such financial support as may be obtainable, perhaps from one or more of the foundations concerned with the promotion of human welfare. Certainly if such projects are ever conducted they will have been made possible only because of the teamwork that is generated by the conference among its member agencies and the obvious fact that the best skills and experience in the home safety field can be enlisted and applied by the conference to insure the success of the enterprise.

Let me say in closing that attainment of the goal of the home safety program depends entirely on our ability to bring the principles and practices that will prevent accidents to the attention of the individuals within each home in a form conducive to their acceptance and observance. To this end we must utilize every feasible approach to the consciousness of the individual and every responsible agency that is concerned with the health and well being of our citizens.

In the National Conference on Home Safety we have made a start in the direction of effective teamwork among 51 national agencies. Let us hope that this enterprise may grow in numbers and in spirit until all people everywhere are shown what they can do for themselves in the prevention of needless death and injury from accidental causes.

## Home Safety As We Sell It

By MRS. R. W. HARDY

Chairman, Women's Division, Lamsing Safety Council

"Accident Facts", published by the National Safety Council, shows that 33,000 people were killed and nearly 5,000,000 were injured in so-called home accidents. This figure rates second to motor vehicle deaths in comparison with occupational, traffic, and farm accident deaths. Consequently, taking into consideration the national figures and using state and local statistics, the women of our community have decided to make an honest attempt to do something about it.

The Women's Division of the Lamsing Safety Council was organized in 1939. In 1944 this Division changed its name to the Women's Division in order to do a more complete overall community safety job, but they still have as their prime objective accident prevention dealing directly with home accidents.

The women of our Division, who have adopted the slogan "Safety Begins at Home", feel that no startling reduction in accidents will be made until we sell every housewife in Lamsing on her responsibility in the safety of the community.

We feel that—  
it is mother who is the one person interested in whether dad's working conditions are proper;

it is mother who can sell dad on observing the simple rules of safe working while on the job;

it is mother who is interested in the traffic program where it affects her youngster going to and from school and the older members of the family in the use of the family car both night and day;

it is mother who says a little prayer to herself each morning as the family leaves for their daily occupations whether at work or at school, prays that they safely return to her at night;

it is mother who is hurt the most when one of her brood is hurt.

In other words, mother is still morally the family boss in any American home.

In our selling program the housewife must be shown that in order to accomplish this program she must set a good example in the safety of her home as to its equipment and safe storage of equipment. In other words—

good housekeeping. There is no need to go further and enumerate the various hazards existing in the American home; you have all heard that too much already. The point is that if we correct the hazard of the bathroom, we will probably find hazards existing in the kitchen. Therefore, mother must be sold that the program must envelop the entire home.

We are told that 98 per cent of all accidents are caused by human failure—human failure because of the lack of a courteous attitude toward a healthy living and a lack of proper instruction, and as it affects the home—"proper home training". If a youngster is taught in the home to live a healthy and a safe life from birth and his habits are well formed, they will tend to carry on through his whole life. You might rightfully ask now, "that's all good, but so what?" "What are you going to do about it?" Our plan is not new. In the development of our program, we have received the assistance of the National Safety Council and its staff members and various other communities who have home safety programs. We do feel in some cases we have tried to develop something that is new and unique; if nothing more than looking at the whole program as a long range program for the future.

Our organization is set up so that every women's club is invited to be officially represented in the Women's Division by one or more members who meet regularly once a month to hear a speaker on a subject which is of vital importance to us at that time. These representatives return to their own group and pass on the message to their members and consequently into the homelife of Lamsing.

We receive 100 per cent cooperation in the development of our program from the public and parochial schools of the community and the School Safety Committee of the Lamsing Safety Council. For example, last spring 15,000 home inspection blanks were distributed to the grade school children and with the assistance of their parents a home inspection made. We are planning a program for this fall in cooperation with the Boy Scouts of America to have placed on the front door of every home this little sticker which reads,

"Safety Begins at Home—Cooperating with the Lansing Safety Council".

We women do not claim that we can do the job alone, but we do want to show the official governmental family of enforcement, education, and engineering that we are willing to take our responsibility in making Lansing a safe place in which to live, work, and play. Each new mother receives a "Congratulations" pamphlet for their new arrival which was published by the National Safety Council, and a letter to the new mother signed by the Chairman of the Women's Division.

Bookmarks are furnished through the public library carrying a message from the Women's Division on the prevention of home accidents.

A member of the Women's Division serves on the Traffic Committee of the Lansing Safety Council in the development of traffic safety programs. Several of our members serve on the Board of Control of the Safety Council, and one of our women is honored by serving on the policy making and financial planning committee of the Council.

A speaker's bureau has been maintained by our division, and programs have been ar-

ranged and speakers sent out to various groups in the community.

We aren't fooling ourselves that the program we have laid to reduce home accidents is going to be an easy one. We realize the enormous selling job ahead of us, and we realize it is as Paul Jones of the National Safety Council has so adequately put it, "we aren't talking to anyone who is going to get killed; the accident is always going to happen to the home across the tracks or to the other person's home". It is a funny thing as you look at this problem, that accidents never seem to hit any one classification of the rich, the middle class, or the poor, but they seem to be equally divided among all ranks of American home life. Thus facing it, we sincerely realize the big job ahead of us.

Doesn't it seem silly to think that this is such a tough job. Would it be so hard if we came to realization that no one person or organization could do it alone, but that it must be the coordinated efforts of the entire community of official and unofficial organizations pulling together on a single idea not thinking of who is going to get the credit for the job but that when a substantial reduction takes place we can all say "a job well done".

### Thousands of Home Accidents a Year

By JOHN W. GATES

Director, Safety Services, Atlanta Red Cross Chapter

The first essential in any good safety program is that those persons to whom the program is being directed are aware of the threat to their well being posed by the particular accident situation concerned. In most communities the newspapers and other publicity media give generous coverage to those accidents which find their way into public records—these being principally traffic and other public accidents. Those of us interested in home safety have had to rely principally on the excellent records accumulated in the Safety Council's *Accident Facts* for our home accident statistics. Each man's home being "his castle" there is a natural privacy surrounding those accidents occurring within the home and it is very seldom and only in the exceptional cases, that they receive much publicity. Yet, if we are to make a reasonable

inroad on the home accident problem in our locality, we must put forcibly before the public a report as to the great extent home accidents affect the community.

In using national statistics for this purpose we run into the familiar bogaboo—"it can't happen here". Human nature causes all of us to assume that any national statistics are reporting situations foreign to our own doorstep. The mere fact that there are very few reports in local publications concerning home mishaps encourages belief that they present no problem of a local nature. In promoting a home safety program in Washington and Atlanta we found it necessary as one of our first steps to develop some means of public information to prove that home accidents were not only as numerous but even more numerous than traffic and other

types of public accidents with which the residents of our cities are more familiar.

Inasmuch as we knew that nowhere was there in existence a reservoir of accumulated data concerning these accidents, there was only one thing to be done. We must organize our own survey. How was this to be done?

It was apparent that the survey must be kept current or else our statistics would soon lose their effectiveness by becoming obsolete and expeditious. Also, it was apparent that it would not be practical nor even possible to attempt a door-to-door survey. We asked the question "Who would have home accident records?". The answer being, of course, the doctors and hospitals who were required to treat the victims of these mishaps. For the thousands of cases that did not receive medical attention of course there were no records nor any practical way of recording them.

We also discarded the idea of a survey among doctors as being impractical, particularly as we were planning to accumulate our figures on a weekly basis. This decision was made so that we could offer fairly fresh news concerning home accidents more frequently to the local publications.

The hospitals then were left as the only practical source for the information we required concerning injuries. We anticipated that by using the hospitals' records we would miss a large number of accidents that did not require hospital attention but at the same time we would record all the more serious accidents and these were the ones which required the greatest attention in a prevention program. The gathering of information regarding home accident deaths presented a more simple problem. We first worked through the coroner's office in our Washington survey but later found that the Bureau of Vital Statistics, where the death certificates are prepared, presented a more accurate source. We have continuously obtained our death statistics from this Bureau in our Atlanta survey.

We were now ready to begin work on securing the necessary cooperation from the hospitals for the project. We prepared a simple form which provided space to record the sex and age of the victim and a separate column for each of the major types of accidents. All that was required for a hospital to record a case was to insert a check mark in the proper column, note the sex and age and give brief details in the remarks column

provided for that purpose. In organizing both the Atlanta and Washington surveys we believe that the simplicity of this form was very instrumental in our success in obtaining hospital cooperation. We used the same form in obtaining a report of deaths from the Bureau of Vital Statistics.

Equipped with these simple reporting forms, we visited the superintendent of each hospital. We explained the purpose of the survey and were careful to point out the simplicity of the information required from the hospital. In both cities we received without difficulty 100 per cent cooperation. In some cases, the superintendent was merely politely agreeable but we were pleased to find in many cases a real enthusiasm for the project. In fact, the superintendent of a large Atlanta hospital stated that he felt that all too seldom hospitals had opportunity to serve the public in the prevention rather than the effect of accidents. A visit was made to the Chief Statistician at the Bureau of Vital Statistics and his ready cooperation obtained.

Having completed these preliminary arrangements the survey was ready to begin. It was agreed that the hospitals and the statistical Bureau would report the accidents coming to their attention each week. The week ran from Friday to Thursday of the following week as this would give us time to prepare publicity releases for the weekend. Our first arrangement was to have the various record clerks mail the reporting form to us but this was soon found to be unsatisfactory. Due to the number of clerks concerned and also the fact that they were busily engaged, the reports would frequently reach us too late. We then instituted a pick-up service where we would visit each hospital weekly and obtain their report. There was another advantage to this system in that we were able to make the acquaintance of the recording personnel and discuss with them the survey, thereby stimulating their enthusiasm for the project. This, of course, led to better reports.

The actual results compiled in our survey are startling. They revealed literally thousands of home accidents a year. For example, in the survey we have been conducting this year through August 31st, we have recorded 49 deaths and 2,798 injuries as a result of home mishaps. During the same period traffic accidents which heretofore had received all the publicity, accounted for only 16 deaths.

We might mention, in civic pride, that these 16 deaths represent a substantial reduction from the Atlanta traffic toll for the same period of the previous year. You may well imagine the attention that has been attracted when we publicize the above figures. In fact, we have received evidence that our reading or listening audience has been shocked by them.

The uses of the survey material have been many and varied. Of course, our primary intention was to give publicity to the local home accident problem. To this end we visited the editors of the local newspapers and received their assurance that they would print a weekly story each Sunday based on the reports accumulated for the preceding week by our survey. In these stories we strive to point out seasonal trends, more frequent types of accidents and include, for the sake of making the article newsy, unusual or freak accidents that have been reported. In Washington these stories have been carried each week by all the papers while in Atlanta regular coverage has been given by *The Atlanta Journal*. Reference is made in each story also to the total number of deaths and injuries which have been reported so far during the current year as these totals have always been greater than traffic and other types of accidents reported in the papers.

The survey has caused attention to be directed, for the first time, to home accidents as a community problem. The information is

recorded in a ledger kept in our office and mimeographed reports issued semi-annually. The mailing list for this report is becoming steadily greater. Among those receiving it are safety instructors, school teachers and safety engineers. Another important result of the survey is that it permits our safety instructors to adapt their teaching to local problems which have been revealed by the statistics.

We know from results that our surveys have had the desired result of drawing public attention to home accidents. The very number of requests that we get for information stemming from the survey proves this point and the number of these requests increases constantly. Many of the requests come from home makers and mothers for information as to how to avoid accidents they had read of in our stories. In this respect the survey acts directly as a safety measure. During the past year in Atlanta we have been favored by a full column by one of our leading editorial writers. The *Washington Star* has devoted full-page spreads with pictures depicting many of the accidents reported through the survey.

Truly these surveys in these two communities have slowly but surely caused the spotlight of public attention to be directed on the severity of the problem that home accidents pose to these communities. A similar survey can do the same in your community. We recommend it to you as the beginning and basis for a sound home safety program.

### How Home Economist In Business Can Contribute to Home Safety Program

By JEANETTE CAMPBELL  
Home Service Dept., General Mills, Inc.

The home economist, by the very nature of her training, is interested in everything pertaining to the home. The business home economist working on a local level is active in many organizations in her community and works with large groups of homemakers and young people. Many of the business home economists employed by national organizations reach millions of women through radio and written material. These women are in an ideal position to integrate the teaching of safety with information on cooking,

kitchen planning, clothing, and home management.

Let's glimpse for the next few minutes some of the specific ways in which home economists in business can help to promote safe practices in the home. First of all, let's consider the home economist employed by newspapers and magazines to write homemaking columns. How can they help? One way would be to give a safety tip each day, in the newspaper food column. A safety tip daily is better than devoting a column to

the subject and then dropping it for awhile, because one idea a day is likely to be read, and the subject of safety is kept before the homemaker each day, making her more conscious of it.

This daily safety tip could appear in a separate block or more subtly by incorporating the safety message right in a recipe. We all know that most women read and clip out recipes—no matter how many they may have bulging out of already crowded kitchen drawers. How can safety information be incorporated in a recipe or in directions for preparing food? Let's say that I'm telling you how to make an avocado, grapefruit salad.

First I'll have to mention that the grapefruit must be peeled and sectioned, and that the avocado must be peeled and cut in nice pieces. Wouldn't it be easy to add "Be sure your kitchen knives are sharp. Sharp knives are less dangerous than dull ones. To peel grapefruit, be sure to cut away from you. This way, if the knife slips it doesn't cut you." Then a short, detailed description of just how to peel a grapefruit could follow, and if possible a picture or diagram showing how it's done. The fact is that cutting grapefruit properly is much easier and quicker as well as being safer.

In an article on "getting a good breakfast", many safety tips can be interspersed with the food information. How about the homemaker who comes down to the kitchen to get breakfast for the family wearing a flimsy blouse with long flowing sleeves? And believe me, there are plenty who fall in that category. This is a dangerous practice when working around fire, as we all know. These homemakers can be warned in a food column about the danger of this practice.

In magazine homemaking columns when information is printed on efficient ways to clean house, safety tips—the proper use of stepadders can be included. Stepadders have to be used, or maybe I should say, should be used, when cleaning walls and places too high to reach. Pictures could illustrate this very well. Comparisons such as "Don't do this" where it shows a woman stepping on a box or a chair and "Do this" showing a good sturdy step ladder with each step wide enough to stand on, are excellent in teaching good home safety measures.

Also pictures indicating safe storage places for household disinfectants, lye, and cleaning

fluids can go far in showing women how to protect their families.

I am sure we are familiar with the excellent job which has been, and is being done by the newspaper and magazine home economists in pointing out safe housekeeping habits to the women of America.

What can the radio homemaking programs do? Most radio stations do not employ home economists, but much of the material used on their programs for women is gathered from information put out by home economists. Home economists supplying this information can include safety tips. In radio, showmanship is a necessary ingredient, and so home safety can be dressed up with bright sequin trim so that women will listen.

As in the newspaper and magazine, small bits of safety information given each day are more effective than devoting a whole program to the subject. It's a lot like the old man-dried Connecticut storekeeper as he watched two city girls riding down the dusty road on their bicycles, clad in the briefest of shorts and halters. A city man who had stopped in to buy something commented "The modern girl knows how to get her man better than her grandma did". The old man eyed the girls reflectively, paused and said "I don't know about that, mister. I never seen a successful merchant who put all his goods on display at once. The wise storekeeper shows one prize item at a time. That's what their granddads did." And so it is with information on home safety via radio. It's better to give the listening audience one prize item each day.

Too many ideas are difficult to absorb all at one time. It's far better to get one or two thoughts across. That's where real service can be given. How can this be done on the radio? Well, women are still very fond of soap operas, so possibly a one minute skit each day in which a home accident such as a fall down the cellar steps is dramatized—screams and all—would get the point across. Maybe it should be called "It Can Happen To You". After the dramatized version, the announcer might say, "Is your home full of booby traps? To avoid falling down your stairs, be sure that your stairway is not littered with brooms, mops, toys or other articles."

The home economists employed by gas and electric companies are in an ideal position to carry on a safety program locally through

demonstrations and on home calls. Some public utilities in larger cities have a theatre cooking school promotion in neighborhood theatres each year. Here is an excellent chance to include kitchen safety lessons. I am particularly aware of this chance to reach homemakers because up until the first of this year I was with the Minneapolis Gas Light Company, and in their theatre cooking schools a year ago, one demonstration in each theatre was devoted to safety in the kitchen.

Safety tips can be worked into a demonstration easily and subtly. Foods to be used in the demonstration are chosen especially so that safety pointers can be discussed. This is an example. Let's start with the top of the range. Let's assume that we're showing our audience how to cook beans in one of the new pressure saucepans. We're also showing how to fry potatoes in deep fat. What safety tips can we include? Let's take the pressure saucepan first. We'll show it to the women. We'll tell them that when they purchase a pressure saucepan, they should be sure to read the manufacturer's directions carefully before attempting to operate it. We will stress the point that safety vents be kept clean and free from food particles at all times and we'll show how. We will further show that the saucepan should never be more than two-thirds full of food. During the cooking operation we can demonstrate the need for keeping the handle of the saucepan and all other parts turned toward the back of the range so children can't reach them and so that older people won't brush against them. After the beans are cooked we show the release of steam to zero pressure before removing the cover.

Now we come to the oven. A cheese soufflé or a custard which is baked in a casserole surrounded by hot water teaches a very good safety lesson. After the soufflé or custard is baked, we take it from the oven, turn the heat off, and let the pan containing the water remain in the oven until it's cold before removing it, thus eliminating the danger of a bad burn, if by chance the water spills while we're carrying it.

In an oven demonstration, there's a good chance to show how to use heavy pot holders, making sure they're dry. A damp pot holder touching a hot oven rack or hot pans forms steam and could cause a burn.

A canning demonstration offers worlds of

opportunities to teach home safety. Here are a few points to be stressed: proper cleaning and sterilization of jars so foods will keep; the need for using the water bath method for fruits; and the pressure cooker for vegetables, meats, and poultry.

A thorough discussion of botulism poisoning in terms women can understand is certainly in order along with a warning about not using the oven for canning. I've seen several women who were so badly burned that they will be scarred for life because they insisted on canning foods in the oven. I can remember calling on a lady in one of our Minneapolis hospitals who had been canning beans in her oven. I also visited her home to see the damage which had been caused by the jar explosion. Glass was imbedded in the walls, beans were plastered on the ceiling, and the range was a twisted mass of steel. How did it happen? Well she packed the beans in the jars to within an inch of their lives. She turned the covers on the jars down with a vice-like grip and then she placed them in the oven. Although she would have had a jar explosion in a pressure cooker following this kind of procedure, the damage would not have been quite so great in the pressure cooker.

A jar explosion is not the only danger with oven canning. Heat can not penetrate as thoroughly to the center of jars in a dry heat atmosphere such as an oven, as in a moist heat atmosphere like that in a water bath or pressure cooker. If there is not thorough penetration of heat, foods will spoil.

In a canning demonstration all such safety factors can be explained and shown. Women have an opportunity to ask questions and clear up any problems which have been puzzling them.

Safety tips can be included in each and every demonstration. Gas company home economists can urge women to buy only those appliances bearing the AGA Blue Star Seal of Approval, while electric company home economists can urge women to buy appliances approved by the Underwriter's Laboratories.

The representatives of the electric companies should impress upon homemakers the safety need for having non-metallic light sockets and switches with insulated pull chains. Homemakers should make sure cords connecting lamps and other electrical appliances are not frayed.

Gas company home economists, calling on

customers in their homes, can check to see that gas burners are in proper adjustment.

Because so many utility companies now operate kitchen planning departments I'd like to mention some ways in which the home economists employed by these companies can help to promote safety in the kitchen. If there is a real kitchen on display, little cards pointing out the safety features can prove a great help. Knife racks where only the handles are exposed or where sharp blades are protected; light switches arranged so lights can be turned on at the door so you don't enter a dark room; electric outlets installed away from the sink; proper lighting over special work areas like the sink; proper and adequate storage so that there won't be disorder in the kitchen; flat bottomed, well balanced pans which won't tip displayed on top of the range; and rounded corners on all counters and tables—these are just a few of the many ways to make the kitchen safe.

Kitchen planning consultants talk to men and women personally and in large groups. Here they stress the need for proper arrangement of kitchen equipment and proper working heights to eliminate fatigue and thus to make the homemaker more alert so she is able to avoid needless accidents.

Many kitchen planning centers have a bookshelf on which all kinds of books and magazines pertaining to home building are kept for customers to read. These can include articles on safe home construction and repair.

Further, the kitchen planning consultant can work with architects to include safety features when drawing home plans, and with local authorities and civic organizations to promote and enforce safe building codes.

Home economists employed by food companies can, through demonstrations and printed material, teach women how to store foods properly both before and after cooking to eliminate food spoilage. We can also in-

clude safety tips in recipes and bulletins. An example is a custard pie recipe or one for cream puffs or eclairs where a word of caution can be included in large print "Be sure to store in the refrigerator".

More and more equipment companies are employing home economists. These women are on guard to help their companies manufacture safe equipment. Through careful testing in the laboratory they are able to discover possible hazards, so that these can be eliminated before the product reaches the market.

The equipment home economist helps in another way, too. She writes or helps to write the instructions for using the equipment. She strives to see that these directions are written clearly, in detail, and in an interesting manner with plenty of illustrations and diagrams so homemakers will be sure to read and understand them.

We've been talking about what the home economists in business can do individually to help promote safer kitchens. What can we do as a group?

In St. Louis, the Home Economists in Business sponsored a local institute and training school for the women of the community. Five lessons were held, once a week. Publicity for the institute was attained through newspaper articles, radio announcements, and letters to clubs. All women who completed the five lessons were awarded a Home Safety Engineer's Badge.

Such institutes should be sponsored in collaboration with the National Safety Council, in other cities. We can help to teach women safe kitchen practices so that 5,000 people won't meet their deaths in kitchens this next year, and so that 80,000 won't be injured in that same room. If we all work together we may be able to make "home" a safer and more enjoyable place in which to live.

*Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME XXVIII

SCHOOL AND COLLEGE SESSIONS

NATIONAL SAFETY COUNCIL, INC.  
28 NO. WACKER DRIVE • CHICAGO 6, ILL.

## Foreword

**T**HE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

**THE NATIONAL SAFETY COUNCIL**  
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## School and College Sessions

MONDAY AFTERNOON SESSION  
October 6, 1947

### General Session

Presiding: NILES ANDERSON, Supervisor, Section on Safety Education, Div. of Instruction, Pittsburgh Public Schools; General Chairman, Safety Education Supervisors' Section, N.S.C.

### What I Expect From My Safety Patrol

By WILLARD E. GOGLIN

Superintendent of Schools, Minneapolis Public Schools

No safety program will succeed until we have developed proper attitudes toward safety—until we feel that it's smart to be safe. In our existing society, it is socially acceptable to be unsafe. The high school girl prefers "glamour" dates with a boy who is not afraid to take chances, with one who will speed, and who isn't afraid to go through a red light, now and then. High school students are not alone in the attitude of "It's smart to be unsafe"; this attitude is one shared by older persons.

Until everyone takes conscious pride in the fact that he is a skillful driver, or that she has a fire blanket in the kitchen to smother small fires—until one is proud of taking countless safety precautions—any safety program will have a hard time being effective.

We are scared, calloused, hardened to accidents. It is easier to let professional safety persons do the work. We still do not feel that it's smart to be safe. Until we develop a program which will change existing attitudes toward safety, our accident rate will continue.

Many schools carry on safety education programs in school buildings which are not safe. Unfortunately, many school persons have fallen into the habit pattern of teaching in unsafe buildings. They are careless about fire hazards; they are careless about little things like handrails and stair treads. These persons forget that safety should be taught in terms of environment.

Safety education should not be confined to a specialized program which is taught in a 45-minute period. Safety education should be included in reading, writing, arithmetic, social studies, and the sciences—it should be included in every part of the curriculum.

This is not an argument against specialized activities. Specialized activities if they are to be effective, however, should stem from an integrated safety program which permeates the whole school program.

The school is the hub of the community by the very token of the fact that it has the largest community enrollment—from kindergarten through adult education classes. The school, then, should endeavor to pull the support of all community agencies into its safety education program. We have talked a great deal about co-ordinated community safety programs, but lots of it has just been talk. We still have many separate agencies, most of whom are very worth while, and are working toward the same goal, but lack of coordination among these agencies results in whole segments of the population failing to receive the benefit of a safety education program.

Schools should give definite attention to the development and maintenance of physical fitness. The war showed us, by the number of young men rejected from service, that we are a soft, flabby nation. It is probable that physical condition has a great deal to do with accidents. If you have a fast reaction time and are well co-ordinated, you are less likely to have an accident than if you are in poor physical condition.

A public which is well informed about hazards will be more likely to support a safety education program than a public which is unaware of existing dangers. Schools, along with other community organizations, have left the people ignorant of the causes and effects of accidents, as well as methods of controlling factors which contribute to accidents. Again, because the school is the hub



of the community, it is the logical agency to dispense necessary safety information.

A safety education program which cannot change along with changing conditions, will be an ineffective program. For example, it is not enough to swear at motor bikes and say that they should not be allowed. Obviously, motor bikes have become a part of the American scene. The sensible thing to do then is to expand the safety education program to include motor bikes. But you who are responsible for the safety education program

in your community must remember this—you must not only cope with existing hazards, you must foresee and be prepared for new hazards.

A well-adjusted person and a well-adjusted educational program must be able to control an ever changing environment—or become maladjusted. Your safety education program cannot remain static. You must have a dynamic program to match the dynamics of the modern world.

## TUESDAY AFTERNOON SESSION

October 7, 1947

### National Driver Education and Training Program

Presiding: GORDON C. GRAMAM, Supervisor, Safety Education Dept., Detroit Public Schools; General Chairman, National Driver Education and Training Committee, N.S.C.

#### Accrediting Driver Training Courses

By DR. A. R. LAUER  
Professor of Psychology, Iowa State College

The Subcommittee on Accrediting Driver Training Courses has canvassed the field very carefully and finds no specific cases which indicate that accrediting of this work has been questioned if at least three fundamental academic conditions obtain. These are:

1. A properly oriented administration that approves of education for safe living and that does not hold a reactionary philosophy of education.
  2. Courses which are up to the standard requirements in content and organization.
  3. Proper selection of host departments.
- It seems to be largely a matter of proper selection of departments to serve as hosts to this newcomer in the academic galaxy. It is not likely that the chemical courses in languages would be given credit in atomic physics at the California Institute of Technology or that courses in live stock breeding would be accredited in the Union Theological Seminary. Neither would the Center for Safety Education at New York University accept credit toward the doctorate from finishing courses for girls at Stephens College including culture and the proper etiquette at spring formal. At Iowa State College, for instance,

there are from 15 to 30 credit hours about or pertaining to safe driving, but such a course would not be accepted by the catalogue committee if it were to become a part of the curriculum in romance language or music.

Physical education and health have the predominance of courses offered throughout the country although education runs a close second. Psychology and science have been more favored in some schools while industrial arts, a very worthy host, seems to trail the procession.

One might make either of two superficial conclusions regarding the predominance of certain departments being active in this field: viz., (1) they are short of content material of their own and are looking for new subject matter, or (2) they are more progressive than other departments. As a matter of fact, neither is probably correct. A shortage of industrial arts teachers has kept them from becoming more widely interested in the newer areas. Their day is already too full. The same is true of vocational agricultural teachers. The outdoor and field aspects appeal to physical education groups who have frequently pioneered the work.

In one eastern school the mathematics department has accepted responsibility for the work and a thesis on the mathematics of driving was written in the college of education at a well coast university.

This apparently describes the picture as it presents itself although there is no reason why the physical sciences and schools of commerce should not share in this vital program.

The committee refuses to accept the problem of accrediting as a crucial one, because it has almost invariably been accepted as a matter of course when the administration was sufficiently interested. However, finicky curriculum committees are always weighted down with their responsibility to the world regarding the standards of higher education and any new subject must be made twice as hard as the "old reliables" to be considered worthy of credit. This committee's chairman had a major in modern language in the undergraduate school, and these courses have never been questioned as to credit even though some of them are decidedly "snappy" or easy ways of earning credit. Furthermore, many students go through them with little or no useful and effective knowledge or skill in the language studied.

To be rather constructive, however, we may indicate the natural steps in securing credit for safe driving courses, if resistance is anticipated. The following steps are important.

1. First sell the administration on the work as a curriculum subject.
2. Set it up in a systematic and professional way. Prepare outlines, a syllabus or manual and adopt standard textbooks.
3. Build the course on a sound foundation of theory and practice. This means setting up of proper objectives using problem sets, required library readings, work sheets and laboratory problems to accomplish pupil outcomes desired. The reliable testing devices to be assured that the desired results are actually obtained.
4. Utilize the results of research which are available. Driving is a science and a great deal has been done on roads, cars, and equipment in addition to considerable work done on the driver—the key to the accident problem.
5. Finally, lay the course out to include regular classroom work in addition to behind-the-wheel practice. See that in-

structors are selected who are prepared and qualified to handle the work.

6. Inaugurate some kind of research projects and carry them along on a high plane. When available, publish the results. Use a few mathematical formulas if you care to impress the educators. Show that your course does make better citizens as measured by their violation and accident records. If these steps are carried out, accrediting problems will vanish.

One of the greatest drawbacks to accrediting of courses is lack of properly trained instructors in charge. It is difficult to convince the well-trained administrator or registrar that he should give five semester hours college credit to a course—meaning a total of some 750 hours of a student's time—when you tell him that the professor in charge has obtained a diploma from a 40-hour course himself. It isn't difficult to understand why accrediting of driving may have hit a snag at some places; in fact, it is a miracle that its cars have not been completely knocked down as a credit course.

Some progress has been made, however, thanks to a sympathetic group of educators. New York University has set up courses in safety leading to the doctorate. Iowa State College has a major in safety and human conservation and Iowa State Teachers College offers a minor in driving and safety. Many other schools have similar courses and a procedure has been established. If accrediting is a problem we believe it is the teacher's own fault in many cases for giving sub-standard work.

Very recently the Superintendent of Public Instruction for Iowa called a meeting of those giving driver training and these interested in accrediting and asked what standards should be set up for teachers of driving. It should be set up for teachers of driving. It was unanimously agreed that the standards should be the same as for any other subject. Consequently, during the year 1947-48 they will require every teacher of driving to have a minimum of 40 clock hours in materials and methods, the next year the standards will be raised, and by 1949-50 every teacher of driving will have to have 15 quarter hours or to semester hours to be approved by the state as a teacher of driving in any form. There is a constitutional clause which holds in effect that "once approved always approved" and this will protect the experienced teacher who may not have been able to secure

the advance work prescribed for newer teachers. When this is done in every state the problem of accrediting driving will vanish completely. You need not fear that colleges and high schools will refuse to accredit those things which the regulatory bodies in education are listing for approval of teachers.

More research needs to be done on the results of driver training, not only on skills and knowledge but also on attitudes toward traffic and driving. Also, more experimental studies of driving, per se, should be made. Too much driver training has been on the speculative level. We are given to teaching the driver up to the point where he may get a driving permit or perhaps even giving an advanced course until he can get his driver's license. Imagine a university graduating its seniors when they can just write their names. Of course, many post graduates can hardly do that now. But seriously, there must be more advanced work done. We have reason to believe that a driver could study for even a year and not exhaust all the things a good driver should know if he had a

teacher smart enough to direct him.

We have tried to say here that accrediting of driving courses, either in college or high school is relatively simple if standards of other subjects taught are upheld. It is our feeling that proper allocation of the course, enlightened administrators, high standards of accomplishment, better organized courses, research and above all, properly trained teachers, will eliminate this problem entirely. In the meantime, we can all cooperate in this endeavor to raise our standards and thus help reduce accidents on the highway which are needlessly taking close to 40,000 lives a year.

Iowa State College is just inaugurating a second course for those who have taken a regular so-clock hour course in driving called "Practice and Theory of Driving." At present writing this course seems to be experiencing no trouble in getting by the catalogue committee.

It is recommended that the assignment on accrediting be considered as consummated and the Sub-Committee be dismissed.

### How Can Cars Be Made Available to Schools for Driver Training Purposes?

(Report of the Sub-Committee)

By M. R. DARLINGTON, JR.

Managing Director, Inter-Industry Highway Safety Committee

In our report submitted to the National Safety Congress in 1946 several methods by which cars could be obtained for driver training purposes were listed.

In the belief that interest in driver training would be stimulated by a nation-wide program for the procurement of cars by individual schools, the Committee subsequently recommended the following: that a member of the Committee and a representative of the National Commission on Safety Education submit to the Automobile Manufacturers Association a national program whereby cars may be made available to schools for behind-the-wheel instruction by purchase, rent, lease or loan.

This suggestion was referred to the recently formed Inter-Industry Highway Safety Committee which represents the automobile, petroleum and tire industries and the National Automobile Dealers Association. The

purpose of this Committee is to support the President's Highway Safety Conference "Action Program" by organizing state and local committees of dealers and trade association representatives of the three industries to cooperate with public officials and organizations active in highway safety.

One of the programs adopted by several state Inter-Industry Committees is the promotion of high school driver training by: (1) Urging the schools to train teachers to offer the subject. (2) Lending cars through the dealers for behind-the-wheel instruction.

It is anticipated the promotion of driver training will be stepped up materially through state and local Inter-Industry Committees within the next few months.

In addition to this program, the American Automobile Association has announced cars are available through their organization to any school wishing to offer a course in driver

training.

With these developments it appears we have reached, or will in the near future, the position of having more cars available for behind-the-wheel instruction than trained teachers to offer the subject. Since the objectives of our Committee have largely been fulfilled, the following suggestions are offered for consideration of the National Driver Education and Training Committee:

(1) That the Sub-Committee on "How Can Cars Be Made Available to Schools for Driver Training Purposes?" be dismissed.

(2) That every effort be made through official and non-official organizations to promote an expanded program of teacher training for behind-the-wheel instruction.

### Driver Education Legislation

By AMOS E. NEYHART

Administrative Head, Institute of Public Safety, The Pennsylvania State College; Consultant on Road Training, American Automobile Association

The subcommittee of the National Safety Council's Driver Training Committee on "Should Model Legislation for Driver Training Be Prepared by This Group?" favors wholeheartedly the introduction of driver education and training in our schools. This should be accomplished through educational leadership and guidance and sound promotion on the part of the agencies and organizations, both public and private, interested in this phase of traffic accident prevention.

The subcommittee does not favor legislation in order to get courses of any kind started in our schools. However, the subcommittee is well aware that some courses such as health, civics, temperance and others have been introduced through legislation. In states where legislation is being considered or in states where there is a possibility of new legislation in this area, the subcommittee feels that in order to avoid undesirable legislation, it is preferable to have prepared suitable material for such legislation.

The subcommittee felt that as a preliminary to the drafting of the material in this field a survey should be made of existing legislative enactments affecting driver education and training throughout the country to determine which features might be most effective and incorporated in the suggested legislation.

Furthermore, the members of the subcommittee present at the last meeting were unanimously of the opinion that all activities in the field of driver education and training should come preferably through the legally constituted educational authority. The subcommittee wishes to make itself equally clear

that this proposal is not intended to bar members of highway patrols, highway departments, motor vehicle administrators and other agencies, public and private, from cooperating in these activities to the fullest possible extent.

A study has been made of existing legislative enactments affecting driver education and training throughout the country and the suggested act is submitted for consideration: AN ACT ESTABLISHING IN THE PUBLIC SCHOOL SYSTEM OF THE (STATE, COMMONWEALTH) A UNIFORM STANDARD PROGRAM OF MOTOR VEHICLE DRIVER EDUCATION AND TRAINING.

BE IT ENACTED BY THE PEOPLE OF THE (STATE, COMMONWEALTH) OF:

Section 1. This act shall be known as the Driver Education and Training Law.

Section 2. Findings and Declaration of Policy (a) It is hereby determined and declared as a matter of legislative finding that

(1) Traffic accidents continue to pile up an appalling record of deaths and crippling injuries on the streets and highways of the (State, Commonwealth) of \_\_\_\_\_ and

(2) The future outlook for highway safety under expected conditions of numerical increase in vehicles and greater mileage traveled is even more menacing than the situation presently existing and the safety of the citizens of the (State, Commonwealth) of \_\_\_\_\_ is a paramount concern of government and

(3) It is well established that motor vehicle drivers adequately trained and fully cognizant of their responsibilities are safer drivers than those without such training and

(4) The public schools have demonstrated that a very constructive training program can aid directly in the reduction of accidents and improvement of traffic conditions.

Section 3. Department of Public Instruction to assist in setting up program. (a) The Department of Public Instruction shall assist school districts throughout the (State, Commonwealth) in the functioning of an approved program by

(1) Establishing teacher training courses to insure expert guidance in the training of prospective drivers

(2) Recommendation of minimum standards for the classroom work in driver education and the practical work in behind-the-wheel instruction

(3) Recommending the amount of credit to be given toward graduation, if any

(4) Providing such assistance and making such regulations as may be necessary to carry out the purpose of this program.

Section 4. Local School Districts May Establish Courses

Local school districts may establish courses in driver education and training under direction of the Department of Public Instruction by complying with the approved program and may apply thereto for such assistance as may be available.

Section 5. Department May Provide Assistance

The Department of Public Instruction may provide assistance to local school districts to the extent of appropriation available as follows:

(1) Employment of a State Supervisor of Safety Education and necessary traveling expenses; purchase of audio-visual training aids and driver testing equipment.

(2) Special subsidy to local school districts for the employment of teachers.

Section 6. Appropriation

The sum of \_\_\_\_\_ or so much thereof as may be necessary is hereby appropriated annually from the (source of funds) to the Department of Public Instruction to defray the expenses involved in carrying out the provisions of the act.

The following methods of obtaining funds to appropriate for driver education and training are suggested:

1. Increase the cost of the driver's permit or appropriate a portion of the present fee

2. Increase the cost of the operator's license or appropriate a portion of the present fee

3. Increase slightly the vehicle registration fee or appropriate a portion of the present fee

4. Earmark a portion of the present state gasoline tax

5. Earmark a portion of the motor vehicle inspection fund

6. An appropriation from the general fund.

### Suggested Policies and Standards for the Acquisition and Use of Automobiles for High-School Driving Instruction

(Summary of Report)

By STANLEY A. ABERCROMBIE

Specialist, Traffic Safety Education, National Commission on Safety Education, NEA

Shortly after the end of the war the NEA Research Division conducted a survey among school systems in the United States to determine the extent and character of high-school driving instruction. More recently the National Commission on Safety Education of the NEA published an administrative guidebook entitled *Let's Teach Driving*, which represented the work of about fifty persons. These facts are cited to show the interest of the NEA and the National Commission on

Safety Education in the subject of driver training in high schools.

About a year ago, the commission undertook a joint project with the American Association of School Administrators and the National Council of Chief State School Officers to provide guiding principles for schools planning to inaugurate driving. Realizing that many high schools are preparing to offer this instruction for the first time, the commission believes the report growing out of

this project will be a definite and much needed help to superintendents and principals who are unacquainted with the administrative and instructional problems in this area of safety education. This is particularly true with respect to the acquisition and use of training cars by high schools.

In its present stage of development, the report includes: basic considerations before schools undertake to teach driving; suggested

procedures for obtaining training cars from various sources; administration of driving instruction; and recommended local procedures for driving instruction.

Before a final report is published, all interested organizations will be asked for criticisms and suggestions on the material in the report. It is hoped that a published report may be ready for distribution within the next one or two months.

### TUESDAY MORNING SESSION

October 7, 1947

### Group Meeting on Safety in Industrial Education

Providing: EARL BURR, Chief, Accident Investigation and Statistics Section, Western Electric Co., Inc.

### The Part of the School Administrator

By JAMES H. SMITH

Principal, Lane Technical High School (Chicago)

Since the two schools concerned in this project are the Washburne Trade School and the Lane Technical High School, the administrators involved at present are Martin Brauns, director of Washburne, and myself. However, the part we play would be duplicated in any Chicago secondary school where such a project would be introduced.

Of course, the actual work of carrying on such a project as a safety program is delegated to the various building administrators, teachers and students, but the co-ordination of the different phases of the work, its direction and its evaluation are all the responsibility of the chief school administrator.

The same principle holds for assistance from sources outside the school. William Sears, the safety co-ordinator for the Board of Education, works with, and through the school administrator, and with the administrator's approval the safety co-ordinator works through the shop superintendent and other administrative faculty members. Committees, such as the inspection committee from industry and the Safety Council, do likewise. The school administrator is the co-ordinator for all these groups and the teachers and pupils must be contacted through him.

It should be understood definitely that the principal, while responsible for the admin-

istration and supervision of the school, is not a dictator. He is a co-ordinator, a liaison officer, a guidance executive whose duty it is to see that all groups work together. It is his job to see that teachers, safety co-ordinator, outside advisory committees, parents, and others work together harmoniously and democratically to achieve the desired results. He leads, suggests, persuades, but he also asks for suggestions, accepts ideas and works with the group.

In this school shop safety project, it has been the job of the school administrator to see that a democratic, co-ordinated procedure was followed. This project was not forced upon the teachers and pupils by or through industry, the principal, the central office or anyone else. For years, Lane and Washburne have had fine safety programs in their shops, laboratories, gymnasiums and classrooms. When the opportunity to work with the committee from the Safety Council was presented to these schools, it was gladly accepted by teachers and pupils, as well as by the school administrators.

A school shop safety project, such as this, is successful only to the degree that the students are influenced to become thoroughly trained in proper safe habits and procedures and to become safety conscious. The students themselves must participate actively in the

program. It is part of the school administrator's responsibility to see that the project is so conducted that every boy in every shop is concerned about safety and that the boys themselves have a voice in the program and its administration.

Perhaps it would be well to state briefly how this project is organized so that the boys are concerned and do participate. Lane Tech has a very active, very well-organized, democratic student council, as you have perhaps noted from newspaper items about its accomplishments during the war. The boys in the student council are representatives from the various rooms and years. One of the officers in the student council is the student director of safety. The director of safety can work through the representatives of the student council on matters of general safety, such as the loading of streetcars, etc.

In the case of the shop classes, however, there is a special setup. In each of the shop classes, there is a student safety inspector, who is responsible for certain definite items or features. These safety inspectors meet with the student director of safety, the shop superintendent and the shop department chairmen to discuss their duties and responsibilities and to make suggestions. Each boy has a definite list of duties for which he is responsible in his shop. Thus, the boys have a very definite and vital part in the shop safety program.

The teachers, too, have meetings. The shop superintendent meets periodically with the shop department chairmen and the Board of Education Safety co-ordinator. The department chairmen confer with the teachers in their departments. At these meetings, matters of safety are discussed and emphasized. Suggestions and comments made to the school administrator and teachers by such persons as the safety council inspection committee are brought up. Problems are talked over and decisions are made. These meetings are the teachers and no attempt is made by either Mr. Sears or the administrative staff of the school to force a program on the teachers and pupils. Because of these meetings of the teachers and the meetings of the pupils, the safety program and procedures evolved are the work and responsibility of everyone. The school administrator must see that this common responsibility and interest is maintained at all times.

Now, of course, the question of the enforcement of safety procedures and rules

arises. The school, in this matter, has an advantage over industry, inasmuch as every shop teacher is an especially trained and selected individual who can lead the boys and guide them into the proper channels.

On the other hand, there are disadvantages. Boys are inclined to be daring, to be careless at times, to indulge in "fooling" or "horseplay" unless some check is given. Although a fine safety program is democratically introduced and maintained, both schoolmen and industrial personnel know that there are times when individuals do not conform to the rules of safety or common sense. It is the duty of the teacher to see that these individuals are educated so that they do conform. And it is the responsibility of the school administrator to see that the teacher receives the necessary help.

To be specific: suppose a boy repeatedly breaks safety rules and indulges in practical jokes or "horseplay" despite warnings, advice and attempts to point out the danger to himself and others. The teacher has a right to ask that something be done. Some member of the administrative staff should confer with the boy and with his parents so that the seriousness of the situation is brought out. If the boy still persists, it may be necessary to take the boy from the shop until he learns that safety is a "must". In a school shop, lack of knowledge of safe practices or failure to follow safe procedure is as valid a reason for failure or dropping the subject as is failure or inability to do the work. Fortunately, such cases are extremely rare but in a safety project, teachers and pupils should know that all have a voice and responsibility and no individual will be allowed to endanger himself or others.

In any safety project such as this, the school staff must always remember that the project is part of a general program. A school safety program is a continuous program involving safety in the gymnasium, laboratories, classrooms and corridors and includes even such safety outside the school as traffic safety. The shop safety project, while it emphasizes safety in the shops, has a carryover value into the other phases of safety education and training. Therefore, the value of such a project is not confined to a specific field and the school as a whole is concerned. The school administrator must not lose sight of the fact that all phases of safety training must be cared for and it is part of his job to see that emphasis is given to all safety

needs and not just to shop safety.

The school administrator and his staff must bear in mind that there are certain phases of a safety program about which students do not have enough knowledge to make decisions. For example, students and teachers, in many cases, should not decide on types of guards for machines. There are standard types of guards and recommendations for guarding machinery that are made by the Safety Council, manufacturers, state inspectors, etc., and these should be followed.

The school administrator in all his work on a safety project such as this must always remember that there are two phases to safety education. The students must:

1. Become safety conscious.

2. Develop a safety conscience.

It is not enough for the student to be conscious of the dangers involved in his work in the shop and the need for safe practice. He must also develop a safety conscience so that he will practice the things he knows. It is the same problem in running machinery as in driving a car; many drivers seem to be conscious of the need for safety; nevertheless they drive too fast. They are safety conscious but do not have a safety conscience. In this project at Washburne and Lane, we are trying to develop a shop safety conscience. And the school administrator must do his part by seeing that all participate—teachers, pupils, supervisors, advisors, administrators—in a co-operative and democratic manner.

## The Place of the Student in the Project

By NICK PAMPANELLA

Student, Washburne Trade School

The Washburne Trade school of the Chicago public school system is distinctly vocational in that its purpose is to prepare students for immediate employment, or to increase their skill and knowledge while employed. The student body of the day school is composed of four specialized groups, namely: (1) the indentured apprentice who attends school, with salary paid by his employer, for one day per week during a period of four to five years; (2) the part-time student of the continuation department, who attends one day per week, between the ages 16 to 18, in compliance with the Illinois child labor regulations; (3) the unit trade student who is of high school age and who attends daily; (4) the veterans of World War II who are registered under the provisions of the G. I. Bill of Rights and who is interested in learning a trade. The night school attendance includes the indentured apprentices and the employed adult who is enrolled in a trade course.

Washburne has gained a national reputation through its outstanding work in apprenticeship training. The Federal Committee on Apprenticeship, sponsored by the United States Department of Labor and composed of employer and union representatives, has designated it as a Chicago public school specializing in the skilled crafts. Thirty-five hundred day school apprentices are from these trades:

plumbing, metal tending, pipe fitting, plumbing, welding, electricity, painting and decorating, sheet metal, carpentry, linotype, presswork, machine shop, foundry, and pattern making. In addition, there are the apprentices in tailoring, sugar decorating, cooking and pastry cooking. Evening school apprentices include the die sinkers, cement finishers, tile layers, chefs, metal engravers, and switchboard construction workers.

The background of the apprentices is varied. More than 85 per cent are high school graduates and have completed the technical course. During the period of their apprenticeship they may be employed by a contractor with seven employees or by a contractor with several hundred men. Each job presents changing circumstances, conditions, methods and equipment.

Safety, which becomes a distinct part of the apprentice's everyday life, has a three-fold significance to the apprentice. He learns to safeguard himself, his fellow-worker, and the public. The effect of safety consciousness extends beyond his daily work. It is of long-range value. These same young men who are the apprentices of today will be the journeymen, the foremen, and the superintendents of the construction jobs of the future. In many cases they will become individual contractors, prepared to accept the responsibility

of safeguarding their own employees.

The success of the apprentice training program at Washburne is due to its integrated course of study. Each trade has its own skills, and the related school instruction must present the mathematics, the science, the drafting, the materials of safety and hygiene, and the other basic information required. Safety is not an isolated lesson; it is a vital part of the curriculum.

Through graphic presentation in lecture-demonstration, instructors illustrate the necessity of personal protective equipment, the proper maintenance and handling of tools, good housekeeping and sanitation, first aid and medical care. The apprentice learns to appreciate the importance of mental attitude. He recognizes the danger of being mentally aroused by the clashing personalities of fellow workers and of superiors. He recognizes the mental and physical effect of noise, fatigue, hunger, poor ventilation and illumination.

In his work on the job, the apprentice distinguishes between the incorrect and the correct procedure, but has little time for analysis. During his classwork he receives a systematic explanation of the possible hazards of certain practices. When new situations arise at his work, the apprentice, with his background of class instruction, is able to deal intelligently with the new problem. When the apprentice becomes analytical of the demands of the new project he has reached an advanced level in safety education.

Instruction in the trade is regulated by a series of units, which are accomplished by the apprentice over a period of four to five years before he is eligible to become a journeyman. These units, which are devised by several instructors in a particular trade, are supplemented periodically.

Related science shows the pastry cook the importance of cleanliness in the preparation of food, his responsibility to the public beyond the limits of his kitchen. The pipe fitter receives an understanding of the dangers of certain refrigerants and the need for the recirculation of air in the air conditioning of theaters. The painter learns to respect the property on which he is employed.

Related mathematics includes an analysis of the possible dangers of high pressure boilers, the stress and strain of roof trusses, the hazards associated with overhanging ornamental plaster, and the supports for

ventilation ducts.

As a part of his daily school work, the metal lather, the plasterer, the sign painter, and carpenter, and the painter learns to recognize the various types of ropes, their tensile strength and their durability. Tying a variety of knots, and the proper methods of handling ropes, are among the units to be completed. The apprentice receives a greater sense of appreciation of the perils of a poorly constructed ladder, and the limitations of scaffolds. As a result of his instruction in school, he is more conscious of poor books, sling chains, ladder rungs, safety feet, and the steel supports on springers.

In making a tour of Washburne's shops with our shop supervisor, I observed the varying meanings of the word "safety." The majority of trades require rolled-up shirt sleeves, properly tied aprons, and the absence of ties and jewelry. In contrast, the plasterer, foundryman, and welder wear a protection for arms, leather or asbestos gloves, goggles or eye shields, protecting the eyes from fumes, dust, intense light and heat, and flying objects is emphasized in all trades. Mental alertness in recognizing the speed attained by wheels and revolving machinery, the correct position in feeding saws, presses, cutting and shaping machines, and the effect of distracting noises, is stressed. The danger of fire varies with the shop. In carpentry, painting, and printing, inflammable liquids present a danger; in machine shop, sheet metal, and chef's training, the storage of oily rags and waste may be a dormant fire. Open flames, and electric outlets and connections are associated with all trades, so are clean floors and the removal of foreign matter from the hands.

All of Washburne's shops are equipped with posters and signs appropriate to the particular shop. The safety committee of the Student Council is in charge of the circulation of these visual aids to sustain interest. The National Safety Council's safety instruction cards, issued for the "man on the job" in a series of 478 cards, and the safe practices pamphlets and posters are used. Handbooks in circulation are entitled *A Good Mechanic Seldom Gets Hurt*, by C. E. Gorman, *Industrial Safety Education in Schools*, distributed by the Metropolitan Life Insurance Company, and the *Training for Safety Bulletin No. 279* of the Michigan State Board of Control for Vocational Education. Motion pictures and strip films are obtained from commercial dis-

tributors.

Since the greatest proportion of safety work is incorporated in the course of study, a great responsibility is placed on the one or two instructors with whom the student has contacts during the course of the day. It is a generally accepted principle that the vocational teacher must possess not only the practical experience necessary to teach the supplementary skills, but also must have the necessary academic and technical education. The advance manipulative skills and theoretical knowledge associated with the trade are interrelated. The standard of theory plus practice is foremost. A mastery of the craft and the ability to utilize the apprentice's experiences on the job, as a means of teaching applied mathematics and science, are required qualifications of the vocational teacher. His responsibility is the producing of better workmen and better citizens.

Another division of students at Washburne is the beginner in trade work. This comprises the unit trade student, the continuation student, and the war veteran. All but the continuation student attend school daily. They are enrolled in the following courses: wood shop, printing, sheet metal, auto shop, aviation shop, electricity, tailoring, commercial art, millinery, dressmaking, cooking, beauty culture, drafting, machine shop.

As a beginning student in shop work, he is introduced to safe shop practices through a gradual increase in the difficulty of assignment. The elementary jobs involve simple tools and operations, and are increased to include the operation of all types of machinery. Shops and machines must be similar to those which the student will encounter on the job. Since he has never before been associated with the trade, if he learns the safe way it will be his only way. He will know no other practice but the correct one.

Adolescent students are often physically incoordinated and mentally unstable. They have no background of appreciation of possible hazards and must rely on the guidance of the instructor. Another type of beginner is the war veteran who formerly was employed in an unspecialized work and now wants to learn a trade. He may have acquired many poor work habits and manipulation methods which must be overcome. The pro-

cess is more difficult since he already has well-developed work patterns. The continuation student, who attends one day per week for less than a year is employed in unspecialized work under varying conditions in factories, stores and offices. Because of the limited time in school, the continuation student is taught general practices in safety, and are placed in trades of their own selection.

Fifty per cent of the unit trade students work after school and on Saturdays in an allied trade. Here the student encounters the practices of industry and is able to recognize unsafe practices. My fellow students in printing are employed in print shops as general helpers and stock boys. Part-time workers in industry are not often given much instruction in safety.

Through an association with acceptable practices, taught in the school shop, students learn the proper methods of stacking paper, loading trucks, and of ascending and descending stairs while carrying a load. They first encounter the fatigue factor, the distraction of vibrating machinery, and the value of a substantial noonday lunch, toward retaining mental alertness. Cleanliness of person and the finished job, which is so important in printing, are learned originally in the school shop.

Students of beauty culture and millinery serve customers during school hours. They acquire an appreciation of the safety factors underlying their work, by means of actual contact with the public. These girls, and those in dressmaking, work at their trades after school and on Saturday.

Safety education means an effective teaching program and an effective accident prevention program. Safety education cannot attain maximum success unless it is conducted as an integral part of the teaching program. Mechanical guards and devices placed around machinery, posters, levers, and printed rules will never substitute for intelligent precaution and manipulation on the part of the students.

The secret way to prevent accidents is to train students, so that correct operations become automatic; then the worker, through habit as well as judgment, attains maximum safety.

## TUESDAY AFTERNOON SESSION

October 7, 1947

## General Session

Presiding: Mrs. L. W. HUGHES, President, National Congress of Parents and Teachers

## School Plant Planning and School Safety

By N. E. VILES

Specialist For School Plant Management, U. S. Office of Education

In America we accept the general principle of compulsory education. Nearly all physically able children are required to attend school through certain grades or to a fixed age. In most instances the child does not have an opportunity to choose, even if he had the ability to choose wisely, the building where he will attend school. A statement frequently used in America is that "one might be forced to go to jail or to school." Other places he may enter or feel free not to enter as he desires. If we are to insist upon compulsory education, we must accept the responsibility of providing safe quarters for the pupils who are in school. When we demand that a child attend school in a certain building or location and when we use public tax money to develop schools for the children of a community, we become participants in a program wherein pupils may be endangered if adequate safety facilities are not provided. It follows that we, as parents or as tax paying participants, have an obligation to assure a maximum degree of safety in the schools.

Three of the basic criteria to be observed in planning school plants are safety to life, safety to health, and curricular adequacy. These are given in the order of importance. There are other criteria but these are the ones that apply to this discussion. The National Council on Schoolhouse Construction has given specific attention to the development of school plant planning practices that will provide the safety features implied in these criteria. It also seems worth mentioning that the American Association of School Administrators now contemplates using these basic criteria as part of the background for the 1949 yearbook which is to be devoted to school plants.

In planning a school building, we should remember that no school building is completely fireproof; no crowd of children panic-proof; and no evacuation plan foolproof. It

is possible to adopt a type of school plant construction that will reduce pupil risks from fire and other hazards in the building. One story buildings can be of almost any type of construction. If adequate exits are provided, two story buildings with masonry walls and wood joint ceiling, roof, and classroom floor construction may be made comparatively safe if they provide for each child a fire-resistant walkway from his classroom door to the exterior. This necessitates fire-resistant stairs, floors, walls, and ceilings for each corridor. Buildings of more than two stories should be fire-resistant throughout. Basement areas are suitable only for storage, when properly protected, and for heating units when such are to be located in the basement.

Structural safety can be increased by proper attention to the engineering service. The presence of cracks, leaning walls and other defects found in many buildings evidence this lack of engineering service. In most instances, adequate tests of ground weight capacity are not available when the building is erected. The responsibility for determining structural adequacy is generally not fixed. The states do not accept the responsibility to provide adequate inspection. The local boards of education usually do not appreciate the necessity for providing such service, but depend on the architect who may or may not have adequate engineering service on his own staff. Oftentimes the architect is faced with the necessity of reducing costs, and since there is no definite check on structural adequacy he may decide to make cuts in places where inadequacies are not apparent. We could point to numerous illustrations showing building deterioration resulting from improper construction standards. In one instance a few years ago, it was necessary to condemn a fire-resistant high school building that was about 12 years old.

This building was properly planned, but the local school board relieved the architect of the responsibility of supervising the construction and employed a local man. During the drought years, the soil lost its tenacity as the water table became lower and the building folded like a tent. Pupils in it were no longer safe and the building was so far gone that it could not be made safe.

Another illustration of lack of structural adequacy is that of ceiling plaster deterioration. Several instances are on record where schoolroom ceiling plaster has fallen. In some cases this plaster was  $\frac{3}{4}$  to 1 inch thick and over a classroom area of 800 to 900 square feet, had an immense weight. Injuries to school children from defects such as these are possible at any time. Of course the school board might blame the architect and the public might blame the school board, but the attempt to place responsibility after the injury has occurred does not help the injured child. The states and the local school boards, as well as the architects and engineers, and the school officials must share this responsibility. However, sharing a responsibility may mean a lack of fixed responsibility. Consequently, the states should provide checking, inspection, and approval service that assures a maximum of safety in construction.

Many pupil injuries in school buildings are the result of carelessness or lack of pupil control. This does not lessen our obligation to provide for the pupils all possible safeguards in the school building. We cannot expect to retain registration that might guarantee no pupil injuries. If schools do not wish to accept any of the responsibility, they might disband and permit the pupils to stay at home. Pupil safety from fire should center around construction that eliminates fire hazards, constant care to protect against spontaneous ignition, adequate extinguishment procedures and a definite, often-practiced program of pupil evacuation. In this particular discussion, we will want to limit ourselves to construction practices related to pupil protection.

As stated previously, corridors in multiple story buildings should be fire-resistant. Corridor widths should be ample for regular or emergency traffic flow. A corridor serving four rooms should have a minimum width of 8½ feet; secondary corridors serving only two rooms should have a minimum width of 7 feet. These widths are clear of all obstructions of either fixed or movable objects. Pro-

jections into these corridors should be limited to 8 inches. The width is computed as that between locker door swing when opened.

Drinking fountains, wash basins, and fire extinguishers should be recessed into the wall. Each corridor should terminate at a standard egress and not more than one room length should be extended beyond an egress. Corridor floors should not be slippery, corners should be rounded. A common fault in many corridors is the blocking of half the corridor width by locating the stairs near the end of the corridor. This will be discussed under stairways.

As indicated previously, stairs should be of fire-resistant construction and should have solid treads and risers. There should be at least two stairways in every building, remote from each other. Two stairways coming to a common landing should be considered as one stairway. The bottom of each stairway should terminate at or near an egress. Stair risers should be not more than 8½ inches. The treads should be not less than 10½ inches. In other words, the riser plus tread should equal approximately 17½ inches. Children will run in school buildings and when a child runs to the head of the stairs, he should have a vision of his walkway down the stairs. With a classroom height of about 15 feet, the number of risers between floors is usually about 24. In some instances, architects have attempted to increase the riser height by ¼ inch, feeling that that small amount would make little difference. There must be some stopping place and this has been designated as 6½ inches for riser height. If we are to permit riser heights to increase to 1½ inches, we soon might get a stair that is more like a ladder. This might provide good physical exercise but not the safety factors required.

Each stairway should terminate near an egress at ground floor level. The main stair should not continue to the basement. Two-hase stairs are recommended. This requires a width of 44 to 60 inches between handrails. If the width is appreciably more than 60 inches, a center handrail should be provided. The handrails on either side should be 36 to 38 inches high. Winding stairs are not comparable for pupil traffic, and each stair tread should have the same width throughout its length. This width should be consistent clear width, not including nosings or overhang. Nosings should be flush. Treads and nosings should be of nonslippery type. Stairs from story to story should be in two

runs with a landing, preferably a turn landing, with a clear width equivalent to the length of the treads. There should be not more than 16 risers in each run. Storage space under or adjacent to stairs should be prohibited. Ramps are not recommended for most buildings except where needed to compensate for slight variations in elevation. It may be desirable to use ramps when the change in floor levels is not over 18 inches, and then the slope of the ramps should be not more than 1:10, and the surface should be nonslippery. Outside exposed stairs and landing steps should be reduced to a minimum.

Mention was made previously of the practice of locating stairs in corridors. This is not usually desirable even when the stairs are cut off by fire doors. This location reduces corridor illumination, hampers expansion and in many cases cuts down the available corridor width. Stairs should be located in stair wells, preferably from the corridor to the outer wall and back. Stairs and stair wells should be fire-resistive. Entrances to the stair well should be through fire-resistive doors, preferably automatic closing or held open only by acceptable fusible links. The upper part of this door should be equipped with wired glass. There should be a hood over the door extending from the corridor ceiling down to door height to help arrest or retain smoke and fumes that might gather in the upper part of the corridor.

As with other construction factors, the installation of adequate exits does not insure maintenance that will provide the safety desired at all times. One story buildings of one or more rooms should have at least two exits remote from each other. Buildings of more than one story should have one unit of door width for each unit of required stair width from above, plus one unit of door width for each unit of required stair from the basement, plus one additional unit of door width for each 4,000 square feet (or fraction thereof) of gross floor area on the first floor, plus one additional unit of floor width for each 600 square feet (or fraction thereof) of auditorium or other assembly room floor area on the first floor. (These requirements comply with the National Exit Code.)

It is preferable to use single leaf doors; revolving doors are not desirable and if installed should be flanked by adequate leaf doors, all opening outward. If double leaf doors are installed, they should be separated

by a center mullion. The leaf doors should be equipped with antipanic hardware that opens the exit door at any time the pupil push on it. These doors should be fitted with hardware latching into the mullions, and should be equipped with door checks that are not too stiff to operate easily, but which will prevent slamming. Doors should be computed as 22 inches for one unit of door width. However, one 40-inch door will provide two units of door width. Thirty-six inches should be a minimum exit door width for pupils. However, 30 inches may be used for service quarters. The exit doors should be located so that there is one stair or exit door within a hundred feet of each classroom door. Classroom doors should be equipped with hardware that prevents their being locked against egress. This precludes the use of thumb controlled spring locks, and makes it necessary to have hardware that is operated by the knob or latch used normally for opening the door. Classroom doors should open with the flow of traffic so that when leaving the room a pupil is facing the nearest exit or stairs. As indicated previously, lack of proper care or control of exits is responsible for many pupil hazards. Installing the correct type of exit units with suitable exit hardware will contribute very much to the safety of their operation.

In selecting school sites, attention should be given to the responsibility of obtaining ample water and fire extinguishing facilities. This involves the location of hydrants and accessible roads for fire-fighting equipment. It is also important to select sites that are away from heavy traffic lanes and if possible so located that pupils will have a minimum amount of street crossing through heavy traffic lanes. The grounds should not be so steep that pupil footing is insecure. Loose and protruding stones should be removed. Accessible driveways should permit the driver to enter so that he makes less than a 90° turn, and the driveway leaving the site should permit driver to leave in the same manner, so that he can merge with the traffic on the street in an almost parallel line. Likewise, service trucks to the cafeteria and coal bins should be able to reach the building without crossing pupil traffic lanes or without being in the line of traffic between the building and the playground. U-shaped drives in front of the building are not desirable.

The playground area should be so developed that small pupils may be segregated if

desired. Horizontal ladders, jumping pits, and pole vaulting areas should have soft landing areas. The playground equipment should be located for easy supervision. Equipment such as giant strides, ocean waves, and the merry-go-round is of doubtful value. Playground equipment and playground areas should be so planned that there is not too much cross traffic. Having a baseball game, a shiny game, another of tag and still others for large and small pupils crisscrossing each other and occupying the same area during a play period may be economical of space, but is not economical of the lives and bodies of the children. It should be possible for pupils to come to the playgrounds without having to rush through the building.

Ample parking areas should be provided in areas where the cars coming to and from the parking areas will not compete with pupil pedestrians for the right of way. It is particularly desirable to provide a platform loading area where parents can drive in for children with a minimum of effort and hazard.

Auditorium, gymnasium and other assembling units should be located at or near ground level. Stairs should be reduced to a minimum and adequate exit facilities should be provided. These should be so equipped that they permit mass evacuation. Auditorium exits should comply with the National Exit Code. Aides should be lighted. Ample aisle space should be provided. Stage fireproofing is desirable. In the gymnasium, folding bleacher seats should be equipped with stair aisles. A curb should be placed around the swimming pool to prevent slipping. Small tiles with visible joints seem to give the best footing around swimming pools. Showers and lavatories should be equipped to insure against scalding water temperatures.

Pupil comfort should be closely associated with pupil safety. Eye and ear fatigue can be closely associated with a lack of alertness against bodily injuries. Ample illumination in all parts of the building is essential and the lights should be so installed and protected that the pupil is not subjected to great variations of intensity of either natural or artificial lighting. Likewise, the finish of the room should be such that the pupil is not faced with excessive brightness contrasts in any part of the work area. In a similar manner, he should be protected against interfering noises. This makes it necessary to protect against outside noises and may make it neces-

sary to segregate several of the noisier activities of the school. It is generally necessary to provide sound-absorbing materials to give the proper acoustical effect.

Both the safety and the utility of the building can be improved by proper attention to building arrangement. In a building housing primary, as well as other pupils, the lower or primary classes may be segregated by location within the building. They may be located so that they have first out privileges.

Pupil building traffic can be reduced by locating such rooms of similar nature as the science literature room and the science laboratory near each other. Toilet rooms can be located near the traffic lanes and accessible to playground areas. Pupil traffic flow may be accelerated without increasing the hazards by laying a strip of a different color down each side of the corridor floor. This is easily accomplished with asphalt tile or linoleum surfaces. Ample ventilation will also improve the physical comfort of the children and thus increase their alertness.

Some states prohibit locating the furnace room within the building. This is allowable providing the furnace room is amply protected with fire-resistive walls and ceilings, with openings amply shuttered with automatic closing fire doors. There should be at least two exits from this furnace room, one of which should be to the outside.

Auditorium units, gymnasium, corridors and exits should be equipped with signs marked "EXIT." These signs should be 4 1/4 inch block letters which should be so designed that they are clearly visible at all times. These exit signs should be lighted by current which should be taken off ahead of other circuits in the building. Municipal or outside fire extinguishing facilities are desirable. It is also generally considered desirable to provide the building with extinguishing facilities such as fire extinguishers and standpipes and hose units. These in-the-building facilities probably have some value in personal protection, but are of more value in protecting property than in protecting pupils' lives. If a fire is discovered in time for it to be extinguished by a hand extinguisher or a small hose, it is possible that all the pupils could be evacuated from the building. Sprinkler systems installed in schools are valuable particularly in hot spots such as shops, home economic units, store-rooms, stages, etc. All buildings should be equipped with adequate fire alarm systems.

These systems should have bells or gongs of a tone distinctly different from those of the regular class bells. They should be so arranged that they may be used for fire drills and for emergency evacuation. The impor-

ance of fire protection in school buildings, brought out in the President's Conference on Fire Protection held in Washington, D. C. on May 6, 7 and 8, should not be overlooked.

### Who Should Plan Schools?

By CHARLES BURSCH

Chief, Division of Schoolhouse Planning, State Dept. of Education,  
Sacramento, Calif.

"If you want anything done well, do it yourself," is an old bromide that should have passed on with many another of its banal contemporaries. A more recent version is, "If you want anything done well, get someone who knows how to do it."

In this complex world of today perhaps someone should formulate another version which might take this form: "If anything is to be done well, someone must assume responsibility for collecting, integrating and incorporating potential contributions from all competent persons and sources of information."

The planning of school buildings has gone through these stages. In the "do it yourself" stage a board member was designated to take over the building program. The resulting buildings were often anything but satisfactory. Architects had a field day during the "get someone who knows" stage. Monumental public buildings, euphemistically called schools were the result. The design of school plants as educational instruments has had to wait upon educational administrators who, as representatives of governing boards of school districts, became competent and willing to "collect, integrate and have incorporated" ideas and requirements from all potential sources.

Who should plan school buildings? The responsibility for the outcome of planning a safe school building cannot and should not be shifted from the shoulders of the chief administrative officer of the school district. What we are really concerned with at this time, however, is upon whom should the school superintendent call for assistance in the discharge of that responsibility. It is obvious to most of us that the services of an architect are required; also the services of a structural engineer and of specialty engineers

including mechanical, acoustical, lighting, safety, landscape and civil.

Several agencies not ordinarily included in schoolhouse planning procedures have substantial potential contributions to planning for safety in any type of structure. Among these should be included:

1. National and local safety councils
2. American Standards association
3. National Fire Protective association
4. National Council on Schoolhouse Construction
5. National Board of Underwriters and State Intercollegiate Federation Protection groups
6. State and local fire marshals
7. Industrial accident commissions
8. State and local health departments
9. Regional and local planning commissions

The end is not yet in answering the question "who should plan schools for safety?" Perhaps the most significant recent trend in planning school buildings is school staff participation. Improving the safety of school plants can be substantially accelerated by the intelligent use of the ideas of certain school employees. But by whom? The employees having jurisdiction over the areas and facilities where the school accidents occur. The accident facts point unerringly fingers at the building principal, the physical education and recreation staff, the custodian, the shop and homemaking instructors. The school nurse or teacher responsible for giving first aid to injured students would obviously have some pertinent comment on planned school plants for safety.

It should be emphasized here that the above-mentioned school personnel is not here charged with responsibility for the accidents but is selected as best informed on the physical

conditions surrounding accidents. The school accidents caused by inappropriate plant facilities are chargeable to those responsible for planning and financing schools and not to those employed to operate a program with the inadequate facilities.

The planning of school plants for safety should not be limited to making school premises safe. Perhaps of even greater long-term importance is the planning of school plants so that general safety education may be carried on effectively. With proper space and equipment, the school may teach auto driver and highway safety, home safety, vacation safety, and industrial or vocational safety.

The question "who should plan for safety?" may well be further clarified if brief consideration is given to the physical conditions, in the school plant, that are related to safety. What facilities, if properly planned or provided, would tend to reduce the number and severity of school accidents with any given staff and safety program.

1. The location of schools. The safety aspects of location are important and numerous. Relation to highways and streets, railroads, airports, blind street corners, hills, ravines and streams all have distinct safety implications. While it is true that proportionately few new school sites are selected each year, the significance for safety should be fully realized. On the basis of safety alone, many practices controlling site selection in the past should be abandoned. I refer to the influence of interested realtors, chambers of commerce, arbitrary decisions by uninformed board members, etc. School sites selected on presently available technical criteria are a much better safety risk than most school sites now in use.

2. Sites and shapes of sites and building spaces. Accident facts show that a disproportionate number of accidents occur on playgrounds and especially on "unorganized playgrounds." The most hazardous school situation observed by the speaker was one made so because of inadequate area. Sites and shapes of sites or building spaces should be determined not on a per-pupil basis but on the basis of a layout of service areas allowing ample space for the activities as well as safety areas between activities.

ties. This is true on the playground, in the school shop, science or home-making laboratory.

3. School site and floor surfaces. The selection, treatment and maintenance of playground and building floor surfaces has a direct bearing on safety. Planning, which is the subject of this discussion, has more to do with the selection of proper surfaces rather than their maintenance. However, it is of supreme importance that the type and material of surface selected be one that can be maintained for safe use.
4. Obstructions. Even though year after year many accidents occur by pupils running into unnecessary and indefinitely located obstructions these obstructions continue to exist, I know, as you do, of many situations where "tree lovers" would have so frightened the school board that a hazardous tree may not be removed from the playground. The simple requirement of smooth wall surfaces in playrooms and gymnasia is ignored more often than met.
5. Pupil circulation. Inadequate and poorly planned means of circulation (entrances and exits, stairs) cause too many mishaps. Straight corridors of ample width and properly designed stairs all would make substantial contributions to safety. Tendencies toward planning school buildings of simpler shapes and in providing such facilities as controlled busports are steps in the direction of improved safety as it relates to pupil circulation.
6. Lighting. School lighting contributes to safety in at least two distinct ways: (1) by proper lighting the strain to pupils' eyes is reduced; (2) adequate and well-designed lighting also makes a major direct contribution to safety. Special lighting of stairs, corridors, entrances, outdoor walks and parking areas, dangerous shop and homemaking equipment are cases in point.
7. Equipment. The selection, arrangement and proper installation can make a major contribution to safety. Such matters are highly technical in nature and should be determined by such competent persons whether it be a safety engineer, staff member of an industrial



accident commission, insurance agent, etc. The most outstanding memory of the writer in this connection was a knockout blow because of the lack of safety of the safety gadget known as a fire escape. The bottom portion of the fire escape was about 5' 8" from the ground close to the corner of a building.

8. **Storage.** The relation of adequate, convenient and appropriate storage to safety is very close. Unstored or improperly stored physical education apparatus represents one of the major causes of accidents. Another relation of improper storage to accidents is the frequent cause of school fires originating in improperly designed storerooms. Storage for auditorium stages is important to safety. In many situations the awkward relationship of such storage to the stage floor level actually is responsible for accidents.
9. **Heating plants.** The general public is perhaps more aware of the potential hazards of heating plants than any other part of a building. Even so, too many heating and ventilating installations of school buildings are left to incompetent persons.
10. **Electric wiring installations.** Here, as in the case of heating and ventilating, there is general recognition of the hazards involved. However, it is equally true that this type of installation with all its importance to safety is left to incompetent hands.
11. **Acoustics.** The relationship of acoustical treatment to accidents, so far as I know, has not been definitely established. However, in observing the action of students in gymnasiums, shops, laboratories that are not acoustically treated, it is easy to conclude that the disorder and obvious tensions as well as the inability of the supervisor to function properly would result in an increased number of accidents.
12. **Structural adequacy.** Of basic importance to the safety of all occupants of a school building is its structural adequacy. While very large school buildings in the past have had the benefit of design for structural adequacy by competent structural engineers, most of the medium-sized and smaller build-

ings have been designed and are now being designed by architects with a limited knowledge of structural design.

The occurrence of earthquakes, tornadoes, floods, tidal waves and uneven and excessive settlement of building foundations all point to the importance of structural adequacy for all buildings. The 1946 *Guide for Planning School Plants* by the National Council on Schoolhouse Construction has the following suggestions for providing some control in this important field:

- "Whether an architect does the structural design himself or employs a structural engineer, the plan and specifications should include:
  - a. Results of tests of bearing value of the soil under foundations.
  - b. Schedule of live loads computed for various rooms in the building.
  - c. Design computations and diagrams for the important structural members in the building.
  - d. The magnitude of the lateral force (wind and earthquake) the building is designed to resist.

"The provision of competent continuous inspection throughout the construction period is necessary if structural adequacy is to be achieved.

"Any on-the-project agreements between school officials and the builder and any order by school officials as the builder not documented by the architect or engineer should be considered serious offenses. By no other means can responsibility be fixed in the highly technical and important matter of structural adequacy of school buildings."

13. **First-aid facilities.** While the provision in a school plant for first-aid facilities may not reduce the number of accidents, it may be expected to reduce the severity of the results of accidents, and should not be overlooked in planning a school building for safety.

Analysis of the school plant sometimes list protection as one of its functions. This concept, all too often I fear, is limited by school building designers to protection from cold, rain, sun and moderate winds. Protection can and should mean much more. How much more it actually will mean depends upon the range of competent persons consulted, the

completeness and comprehensiveness of the planning and construction procedure followed, and the interest, integrity, and administrative

competence of the chief executive officer of the school district.

### How Can the School Environment Be Made Safe? (Panel Discussion)

**Discussion Leader—Dr. N. E. Viles, Specialist for School Plant Management, U.S. Office of Education**

#### Participants:

CHARLES BARNES, Chief of the Division of Schoolhouse Planning, State Department of Education, California.

GEORGE BROWN, Custodian Counselor, Division of Education and Applied Psychology at Purdue University.

PROF. PHILLIP E. SONESON, Associate Professor of Architectural Engineering, Purdue University.

MR. LAWRENCE B. PERKINS, Perkins & Will, Chicago.

MR. LAWRENCE B. PERKINS: I would like to make several brief comments. Since Dr. Viles and Mr. Barnes have made all the points that I would like to have made, I should like to now label them.

First of all, almost the responsibility of supervision, Dr. Viles, I think it is interesting that the federal government, which more frequently insists on buying plans rather than service from an architect, is the same government for which you work.

In designing hazards out of a building, examine carefully the hazard against which you are designing.

There are three ways a child can be killed in a school. He can be burned, crushed in a panic or injured through faulty equipment of one sort or another.

We are very much interested, although not exclusively by any means, in one story buildings for two of these reasons. It is difficult to develop a sense of panic when one can get out of a building easily and quickly, and it is difficult for a fire to get a good start in a one story building. Where there are plenty of exits, the children can get out before they have time to get panicky. In short, any building which has no stairways is probably safer than one which has even good stairways.

The largest single factor of safety in a school building, regardless of its design, is the attitude of the teachers and students within that school. If they are well handled

and well disciplined, they can probably get through some tough situations.

I think school buildings ought to be safe. There are a great many things which can be done. You have heard many of these related. One I didn't hear was avoiding high voltage lighting systems.

I really think that the right attitude and surroundings which produce relaxation are the best insurance for keeping children out of many kinds of trouble.

I think you might be interested in the authorities which govern an architect from the standpoint of safety and public interest. The architect must qualify with city authorities on health, public works, building and various other administrative branches, such as the engineering branch. At the county level he has to qualify with the superintendent of schools and with health and zoning officers. At the state level he has to qualify with the state office and whatever the Board of Education requires. The federal government sets certain conditions if it is providing some of the money.

Many of these agencies find themselves in conflict with each other, and when you get right down to it, the architect is the final and highest authority and the master he must serve is his own conscience. He presumably has the same interest in not injuring children that anybody else has and he has a great deal more power to do something about it.

MR. VILES: I am going to ask Prof. Soneson, associate professor of architectural engineering from Purdue university, to give a brief presentation of the Purdue bleacher collapse of last spring.

PROF. PHILLIP E. SONESON: I consulted with the President of Purdue university yesterday about this, and he decided it was "safe" for me to come here, so I prepared a number of photographs and sketches without which I would not attempt to discuss this subject. If you will refer to these, you can understand the situation readily and I think you may be able to examine your own pro-

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party more intelligently when you get back home.

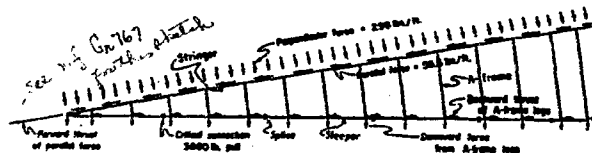
MR. VILES: Prof. Soneson, as you discuss this, are these people to understand that this might happen at their school?

PROF. SONESON: It could happen very easily. Bleachers have collapsed in a number of places, but this occasion was one of great magnitude and consequently received national attention. After examining these illustrations and diagrams, I hope you will know where to look on your own bleachers to find out whether or not they are vulnerable.

Most of you are familiar with the typical parts of the ordinary portable wood bleacher. It is composed of a series of seat boards and foot boards, the wood parts which support you. These in turn are supported by long sloping members which are called stringers, and, at intervals of six feet throughout the length of these, are the A-frames which lean forward so that they are at right angles to the stringer. Consequently the load which

were students. The fatalities that occurred were due to students sliding down between the seat and footboard in order to get out faster than the rest of the crowd when the bleacher collapsed, it fell on those who were underneath. Several of these who stayed in their places had injuries such as strained and broken ankles because of failure to get their feet up before the fall.

This drawing shows a diagram of the structure represented by them. When you stand at the end of the bleacher and look at it, you recognize that this is what you see: a long sloping stringer, the A-frame leaning forward, and the sleeper member on the bottom, which of course, could not be built in one piece. Our bleacher was 83 feet long, so it was built in several pieces and these were hooked together by means of two metal parts. One was a loop and the other was a hook, and they were put together quickly and readily, but they turned out to be the vulnerable parts of this structure.



is placed upon the seats is transferred to the stringers which bear down on the A-frames, at the bottom, the A-frame legs push down and backward and are prevented from sliding backward by the horse locks. The horse locks are fastened to a long sleeper member through a metal connection and this sleeper member extends from the front of the bleacher to the back of it. It is an interlocking system which is self-tightening and dependent upon the integrity and strength of the various parts to hold it together.

This sleeper was a critical portion of our 42-row bleacher, the largest one of this type which had been built up to the time of the accident. The bleacher was built of wood almost in its entirety except for the few metal connections.

These were occupied at the time of the collapse by about 3,500 persons, most of whom

How the fall came about you can recognize by examining this diagram of the forces in action. You know that gravity acts vertically, but that force can be resolved into components, one of which is perpendicular to the stringer and the other is parallel to it. The result of placing a load on the stringer is to make it bear down against the A-frames which were more than sufficiently strong for their purpose; at the same time it tends to make the long stringer slide forward, and the purpose of having the stringer anchored to the sleeper at the front is to keep the stringer from sliding forward. What happens when the sleeper fails? The front of the stringer slides out, the A-frames lean forward and fall down, and the whole bleacher turns into a shrieking, splintering crush of wood and metal. That is just exactly what took place. The confusion that ensued would have

been considerably worse had it not been for the cool-headed conduct of the many veteran students in the audience.

The pull on these sleepers is due to the backward push of the A-frame legs being transmitted to the sleeper, and to the sleeper toe being pulled forward by the stringer thrust; these two forces are balanced against each other and they will remain so as long as the parts are sufficiently strong. The greatest pull on the sleeper comes at its foremost splice which is between the second and third A-frame near the front; here the pull on it, because of the vertical load, was 3,850 pounds. When we took a number of these metal connections and tested them in the laboratory, the average strength of them was 3,874 pounds. Thus there was absolutely no factor of safety present; in other words, every time these bleachers were occupied, there was imminent danger of failure. They were occupied for one football game and 11 home basketball games.

As you know, basketball is a form of madness in Indiana, but on this particular evening there was no excessive commotion in the audience, only a lot of excited shrieking and yelling. There was no rhythmic mass motion or jumping up and down. It is worthy to note that the fall occurred at the close of the first half; the players had just gone off the floor and the audience of several thousand people stood up to stretch themselves, as they generally do; that's what started the fall—that little additional motion. When the first connection failed its load was picked up by the ones next to it which, in turn, were overloaded. The first break was at a point one-third of the way from the south end and spread from there in a great slow wave.

A very thorough examination was made by a committee appointed by Governor Gates and the trustees of the university. I was a member of the committee and its secretary, as well as the principal structural engineer on it. When we examined the front line of these sleeper connections and worked through the wreckage, we made a very amazing discovery: the metal parts had a deep crease on the inside of each bend. For the sleeper connections, this was critical because it produced a definite weakness at the bends of the metal parts. One piece is a hook, being merely a bent plate that hooks into the metal loop, and when you pull up on these sufficiently they begin to yield, to bend out of shape. The material itself was low carbon

steel in soft condition and when we took several short straight pieces and tested them, they had sufficient strength; but when we came to the corners, we discovered that these pieces of metal, instead of being bent in a hot condition, were bent cold, causing the strong crease on the inside corner. Every piece that broke, broke across that corner.

On some of the sleepers, the hooks straightened out and on some the loop broke; when we took an unbroken one and put it in a vise and tried to straighten it, we found it impossible to straighten that loop without breaking it. That is another phenomenon: When you work a piece of metal cold, it tends to become brittle. The repeated bending of these loops (each time the bleacher was loaded gradually weakened them at the corners).

The next point of the story is that there were two of these loops on which the breaks were rusted instead of bright. That told us that they had been broken for some time and that they had practically no strength as a result. The only way to see a defect of this kind is to get close with a magnifying glass; you can't find it by having your workmen examine the stands visually before each game. These two loops were on adjacent sleepers and you can recognize what a weakness they caused at this point. The connections next to them had to carry the extra load and finally, the time came when they could no longer resist the pulling and bending exerted on them.

There is a voluminous report by the committee, filed with the governor of the state of Indiana, and it is available to any citizen who wishes to see it. Also, there have been prepared magazine articles written for "The man in the street" illustrated with photographs and drawings.

MR. GEORGE H. BUSH: I would like to raise three questions that would affect our program. First, who is responsible for the maintenance and operation practices in the school? Second, who does the maintenance and operation? Third, what measures of safe practices do we need?

In order to approach those, I think we have to look at some other things that come along with that. We have to have a well-planned program. I will not go into that. I will let you think that over until we ask questions. Next, you need some well-chosen personnel. We could elaborate on that but we won't go into that at this time either. Next, we

need adequate supplies to do the job and, right along with that, we need adequate equipment. I will mention a little more about that later.

The first point that I think of in safety precaution in maintenance and operation is the matter of a nonslippery floor. I don't care how good a floor we plan or build or install, if we don't take care of it properly, if we let it get slippery, it becomes a hazard.

We shouldn't allow loose litter around the school building. Somebody will get hurt. If you have adequate fire inspections in your school buildings, you perhaps will not tolerate accumulations of trash or won't have it long.

Another thing, you should have well-maintained equipment. You should have light switches that work. Your plumbing equipment should work, your drinking fountains should operate satisfactorily and any equipment you have in the building—your automatic temperature controls and what-not—should work.

We should avoid all loose wires and boards. I have been in many school buildings where they have wooden treads on stairs with nails sticking out, some of them a quarter of an inch. I took a superintendent friend of mine out in his hallways to point them out to him. He just laughed and he didn't think anything of it. Well, I think it is pitiful when we see those things and we don't do anything about them. I think those are things we have to watch.

Our electric equipment should all work. I have been in many school buildings, and perhaps you have too, where the plates are off the electrical fixtures and switches.

Another thing we shouldn't overlook is our fire prevention equipment.

To summarize, we should have a well-organized program, that is the crux of the whole thing.

MR. CHARLES BURSCH: If I might be pardoned for expressing a view, I think it is a shame that we have to look to interested agencies for research on important fundamental problems. Think of school lighting, and we think of school accidents and the safety program. Why such a giant enterprise as public education does not have more funds and more personnel working on fundamental research, I don't know. We look to General Electric to tell us how much light we need and how to apply it, and we look to insurance companies to find out

where accident hazards are.

MR. CLAUDE W. HIPPLER (Pasadena): I come from Pasadena, California, where we have wonderful schools. Most of them were built since the earthquake of 1934. All have been built according to the state code and there are severe checks on the buildings in the State of California. We have long halls but most of our buildings require that each room have two exits, one on each side, and there is an exit from the rooms into the corridor. Traffic in all of our schools, the same as every place else, goes to the right. Doors swing against traffic. I have asked architects and everybody else why, when our survey of accidents every year shows us that we have at least 8 to 10 teachers severely injured, glasses broken, and so on, because some student swings a door into the line of traffic. At least 45 to 50 accidents happen to students in this way. The answer always is, "That's the way they have always been built, and well, that's the way they are."

MR. EKKINS: In the State of New York, you have to open classroom doors into the room. I don't know whether it is a misprint. They state that the risk you mention is greater than the risk of impounding children in the classroom. I think that good practice is to recess the door so it can swing outward toward the corridor but not project into the corridor. It isn't always economically possible to do this.

MR. HIPPLER: The State of California says that all doors should swing out.

MR. BURSCH: All it takes is to change the hinges, and you will have all the doors opening into the line of traffic.

MR. WYLIE (Milwaukee): It seems simple enough, in laying plans out, to swing the doors properly. It is true enough that practically every building has a few doors that violate the rule. It is due partly to carelessness and partly, perhaps, to the fact that in our city all the doors are recessed and it doesn't make any difference whether they swing with the traffic or not. When planning stairways, the door is swung away from the stairway.

MR. HIPPLER: I would like to raise a question as to whether or not it wouldn't be considered safer for the doors to swing in, provided there is a teacher there. The smaller crowd which is in the classroom, go to 45 maybe at the most, can be controlled and go out in an orderly manner, if the teacher is at the door or a responsible pupil is de-

signed to that post. We open doors out. Has anyone anything more to say on that?

MR. PERKINS: We are changing two sets of drawings for jobs in New York state so that the doors swing into the classroom. We had them the other way.

MR. VILES: Your original thought was otherwise?

MR. PERKINS: It still is.

VOICE: I think we are too negligent on these little things. A little extra money would recess that door and get away from all of these problems.

MR. VILES: Are there any comments on locking the classroom?

MR. PECKHAM (Tennessee): I don't want any locks. The child can't come from the room into the corridor. When he turns the knob, that door should open at any time.

MR. STEWART (Wisconsin): We are planning new buildings and one of the problems confronting us is what to do with motion picture machines in the classroom. What provision is there in new planning for that hazard? We teach safety in every classroom. We use motion pictures. We are wondering what the new trend is in regard to that. Is there any safe planning?

MR. PERKINS: With normal screen projection, such as you have in home movies and amateur stuff, I don't think there is much risk in using it in any classroom. I would be happy to have my children in your classroom when you are using it. Just breathing is more of a risk than that.

MR. PECKHAM (Tennessee): You can overcome any existing fire hazard, by having a small fire extinguisher handy.

MR. ANDERSON (Pittsburgh): I would like to raise a question on the slippery floor proposition. I think our records show that a great deal of our hallway and corridor accidents are the results of slipping. How do you make linoleum nonslip? I would like a little more discussion on this matter of nonslip floors.

MR. BUSH: Maybe we have to know what part of the building you are talking about.

MR. ANDERSON: Corridors.

MR. BUSH: All right. My friend Perkins likes terrazo floors for corridors or asphalt tile. For myself, I like asphalt tile. They are quieter. But, if I have asphalt tile, I want to be sure that I have the right type of water emulsion wax on it so that it is not slippery, and I want to be sure entrances are protected so that I don't drag water in on them.

A lot of these things are a matter of cost. In your section of the country, one type flooring might be more reasonable than another. I think you have to consider several factors—usability, availability of material, economy and safety. You consider all of these, balance everything, and make your choice. Then you have to provide the proper maintenance.

MR. VILES: You use a 12 per cent base for your wax?

MR. BUSH: We should put the proper wax on it and the proper materials.

MR. EUGENE ZIMMER (Minneapolis): There will be a panel discussion on that and Edward Landry from the office of the Postmaster General will give further information on surfacing halls and buildings.

MR. PEARSON (Philadelphia): I would like to ask Mr. Bush for a definition of this term "litter." What do you classify as litter? There shouldn't be an undue amount of litter, that is true, but will you define litter? Litter in the eyes of some janitors is educational material in the eyes of certain other people. Is it dirt and rubbish and paint rags and things like that? Will you give me some standards?

MR. BUSH: My definition of litter would be anything that is objectionable to the general program and the general esthetic looks of the room. You mentioned the custodians and janitors. I would like you to include the teachers. I have seen teachers harbor and keep and carefully register materials that certainly couldn't be classified as anything but litter. What I would call litter, maybe you would call something else. I think we all need a little education as to what is necessary and what isn't necessary and what can be eliminated.

MR. VILES: Let me add to that. I want to contend that one of the first jobs in planning school buildings is to provide storage space in the room for things to be kept in the room. You people who are training teachers, give them some training in room housekeeping and room management. They don't get it and neither do the schoolmen who come out of the colleges with a background in school plant management. We must provide places to put things and then we have to do a little bit of housekeeping. Half the nation seems to be engaged in housekeeping. It might be good business to teach the teachers schoolroom housekeeping.

VOICE: I think the definition of litter is dependent on who happens to be the strong.

personality in that local spot. If the janitor or the custodian happens to be the brute force in the school, he determines the definition of litter. If the principal of the school happens to be the overwhelming personality, he determines it, and occasionally teachers are so strong that they determine what is litter. I am not joking. It becomes serious when we say to teachers, "You develop an activity in your classroom," and they don't always have places to store their stuff. We say, "Use your initiative to develop things that children do on the spot." Children do think sometimes that look like litter to a person who doesn't understand the educational implications involved and the child has to save his materials until they are of no further use. To the uninformed person, it may be litter.

MR. WARREN (Quincy): I want to explore this matter of ramps a little bit. Are ramps replacing stairs and at what size, by number of rooms, would a school replace stairs with a ramp? What are their possibilities or their hazard as compared with stairs?

MR. VILES: I would like it, if the panel permits, to refer this for comment to Mr. Hedden who prepared part of the standards. He is pretty familiar with what is going on at the time on the ramps.

MR. HEDDEN: I thought he wanted standard sizes.

MR. WARREN: I wanted to know if ramps are replacing stairs to any considerable degree, and in what size buildings? I was interested in building an elementary school of 16 rooms and one of the plans showed no stairways. I wanted to know what size a school has to be and what the relative merits of the two are.

MR. HEDDEN: The only thing I could give him would be the experience in our state. We don't go in for ramps at all except in certain instances where there is an emergency to be effected. Generally speaking, we don't approve of ramps. Some of the other people from some of the other states might have a different idea.

MR. PERKINS: Ramps that go from floor to floor are space consuming and very expensive and probably will be economically out of the picture in 99% of the cases. Where there is a long corridor and a very slight difference in level to accommodate a rise of two to three feet in 50 feet, a ramp is sometimes a better device than a few steps, although the steps can be labeled and signaled so that

they are relatively safe. We have ramps in three buildings that I can think of. One of them has been in use for about 25 years and there has been no comment, adverse or otherwise. In two more recent ones, we have been most cordially not thanked for putting in ramps. Stairs would have been worse, but the ramps are no pleasure to anybody.

MR. BURSCH: Our emphasis in California on one story construction and open type planning, using the outdoor classroom, doesn't call for either stairs or ramps.

VOICE: Getting back to the question of doors, for just a moment. We have heard of doors swinging in and swinging out. There are also revolving doors. None seems to be satisfactory. We cannot eliminate the human element. In our state, we have found that by making use of our school safety patrols we get along. We cannot put the whole responsibility on the teacher. She cannot always be inside the door marshalling children out, in the corridor, and on the playground. We have found school safety patrols very satisfactory in assisting to maintain orderly conduct.

[Mr. Bursch assumed the Chair.]

MISS THOMAS (West Virginia): Nothing seems to have been said about heating equipment. In our state, we heat almost exclusively with natural gas. Most of our buildings are old and the heating equipment is old. When there is a period of cold weather, which we don't have too often, there is a lack of heat and the windows are closed. What can be done to protect against the possibilities of explosions from accumulated gas in the building?

MR. BURSCH: That is fire prevention.

MISS THOMAS: Our state has the same difficulty with personnel as many other places have. Personnel is not too well trained. Teachers, custodian and janitors are not plumbers or engineers. One of these ancient heating plants could very well explode because of accumulated gas.

MR. BUSH: We have that kind of problem, too. The thing we are working toward is to have the Industrial Accident Commission give us the same kind of service that it has given industry. The commission would be as likely to catch something like that as any group. It has technicians.

MR. WILSON (Ohio): In the schools in our town, we have periodical inspections by a fire inspector. He makes a monthly inspection of all fire hazards in the schools. He

visits every room. It might be wise to have your city fireman inspect or check your firing plant and heating installation and see what his recommendations might be.

MISS THOMAS: In our large communities, that is done. But we have so many rural schools where there is no fire inspector.

VOICE: I would like to ask Prof. Soneson a question. Is it customary to build bleachers large enough to seat 5,500 or 4,000 students? If that the customary size? Aren't bleachers divided into units? No blocks of bleachers would then be dependent upon more than 500 people? What is the average practice in building bleachers?

PROF. SONESON: The average bleacher consists of 12 to 15 rows. We had 48, and they covered 10,000 square feet. Some states have maximum areas which can be devoted to a single bleacher, based probably on the number of people it can seat. The "Indiana Code" is being revised in a few respects and may incorporate that provision. The ordinary bleacher is quite small and the possibility of a failure similar to ours is much reduced.

MRS. L. W. HUGHES (Chicago): What causes most of the fires in school buildings? Is it defective furnaces, something wrong down in the engine room?

MR. BURSCH: The heating equipment and the lighting.

MRS. HUGHES: Instead of bothering whether the doors open in and out after the buses are stolen, why not concentrate on safe heating and lighting equipment? Isn't there certain heating equipment that stands first in safety? Why isn't it always employed? It is because of the cost of it? There isn't any use in spending so much time on how

children are going to get out of the building. The thing to do is to keep it from catching fire in the first place.

MR. BURSCH: You could no more dictate the kind of heating and lighting equipment and the various sources of fuel than you could jump over the moon. There are safety standards for all types of heating and those that cannot be made to conform to safety standards should not be used. But we couldn't hope to select the safest fuel and safest heating for a building.

MRS. HUGHES: You can't pick out stairways and you can't tell them how to hang those doors, but you can advise them as to what is the safest type of heating. The public is entitled to know that. There may be some types that are just fire traps. I think the average layman has a right to know what is safe construction. I think if we attack the problem at the focal point, we will get somewhere.

VOICE: Are there any circumstances under which it is ever permissible to have the door of the classroom swing in, such as a domestic science class where the group would be small? Should the door swing out? Is that a universal rule?

MR. BURSCH: You have heard the discussion of that this afternoon. New York state has a law making it necessary for all doors to swing in. In my opinion there is a very great safety factor in having them uniform throughout the nation.

MRS. HUGHES: It is ten minutes past four and you have been a very attentive audience and I think you have appreciated the fine contributions that the speakers have made. If there is no further question, the meeting is adjourned.

## WEDNESDAY MORNING SESSION

October 8, 1947

**Group Meeting on Teacher Education for Safety**  
**Conducted by the Higher Education Committee, N.S.C.**

Presiding: JOHN E. CORBALLY, Professor, Secondary Education, University of Washington

**How Teacher Training Institutions Can Make**  
**Safer People of Their Students**

By WILLARD B. SPAULDING

Dean, College of Education, University of Illinois

Do students at teacher training institutions need to be safer than they are at present? In what ways do they need to be safer persons? What can be done to produce this result, if it is a necessary one? And, finally, what is the place of safety education in a teachers' college and through it in education as a whole?

There have been very few studies of the relative safety of young persons enrolled in teacher training institutions. During the ten year period, 1935-1945, accidents caused 26.3 per cent of the deaths among college students in the nine universities which were studied. This is more than two and one-half times as many deaths as from the next most common cause, heart and circulatory diseases. Sixty per cent of the accidents were traffic accidents and 40 per cent were from other causes.

It is clear from the examination of the enrollment at any teachers' college that a major proportion of the persons enrolled are women, and any examination of the roll of teachers in a public school system will also show that this is true on the job as well. Women in general are safer than men; a surprising statement, but a true one. Among males alone, accidents are the most important causes of death in the age group from 2 to 37 years, but for males and females taken together, accidents are the most important causes of death from ages 2 to 28 years. This age group includes most would-be-teachers. In the 20-to-34-year age group, females account for only 15 per cent of all accidental deaths, while in the 25-to-39-year age group females account for 16 per cent. It is, therefore, probably true that, because of the sex factor, would-be-teachers are safer

than their same age companions in other professions.

We should not assume from this, however, that there is little or no problem to be met in the teacher training institutions because, in the 15-to-24-year age group, which includes nearly everyone who is preparing to be a teacher, there were more than 15,000 persons who died because of accidents in 1941 and nearly 15,000 in 1945—a tremendous waste of the most precious resource of our nation.

We can answer our first two questions, then, by stating that students at teacher training institutions do need to be safer persons, that they need to be safer persons in every way, but that their is greatest need in the area of driving automobiles.

How then can this problem be met?

The State of Illinois has recently enacted legislation setting up a time requirement of 40 minutes per week for safety education. This is a step backward, not only in safety education but in the cause of education generally and I am amazed that such a proposal has had the endorsement of organized groups who are interested in safety. (I understand that the National Safety Council was not one of the endorsers.) There is a long history of attempts of specialized pressure groups, usually working to very desirable ends, to impose their will upon schools by legislation which requires that a specified amount of time be devoted to particular programs in which such pressure groups are interested. There is an equally long history of the complete and utter failure of this approach.

The assumption which underlies such legislation is that time spent in school is all that is necessary to improve or educate pro-

ple. Unfortunately, such is not the case. The way in which that time is spent is what counts.

The whole science of education, and it has a considerable science, points clearly to a consideration of the needs of each child, to using the powerful drive of child interest in order to motivate him, to relating what goes on in school to the vital problems of life outside of school, and to having a very flexible and adjustable schedule within the school so that these aims can be attained. All of this is denied by the imposition of time requirements through legislation.

I worked at one time in a state where there were time requirements for physical education, the English language, the civil effects of alcohol and tobacco, United States history, civil government. An additional requirement obligated the school to teach any foreign language, if the teaching of such language was desired by the parents of as many as 25 students. The inevitable result was that no one paid any attention to the requirements, because it was impossible to operate within such a framework. That will have to happen now, if there is continued success on the part of well meaning groups in persuading the legislature to place such requirements on the schools.

Fortunately for Illinois children, the state department of public instruction has taken the initiative in showing school men of the state how the legislative demands can be met without violating the principles of the science of education. Working with representatives of the schools, the safety organizations of the state and National Safety Council, the department of public instruction is preparing a "Guide for Safety Education" which will be keyed to the "Illinois Curriculum and Course of Study Guide for Elementary Schools." This guide will show how safety instruction can be built on the needs of each child so that the urban child will learn what he needs to know to live safely while the rural child will learn some quite different safety facts which he needs to know; so that the handicapped child will have a safety curriculum meeting his needs where they differ from the needs of his more normal brother. It will show the schools how safety instruction can be wound into the day-by-day living of the child by capitalizing on the child's interest. Tangible results from such instruction will far outdistance any possible gains obtained in a 40-minute

weekly period of safety education.

I do not mean to convey the idea that the state legislature has no right to be concerned with the results of the child's schooling. Schools should develop citizens who are alert, intelligent, and able to deal wisely with problems of local, state, and national importance. Schools should produce a generation which will not destroy a large proportion of itself through accidents. Schools should be able to make men and women temperate in many things, including alcohol and tobacco. I would urge that the legislature establish appropriate aims for its schools and that the schools be expected to meet these aims. I do not believe, however, that any legislative body has great enough understanding of the techniques of education to attempt to determine wisely how these aims should be met. That is a job for the professional, for the trained person, for the teacher training institution. Both teacher training institutions and the public schools which they serve are hampered by the good intentions of pressure groups who seek to enact legislation which concerns itself only with means rather than the end. Such legislation tends to retard the development which it desires to encourage.

If legislated time allotment is not the answer, what is? The answer to the learning of any new kind of activity is to be found in what is already known about the way in which learning takes place. It is, or should be, obvious that what is done by the school is helpful only insofar as what it does is in accord with the way in which people learn. If its methods are patterned after the pattern of learning, then its methods are good, but to the extent that its methods deviate from the pattern they are bad. Let us, therefore, spend a few minutes in considering the ways in which man learns. The learner must be motivated so that he begins to act toward a goal, which he is prevented from reaching by the intervention of a problem. He tries many ways of solving this problem until at last one way is successful. As he is confronted with the same or very similar problems and solves them successfully with the same way of acting, that way becomes learned.

We read about the causes of accidents, we talk about them, we write about them, and we expect our pupils to do all of these things in order to become safer persons. We may even hold essay contests in order to get more of our students to compete and so to become safer, not realizing that the essence

of safety is co-operation and that, by encouraging competition as a goal, we may be setting up habits which will defeat our very aim.

The methods of the school must be such that the concepts of safety actually function to control the day-to-day behavior of students as they mature. This is as true of a teacher training institution as it is of the public school. It is not enough that the concepts be accepted intellectually. They must be part of each individual's pattern of behavior, and this pattern is not formed by reciting rules nor by memorizing words.

Educators have had enough experience with verbalistic methods to realize that, in building good habits of safety, an ounce of deeds is worth a ton of words. Yet even they have not put into practice what their experience and their science have taught them is the only effective way to build habits. The social studies, of which safety education is frequently a part, are especially designed to develop individual habits of behavior, yet their main technique is still to ask students to describe situations, to write rules, to recite quotations from the great documents of our government, or to write essays and give speeches about democracy, or safety, in the fond hope that language and ideas will be sufficient to build desirable habits and attitudes.

Schools should really know better. When they deal with the three R's, the so-called fundamentals, they have always used entirely different methods and procedures, and with far better results. For example, the schools have never asked pupils to quote from the ancient mathematicians, to write rules for addition, to describe the additive process, and then expected the student to add with automatic accuracy. The school knew that such methods would fail. Instead, the school insists on practice in adding. The school provides situations in which addition is an essential function and thereby makes the practice useful and interesting. The rules can come later. The essential principle is to learn by doing, by practice.

If young persons are to learn to live safely in this dangerous world, the schools would be wise to use the methods and procedures which have proven successful in the three R's. The techniques of safe living must be practiced, as well as discussed, at every grade level and in every classroom. The techniques cannot be learned through memorizing rules

nor through talking and writing about them. The students must get beyond verbalism into action.

When the school (and by this I mean all educational institutions of all levels) begins practice, as well as preaching, the school becomes a vastly different kind of institution, a much busier institution. It will not limit the practice of safe living to the confines of the school plant. Students will become concerned about the problems of community safety and will learn to take part in solving these problems. If there are unsafe places on city playgrounds, if traffic hazards are great, if the conditions under which food is served are unsanitary, the young persons in school will learn about safety as they seek to have the hazards corrected. And, what is even more important, the students will learn the techniques of democratic interaction as they join with groups outside of school to achieve these ends. Safety education will find its curriculum in the rich ongoing life of the community and, while participating in this life, students will learn to become effective citizens in the adult world.

We have been thinking together about education as a whole, in order to get some perspective about the way in which safe living can best be learned. It is one of this kind of consideration of the problem that we can come to the best understanding of the unique task of the teacher training institution. This task is a two-fold one, that of making safer persons and at the same time making persons who are able to use the teaching techniques which are demanded when the school reaches out to grapple with the real problems which exist in the community around it.

The chief conclusions of the Commission on Teacher Education of the American Council on Education, published in 1946, state as follows:

"The primary objectives of at least three-eighths of the undergraduate work of prospective teachers should be those properly ascribable to general education. It is undesirable that this part of a student's work should be concentrated in the freshman and sophomore years on the assumption that general education may be 'completed' during this period, or with the consequence that attention to professional concerns must be postponed until a later time. Instruction primarily designed for general education should give attention to any implica-

tions of its subject matter for professional development. The reverse holds equally true.

"Of comparable importance in teacher education is the study of the nature and problems of community and broader social existence. Instruction should aim not only at comprehension but also at developing the impulse to share in social action and skill in so doing. Informed social purpose and intelligent social participation are particularly desirable in teachers. Acquaintance with rural communities and their problems is especially indicated when teachers are likely to begin their professional work in such communities.

"With the lengthening of the customary period of teacher preparation, the importance of providing students with direct experiences in relation to classroom study has increased. Special attention should be given to enabling prospective teachers to study . . . communities at first hand, not merely to observe them but to work with some appropriate degree of responsibility. Such opportunity should begin fairly early in the preparatory program and be continued in complementary relation to a variety of classroom experiences."

One of the problems of every community is its problem of safety. Further, it is a problem to the solution of which the would-be teacher is capable of making a contribution. One of the ways which every college student can help is by refusing to attend places of entertainment which are obviously flouting fire ordinances, by refusing to overcrowd bleachers, and by refusing to live in dormitories which are not equipped with panic-proof hardware or where there are other obviously unsafe conditions.

One other conclusion of Commission on Teacher Education of the American Council on Education, as published in 1946, is:

"It is particularly important that programs of teacher education should contribute throughout to the development and strengthening of democratic powers. These notably include the ability to think, feel, and act for oneself and also the capacity to work effectively as one of a group. Consequently, professional preparation should consistently enable prospective teachers to share responsibility in planning and carry-

ing out their own educational programs and provide them with regular experience in co-operative endeavor."

This authoritative statement has many implications for safety education, which is such an important part of living that it belongs, without question, in the field of general education for all persons and is such an important part of the activities of the community that it belongs in a professional study of the community by all who would be teachers. Teacher training institutions should organize their program of education so that it will meet both of these ends.

I shall not attempt to inform you about the causes of accidents, which are many and varied, and with which I am sure so many of you are familiar. Teacher education should include material which will bring knowledge of these causes to all of the students who are enrolled, and bring it to them in such a way that it will become a vital part of their educational equipment.

But knowledge, by itself, is never enough.

One of the intangible, but most important attributes of the superior teacher has been left until the last for purposes of emphasis. The terribly urgent need for a better citizenry, which comes from the great social problems of tomorrow when these problems are enhanced in complexity and danger by atomic energy, cannot be met by skill and competence and knowledge alone. Safety education, which is part of this future and which must include the ever-all problem of a safe world else there will be no other problems of safety, needs more than these professional accoutrements. A deep and abiding sense of the importance of teaching must be left within the heart and mind and spirit of each graduate. There must, of course, be love for children, affection and respect for fellow teachers, desire to secure increasingly greater competence, and a belief in the essential human values of democracy. These are important, but of themselves they are still not enough. They must be coupled with a fierce determination, a kind of missionary zeal, to make the world a better and a safer place for man because of what is done in school. Developing this spirit is the greatest task of every teachers' college. We cannot and we will not fail.



decided to put in a safety minor, which consists of 27 hours. When our teachers go out into the field of teaching they will be prepared to observe conditions and train their students. I agree with everything that has been said by these students today—they must see the child as a part of society and train the child in that manner.

Briefly, our four courses deal specifically with safety. We have one where we study safety statistics and the need for safety and how best society as a whole should treat the problem of accidents and accident prevention. In that course we study information available from all the recognized safety organizations in the country.

The next course we like to have trainees take is "Teaching of Safety in Elementary Schools." Briefly, in that course we combine the Junior Red Cross accident prevention program, and a study of the organization of school safety patrols, and junior safety councils.

To make this more effective and not just paper reading and paper learning, we take trainees to our campus school, and they organize a school safety patrol.

In our junior safety council work, we felt that we could probably set up a typewritten or mimeographed copy of methods of organizing a council, but how many teachers would go out and organize one if they had not had some experience? So we organized our own council, made up of faculty and students. They have to do a lot of work on the campus. For instance, last year we studied our campus parking problem. We had many hazards. Cars were allowed to park around the campus school; they parked along sidewalks where there were no painted danger signs, and the regulatory signs on the campus were very inadequate, as they are on most campuses.

This council organized themselves into committees—traffic, fire, and buildings, and then went to work. The results were very gratifying. First we made inspections. They took regular class time for this, and compiled a list of all the things that should be done on the campus to make it safe.

For instance, there never had been any fire drills in the dormitories. We housed more than 1,000 girls in two dormitories. We housed about 500 boys in the other two. Some of the stair risers were too low, because at one time part of one building had been an orphan asylum. Also, some stair treads

on the back stairs were broken and we found students used those stairs quite frequently. One cement sidewalk in front of the Industrial Arts building, had a bad drop. It had never been repaired. Well, it has been repaired now because the faculty and student committee of the council went to work on it.

Doing such things themselves very likely will make the students go out into the local community and become a part of the safety council there. But without some adequate training, you are not going to get anyone to do the job just by sending a piece of literature and saying, "Organize it this way and that way."

The actual school safety patrol work also, I feel, is very important to trainees.

In the secondary school safety training, a part of the units are in the American Red Cross fire and home safety program, taking up industrial shop safety at length. We make trips to John Deere, which is the largest tractor factory in the world, located in Waterloo, seven miles from us. We go to a meat packing plant and notice the different precautions in this industry.

The Bell Telephone people probably have one of the finest safety programs in industry. I knew they were going to put in some telephones on the campus, so I took my class out to observe the work. I didn't know what they were going to do, but I felt sure they would do something we could observe. All one of the men had to do (which illustrates how they work) was to chop a hole with a star drill through a cement sidewalk in order to put a ground wire into one building. There were three or four inches of concrete. He put on goggles and heavy gloves to use that little star drill to chop through the concrete. One of the students remarked how many times he had seen people use a star drill on concrete, without wearing goggles and heavy gloves. That was a very good object lesson.

Our fourth course dealing directly with safety is called "Teaching of Highway Safety." We don't just intend to teach skills—we want to try to improve the attitude of our young drivers. The accident ratio among teen-agers driving automobiles is very high. We devote one quarter to the teaching of highway safety.

We have a driving range that covers a 60-acre field, with a little more than a one-mile center line. We have paving, gravel, and next summer will have blacktop on some stretches. We have every known curb and hazard there,

except a drunken driver. Someone wanted to know if he could go out and be that other hazard. We have a lot of hazardous roads in Iowa, and they are all represented.

Every one of our administration and education courses carries a unit in safety. Some of our professors have been teaching safety for years in a small way. So most of our teachers going out to teach in the elementary schools have been prepared in some small way, at least, in the teaching of safety. We hope in the future that more teachers will take this safety minor.

I don't think we should depend too much on the transfer of learning. That was mentioned here several times this morning, just because we are taught in the classroom how to be safe doesn't mean that we are going to be safe when we play baseball on the sandlot, or when we go downtown shopping.

I think we should take our boys and girls right out on the sandlot to teach them and show them the hazards of a stick protruding from the earth, or a steel spike holding one of the bases down, or the plate being too high, and we should show them where to stand when they are at bat. You can sit in a classroom and tell them, certainly, but you must show them in actual practice how to play safely and adventurously. I do think we must not slow them down. We must prepare them to live adventurously.

MR. ABERCROMBIE: The National Education Association, through its Research Division and the National Commission on Safety Education, has recently completed a preliminary survey of college and university activities in, or related to, safety training.

The questionnaire used in this survey asked five things of the presidents of more than 250 institutions. Does the institution have a bureau or institute carrying on specialized work in safety training? An example would be the Yale Bureau of Highway Traffic, which specializes in the field of traffic engineering training.

The second thing the questionnaire asked was does the institution have a department, division or school offering either courses in safety per se, or courses in which a major emphasis or a large percentage of units was related to safety?

The third area of inquiry concerned extension work. Does the institution carry on extension activities, such as short courses or other types of programs in safety?

The fourth item related itself to college

environment, and the inquiry asked if the institution provided a safe environment through periodic inspection and maintenance of buildings, grounds and equipment, and through the enforcing of safety regulations on and about the campus and buildings.

The fifth area of inquiry concerned co-ordination. Does the institution co-ordinate its activities within the institution itself, and between the institution and outside agencies?

We sent this questionnaire to more than 250 institutions, of which 37 were teacher training institutions. From those 37, we received 31 replies, many of which were very interesting. Keep in mind, of course, that many of the other institutions surveyed, while not teachers colleges in themselves, have schools or colleges or departments of education.

I would like to throw out one suggestion related to the item concerned with safe environment, as reflected by this survey. In the few teacher training colleges, 26 replied "we provide a safe environment." Five failed to respond, but they may not have turned the page over and seen the other side of the questionnaire. One (and it was only one of six in the whole survey) reported "No, we do not provide a safe environment."

I would like to throw out the suggestion that, as a practical measure of giving future teachers practical training in safety, plans be devised similar to ones that Mr. Woodcock spoke about for student participation in the inspection of the physical plant where the students are spending probably four years taking teacher preparatory work. Certainly, when they got to their elementary and secondary schools, they would have some practical knowledge of how to make an inspection, what type of problems should be included, and would know something of the technique of correcting the deficiencies found in an environment.

Beyond having mentioned that survey, I would like to point out two or three generalizations which may bring some reactions.

Generally speaking, it might be said that a teacher training institution may undertake safety education first by setting up specific courses in safety; secondly, through integration and correlation of safety content wherever there is a relationship between subject matter of any course and accident prevention.

As teachers of specific subject fields take up the teaching of safety through integration and correlation, there may eventually come



to be far less need for specific courses in safety as such. It is felt by a number of people, I believe, that it is quite necessary for top administrative management in a teacher training institution, or any other institution of higher learning, to have a direct interest in safety before there will be very much done in that institution in the way of providing safety education for the students.

One way in which interest may be stimulated is for all of the organizations that are now concerned themselves with safety education to work with and for the inauguration of programs in many more institutions. That is not an easy thing to do.

There are several state departments that have appointed a specific person to concern himself with safety activities. I think the number of such departments is not more than five. We might stimulate more progress on that score.

I should like to say, in conclusion, that all of the organizations, both public and private, that now are interested in safety education, should realize that progress will be made in safety education pretty much in line with the progress that is being made with education as a whole. In other words, there isn't much point in pushing safety education or any other single area of training clear out in front.

When educators see safety education as part of the total program of education, an integral part of it, they will be more likely to inaugurate safety education.

MISS MARY MAY WYMAN (Louisville, Ky.): As one who has read *SAFETY EDUCATION* for more years than I care to admit, I hope Mr. Jewett will read it regularly and thoroughly. He would then absorb the philosophy that safety is for more and better adventures.

MRS. NELLIE COCHRANE (Chicago Teachers College): I would like to comment on the morbidity of some articles. I don't think we need worry about morbidity affecting children tremendously nowadays. The comic books which they read are full of morbid and horrible episodes.

I also would like to point out that it is the disasters which occur that lead us to the awakening of a need for safety education. After a fire, after any major disaster, everyone is immediately interested in accident prevention.

MR. JEWETT: Then you would say that a safety education program has its inception in

an accident—that before an accident there is no interest in safety education? In other words, you consider the articles about accidents motivating ones?

MRS. COCHRANE: I wouldn't say that there is no interest before an accident; I only say the accident intensifies the interest. It is an awakening to many people.

MR. JEWETT: Then how do we know what safety precautions to take? How do we derive our curriculum in safety education? Do we make an accident survey and then tell people how to avoid accidents?

MRS. COCHRANE: We use accident facts as a basis for our curriculum.

MISS JOSEPHINE TORO (Baltimore, Md.): Are we going to start from the accident or are we going to examine the child in the community in which he lives and teach the child how to live safely in that community?

MR. WOODCOCK: That is the angle we work on. We make a complete study of the community. For instance, our state is primarily agricultural. Waterloo, Des Moines, Sioux City and Cedar Rapids are large industrial centers. There are seven or eight such communities. But, primarily, our problem is farm accidents. I don't think you can divorce accident facts from teaching. You have to know what the problem is, or there will be no use teaching. You have to be realistic.

I don't think you ever have to make your stories gruesome. I don't think we have to know the accident facts of the community.

DR. ROY BRYAN (Western Michigan College of Education, Kalamazoo, Mich.): I would like to ask Mr. Woodcock a few questions about these courses in safety education. They are elective courses for the people in the teacher training course?

MR. WOODCOCK: That's right. We insist on two majors and two minors, preferably three minors, to graduate. They can elect to take a safety minor. I named the four courses: they give three hours' credit each. That totals only twelve. The other 15 hours are psychology, audio-visual education, two first-aid courses, and basic skills.

DR. BRYAN: Those courses are not designed specifically, for example, to qualify a teacher to go out and teach driver training in high schools?

MR. WOODCOCK: The course in teaching of highway safety is the preparatory course for that.

DR. BRYAN: Any student can elect any

one course, or they can take the series for a minor?

MR. WOODCOCK: That's correct.

DR. BRYAN: What percentage of the students in the school, roughly, are electing these courses?

MR. WOODCOCK: I can't tell exactly the number who signed up for the safety minor. I can only say that our enrollment in my courses has doubled each quarter in my last four quarters. I started out with five students in the fall quarter of 1946. This is quite gratifying. All my four courses are open only to juniors and seniors, but at the present time I have less than 5 per cent of the total enrollment. We have only one teachers' institution in the state of Iowa, instead of five, six or seven as some other states have. We have a total enrollment of 2,850 this quarter.

DR. BRYAN: Sometimes we offer a course and it looks good on paper, but only a small number take it.

MR. WOODCOCK: We certainly don't want to slight the few.

We have so many teachers in the field who are demanding even a little training! We offer no graduate work in safety. Principals, superintendents, high school and elementary teachers come back and pay their fees for no credit courses, because they feel they must do some work in safety.

MR. D. WILLARD ZAHN (Chairman, Committee on Safety Education, Philadelphia (Pa.) Public Schools): I think teacher training institutions need to examine their methods of handling courses of all kinds. The subject matter load and the competition between elements of subject matter is getting terrific.

In addition to being Chairman of the Committee on Safety Education of the Philadelphia public schools, I am a district superintendent. It is part of my job to watch the growth of new teachers and to try to evaluate and measure it. I see teachers coming to us well prepared in subject matter but prepared hardly at all in safety.

Certainly the colleges and the teacher training institutions have done nothing in the way of providing safe environment, no matter what they put on paper, except that which the maintenance authorities have done. We are all college people here. How many of you ever heard of a fire drill in a college?

You see, there are four or five out of a group of perhaps fifty. We asked the Uni-

versity of Pennsylvania and Temple university, as part of our work in implementing teacher training, whether they had had fire drills. Those are two great universities, and they frankly said "No".

The average teacher who comes to teach the first or second year tries to establish an emasculated course that he had in college, at the grade level in which he is teaching. That doesn't work. We can talk all we wish about safety consciousness and factual information, but until we impel action we do not get a safety conscience.

The teachers, by and large, know very little about discussion methods in the classroom. Teachers are adept at questions and answers, but that isn't the heart of a real discussion method.

I have a feeling that when the load of subject matter gets heavier and heavier, the colleges have got to do some thinking. Dean Spalding gave a marvelous talk today relating this thing to the lives of people. Yet we sit in colleges and talk in terms of subject matter and courses, when the total is an integrated process.

DR. T. FARRINGTON (Safety Co-ordinator, Harper School, Chicago, Ill.): I want to call attention to the necessity for integrating safety at all kinds of teaching, not just with small children. I taught in the elementary grades in Alabama. I was born and raised on a plantation and so knew something about the dangers of that kind of life. My experience there was that everyone wanted to do something that was dangerous.

When I got to college, I was director in the athletic field, and my problems with men from 19 to 25 years of age was that they wanted to do the most dangerous things.

I literally had to fight to keep the fellows from doing the things that could easily break their necks. One man, just to give you an illustration, because he saw me doing the cutoffs on the flying rings so apparently easily, said, "Oh, I can do that!" He undertook to do the hardest one there was on the schedule. If I hadn't been standing where I could step right under him and let his feet come down instead of his head, he would have broken his neck.

The point I am trying to make is that all classes—children, young people and adults—need general safety education.

MR. JEWETT: Dr. McSwain, I would like to add (and I fully agree) that one thing that is needed is a conception of the problems

which an individual faces at the various levels of his development. A child does not face the same problems as an adult, in many cases. You really have to bring all of your resources to bear on the general problem of safety education.

DR. FARRINGTON: I meant to add that when the higher levels started their programs of safety education, the students said "Oh, I can take care of myself!" But they had accidents!

MR. WOODCOCK: In other words, don't you think we should more or less stress the economic side of safety in connection with accidents? Let's not be gruesome about it, of course. As you say, we are all adventure-seekers. People like to drive as fast as they can. We like to fly. That is one of the reasons we won the last two wars, because we have adventure in our blood. We must not curtail that at all. But controlled adventure is what we must have.

MISS WYMAN: As a supervisor in a city system, long interested in safety education and charged with the responsibility for it, I am thrilled to hear of a school like Iowa State having a program of that kind. I wish we could get some of your people to teach out our way.

MR. WOODCOCK: I should not leave out our good colleague, Iowa State college. Dr. Lauer isn't here to defend himself, so I'd better put in a word for him. Iowa State college at Ames offers a minor in safety, not primarily for teachers. It teaches a great deal of industrial safety. When we get enough teachers trained to take care of the Iowa schools we will be glad to send them to you, Miss Wyman.

MR. C. E. SANDERSON (Director of Safety Education, State Dept. of Education, Austin, Texas): Are these students of yours going to other schools as safety co-ordinators, or going into the classroom?

MR. WOODCOCK: Every one so far has gone back to the classroom. In our Saturday short courses I have three superintendents and four or five principals. These will probably be supervising.

MR. H. R. GRAMAN (Dayton, Ohio): What can be done with teachers already in the service? I just finished my Master's degree at Cincinnati, but I have yet to take my first course in safety. I wrote my thesis in safety education.

Teacher training institutions should do the same thing as vocational education is

doing—provide area education for the older teachers. They are not getting any type of safety training. Modern machinery and modern ways of doing things make it rather difficult to keep up with modern safety devices.

In my thesis I made a survey of Ohio, of all the machine tools used in vocational schools, and set up 34 units to teach the use of those machines. I think this ought to be done in other fields of safety.

DR. McSWAIN: I shall not attempt to summarize. I remember one of my great teachers said that anyone who tried to summarize a panel for those who participated did not have too great respect for the listeners who participated.

There are several things that stand out. Teachers colleges have a responsibility to help teachers help others to live better in an industrialized society.

It seems to me that safety should not be either a course approach or a course approach, but the proper balancing of the two. If we can interpret safety education as social responsibility in living in this industrialized culture, then safety becomes a vital part of general education, and every instructor in every field is responsible for emphasizing it.

In the area of specialization, people who are going to become teachers of safety education would profit a great deal from the program we have heard this morning. Let us be careful that we do not overlook what may happen to the people in the field when we get too many teachers of special subjects. The classroom teacher may say:

"Here is Mr. Brown who teaches safety education, so I don't have to bother about safety education. It's his responsibility."

This summer I had an interesting experience with a group of city men, very conscientious, who thought their moral contribution to the community was to raise a certain sum of money to employ an additional school staff member whose job it would be to direct religious education.

I did everything I could to help them change their point of view, to prevent them from putting that across. Not that I am opposed to religious education but in this day of high specialization, we can bring too much specialization to the classroom. That leads to disintegration.

We cannot any longer recognize that genuine learning comes by listening or reading books or slitting. Getting people out and

participating under guidance will develop more genuine learning. We have now moved out of an area of mechanistic psychology into an area of organic psychology.

How much more important is teacher education as a function of all universities and all colleges? I personally resent the word "training". I don't think it has any place in education. It implies a kind of education that we have long outlived. We have got to develop self-education and a feeling of self-responsibility. That is going to come, if we get more community participation, more actual doing.

I think this committee could do a great deal in helping college people, administrators and members of the staff, face the question of what revision needs to be made in our program of college and university education to help their students be more adequately prepared to meet the responsibility

of social living in this industrial age.

I have asked myself this question, and I share it with you, although it may not relate to the problem at hand this morning: What is culture? It is my view that many people use culture as an escape from their social responsibilities. They can recite the classics, and they can regurgitate the words of the great masters, but when it comes to an awareness of the social needs and responsibilities and conditions in their own community, there is quite an absence of practical culture.

We in the institutions of higher learning—if you wish to call them that—have got to help ourselves see that in an industrial age we have got to have more practical culture. I do not mean to eliminate these others by any means, but I mean we cannot leave some of these other things to the community and the home and expect our students really to gain a sense of social responsibility.

## WEDNESDAY MORNING SESSION

October 8, 1947

## Group Meeting on Driver Education and Training

Presiding: GORDON C. GARRAM, Supervisor, Safety Education Dept., Detroit Public Schools;  
Chairman, National Driver Education and Training Committee, N.S.C.

## What the 1947 Winter Driving Tests Show

(Summary of a Talk)

By RALPH A. MOYER

Research Professor of Highway Engineering, Iowa State College  
and Chairman, Committee on Winter Driving Hazards,  
National Safety Council

1. Motor vehicle death rates as related to motor vehicle travel are highest in the winter in all sections of the country. Winter death rates are from 24 to 53 per cent higher than summer rates in the northern half of the country, and from 5 to 33 per cent higher in the southern half. The two major factors producing these higher winter accident rates are inadequate traction and reduced visibility.

2. Inadequate traction on road surfaces is primarily due to snow and ice and, to a lesser extent, to wetness, particularly on certain types of pavement. Combined with faulty driving practices, poor traction generally results in skidding, a circumstance frequently reported as a factor contributing to motor vehicle accidents.

ly wide variation in performance with bare

3. Reduced visibility in winter driving generally involves one or more of three circumstances: longer hours of darkness; lowered visibility at times of snow or sleet storms, fogs, mist, etc.; and obstruction to driver vision from frost, ice or snow-covered windshields, snow banks, etc.

4. The most striking fact revealed by the Committee's test projects\* was the surprising, tires on smooth ice. Braking distances on smooth ice range from a low average of 110 feet to a high average of 250 feet, depending upon the ice condition, and to a lesser extent, the type of vehicle. Acceleration and performance on curves likewise varies, but to a somewhat lesser degree. The extreme variability and unpredictability of the surface condition present the real hazard of ice and snow to the wary driver.

5. During the winter months special emphasis should be given to winter driving problems in the fields of driver education, highway maintenance, accident analysis, engineering improvements, road condition reporting, and traffic law enforcement. Full cooperation should exist between those responsible for road maintenance and those responsible for traffic safety.

6. Drivers must appreciate hazards of winter driving and understand ways of surmounting them if they are to avoid trouble on the highway. Thus, a broad educational program should be conducted by those responsible for traffic safety. Drivers should know that:

a. Ice and snow increases braking distances from 5 to 12 times that required on dry pavements. "Wet" ice, most frequently encountered after freezing rain or sleet storms, is twice as slippery as "dry" ice encountered at low temperatures. Braking distances on glare ice for cars and trucks equipped with natural rubber tires are 10 to 30 per cent less than with synthetic tires. Glare road ice and the smooth ice of a frozen lake give comparable braking distances. Trucks generally skid farther on ice than passenger cars.

b. Speeds must be materially reduced on slippery pavements to avoid dangerous skidding. Speeds should be in the normal driving range of other traffic and passing kept to a minimum. The recommended safe speed on glare ice for cars and trucks with bare tires is in the range of 15 to 30 m.p.h.

c. The rules for safe driving under adverse road and weather conditions are fundamentally: Get the "feel" of the road; adjust speeds to conditions; slow down well in advance of intersections and curves; use tire chains on ice and snow; keep windshields and windows clear of snow, ice, fog and frost; follow other vehicles at safe distances; signal intentions of turning or stopping; and apply brakes with a gentle pumping action. Tests have shown that a very rapid and hard pumping action will produce considerably shorter stops, but it is doubtful if the average driver can employ this technique to advantage.

7. During fall and winter months, public officials and safety organizations should also give special emphasis in public information programs to the hazards of driving and walking during the hours of dusk, darkness and at other times of reduced visibility.

8. The use of tire chains is the most practical means of self-help for increasing traction on snowy and icy roads. When such roads are not treated with abrasives, chains are a practical necessity for providing traction for passenger cars and trucks. Tire chains reduce passenger car braking distances on ice and snow around 40 to 50 per cent; truck braking distances about 60 to 70 per cent. They provide fairly uniform traction on dry and wet ice. On icy curves, however, speeds with chains on the rear wheels only should be no higher than without, because chains on the rear wheels only do not provide the necessary steering control required on curves. However, in the event of a skid, chains on the rear wheels are helpful in maneuvering

out of the skid.

9. Highway departments should strive for "bare pavement maintenance" during the winter season. This can usually be accomplished by prompt and complete snow removal, expedited by the direct application of chlorides without abrasives. Where it is not economically feasible to remove the ice or to prevent its formation, the spreading of abrasives treated with sodium or calcium chloride is recommended.

10. The spreading of treated abrasives on snowy and icy roads makes driving safer. Braking and acceleration performance is from 30 to 65 per cent better than on bare ice. With untreated abrasives performance is from 10 to 55 per cent better than on bare ice, depending on density of spread.

11. Traffic engineers and accident analysts should continually check the records of accidents occurring during the winter months to identify and correct road locations which are especially prone to accidents when the surface is slippery or visibility poor.

12. State highway departments should develop effective systems of winter road condition reporting, so that drivers will be sufficiently warned of storm and road conditions. This information should be made readily available through all publicity media, and should be accurate and dependable. Safety instructions dealing with road or weather conditions should be combined with the reports.

13. Police should cooperate in this program by promptly reporting road conditions and by warning motorists of the need for using tire chains when traversing sections which are extremely hazardous because of ice or snow.

## The Detection and Treatment of Potential Accident Makers

By H. M. JOHNSON  
Professor of Psychology, Tulane University

In order to treat accident-prone drivers successfully one must first identify them. In order to identify them one must first determine whether the group of operators that we deal with contains many accident-prone individuals or not. Some groups do; some groups do not. There is a way of telling. It is not perfectly simple, but neither is it impractically hard to apply. But unless one applies it, then one does not know much about the nature of the problem that he proposes to solve. But to apply the procedure it is necessary that accidents be adequately classified and that all the classified accidents be recorded and taken into account. I shall sketch this procedure briefly.

In a given sample-population one has  $N$  operators and they collectively have  $n$  accidents. The average  $a$  of accidents per operator is obviously  $n/N$ . If all the members of the group are equally liable to accident, then the  $n$  accidents would be distributed among the  $N$  operators according to a well known law of chance which is named after its formulator, Poisson, and thus is called Poisson's law. You can find its formula in any good textbook on algebra written for freshmen or for students in good preparatory schools. You can find it also in any really good introduction to statistics, such as Yule and Kendall. Therefore, we need not reproduce it or elaborate on it here. We may recall, however, that this law tells us how accidents would be distributed if they did not respect the identities of the individual operators, and the personal characteristics that correspond to their identities. In other words, the law tells how accidents per operator would be distributed if accidents, like God's raindrops or hailstones, fell alike on the evil and on the good; on the just and on the unjust; on the skilled and on the unskilled; on the conscientious and on the unconscientious, etc.

Now if accidents fall into classes that obey Poisson's law, within a tolerable limit of ac-

certainly, then there is no problem of the detection of accident-prone drivers. They cannot, in these circumstances, be detected or identified; therefore, there is no way of deciding upon special modes of treatment—as be re-education, discipline, rewards, special punishment, or the like—that are especially appropriate to them. In brief, under these conditions, we would have no identifiable class of operators who were especially accident-prone; and, therefore, no special treatment that would be appropriate to this class of operators. Our business would rather follow the principle of finding treatments—educative, disciplinary, or the like—that we ought to apply indiscriminately.

Please do not mistake me in supposing that this kind of treatment may not be valuable. In factories, we may find it useful to require all operators to keep their sides clean; to use all the safety goggles that have been invented; indeed, to learn some uniform rules of operation. This may be good practice on the highway, too. But if our sample of operators contains some that are much more prone or much less prone to accident, than others are, then these uniform rules do not clearly apply. Hence the question whether our sample contains some operators who are extraordinarily prone to accident (and conversely, some operators who are extraordinarily likely to be accident-free) turns out to be crucial in determining what we must do, what we may do, and what we must not do, in order to act usefully and in a manner that is logically defensible.

To illustrate the principles that we are discussing, let me present a table taken from the report of Blacomb and Brinkman which shows the distribution of 7,397 accidents according to 2,500 operators of motor vehicles belonging to the transportation system of a greater Boston in 1937. Every event was called an accident that required a report to be made to the company's insurance agency.

TABLE II.—ACCIDENTS OF OPERATORS OF ELECTRIC RAILWAY CARS AND MOTOR BUSES FOR THE BOSTON ELEVATED SYSTEM, 1937

(Actual and expected distribution of motor vehicle accidents of operators employed continuously throughout the year, as reported to employer, regardless of personal or property damage)

| Accidents per operator during experience | Operators having these accidents |                 |            | Accidents accruing to these operators |                 |            |
|------------------------------------------|----------------------------------|-----------------|------------|---------------------------------------|-----------------|------------|
|                                          | Number Actual                    | Number Expected | Difference | Number Actual                         | Number Expected | Difference |
| 0                                        | 217                              | 101             | 116        | 0                                     | 0               | 0          |
| 1                                        | 326                              | 315             | 11         | 326                                   | 315             | 11         |
| 2                                        | 589                              | 428             | 161        | 1,198                                 | 986             | 212        |
| 3                                        | 458                              | 514             | -56        | 1,574                                 | 1,542           | 32         |
| 4                                        | 258                              | 408             | -144       | 1,092                                 | 1,508           | -516       |
| 5                                        | 145                              | 352             | -207       | 725                                   | 1,260           | -535       |
| 6                                        | 99                               | 131             | -32        | 594                                   | 796             | -202       |
| 7                                        | 86                               | 59              | 27         | 602                                   | 415             | 187        |
| 8                                        | 46                               | 25              | 21         | 368                                   | 184             | 184        |
| Total (0-8)                              | 2,504                            | 2,590           | -86        | 6,159                                 | 7,094           | -935       |
| 9                                        | 37                               | —               | —          | 245                                   | —               | —          |
| 10                                       | 24                               | —               | —          | 240                                   | —               | —          |
| 11                                       | 24                               | —               | —          | 264                                   | —               | —          |
| 12                                       | 7                                | —               | —          | 84                                    | —               | —          |
| 13                                       | 5                                | —               | —          | 65                                    | —               | —          |
| 14                                       | 2                                | —               | —          | 26                                    | —               | —          |
| 15                                       | 2                                | —               | —          | 30                                    | —               | —          |
| 16                                       | 2                                | —               | —          | 38                                    | —               | —          |
| 17                                       | 2                                | —               | —          | 34                                    | —               | —          |
| 18                                       | 1                                | —               | —          | 18                                    | —               | —          |
| Total (9-18)                             | 96                               | 10              | 86         | 1,038                                 | 103             | 935        |
| Total                                    | 2,500                            | 2,500           | 0          | 7,197                                 | 7,197           | 0          |

This exhibit is characteristic of all that I have seen except one. I suspect the integrity of that one. I do not believe that those who compiled it were intentionally dishonest; but there is internal evidence that the sampling was inadequately planned. And, inasmuch as the statistical work was done by persons who probably could not understand the results, and inasmuch as the work received only casual supervision from experts, whose interest in the procedure appears to have been casual, I strongly suspect that two columns were interchanged; namely, the column which expressed the actual number of operators in each accident class, and the column which expressed the corresponding theoretical number.

This distribution, like all others that I do not suspect, shows these characteristics: first, it contains an excessive number of individuals who have gone accident free or almost accident free, during the period covered by

the survey. Second, it contains an excess of operators whose accident rates greatly exceed the average; e.g., of operators whose accident rate exceeded 6 accidents each, but more especially of operators whose accident rates exceeded 8 accidents per operator.

If we apply the well-known "Chi-squared" test of goodness of fit of the actual distribution to the distribution that Poisson's law would allow, we find a probability equal to 10-317 that the discrepancies between the two would occur merely by chance—i.e., as an accident of the manner in which two samples were drawn by the same sampling method from the same parent population: the first by census, the second by calculation from Poisson's law.

Consider now the huge excess over what Poisson's law allows us of operators who had more than eight accidents each—there are 96 of them while chance allows only 10. Thus 86 of these operators were probably accident

prone while 10 of them were merely unlucky. If we should treat them as if they were all accident-prone, we would properly classify about nine-tenths of them. If, like a prospective employer, we have no obligation to the ten, we might proceed with a clear conscience. But if we were in the role of an officer of the state, this procedure would not do very well.

What, however, makes 86 accident-prone operators what they are? Obviously, something that operates systematically. But is this something intrinsic to the operator as a psychological person, or is it extrinsic to him, but associated with the nature of his duties? For example, does the distribution of hours of operation, with corresponding differences in traffic conditions, differ between this subclass and the others? These questions should be settled before we begin to work on intrinsic personal characteristics. I shall presently indicate why this is so, but first let us see what our duty would be if Poisson's law had fit the data within a tolerable margin of uncertainty.

In that case we could not say that the sample population contained any individuals who were more liable or less liable to accident than the average, notwithstanding that some had an accident rate that differed considerably from the average. We, therefore, would need to treat them all alike: e.g., use the same safety devices, the same safety practices, etc., as the others. Suppose we should give special lectures, special demonstrations, special warnings, special scoldings, to operators who required no special treatment; it is quite conceivable that we might do some harm.

One is reminded of a country boy who has a good voice but who goes to a singing master. The master requires him to sing "A-a-ah!" The boy sings it on key, with good vocalization and good breath control. The teacher tells him that the effect was pretty good, but that he didn't produce the sound in the right way. He should have opened his mouth exactly three-quarters of an inch and held it so; and he should have spread out his lips to make a wider opening; and put the tip of his tongue a quarter of an inch back of the roots of his lower front teeth. Now he commands the boy to sing "A-a-ah!" according to directions. Is it not possible that the boy might not sing as well as he sang before? Indeed it is not possible that many teachers have spoiled many voices by requiring the students to produce their

tones in "the one best way!" So it may be, if an already safe driver is required to undo his habits that, except for chance, are adequate, in order to form a set of new ones.

Now let us return to these 96 operators in Slocombe and Brakeman's sample. We know that 10 of them are probably unlucky and that the other 86 are more or less chronic offenders. How tell the 10 from the 86? It is not easy to do. Indeed, Dr. Cobb has shown that there is a limit of selective power which the best of all conceivable tests can attain. Moreover, he has shown a way in which this limit can be determined, in about 30 minutes, if one has at hand the distribution of accidents per operator.

In the sample which we have been discussing, the best of all possible tests—and by possible I mean logically possible—would yield a generalized coefficient of correlation of about 0.86 with accident rate. This means that about 64 per cent of the total variance would be accounted for, and about 40 per cent of the standard error of estimation. But this is unusually high; in many other instances, we should consider ourselves lucky if our tests gave a generalized coefficient of correlation with accident rate as high as  $R=0.45$ . Such a test or battery of tests would eliminate about 20 per cent of the variance and about 11 per cent of the standard error of estimation that would accompany a shrewd guess from the average.

Attempts have been made, of course, to discover special weaknesses in the personal makeup or the personal habits of operators whose accident rates are high, and to correlate these weaknesses with the kinds of accidents that these operators favored. One then reasons that the accidents that are considered arise from these special weaknesses. One then tries to re-educate the operators. Followup studies, carried through a few months, thereafter, make the effects of the re-education look almost miraculous until one notices that similarly miraculous changes occur in the records of high accident operators who were not specially treated. The interpretation which some experts have put upon these results of retraining is invalidated (1) by inadequate sampling and, as if that were not enough, (2) by the use of logical fallacy known as affirming the consequent.

What, then, shall we do with this whole group of 96 multiple-accident operators, if we have to treat them all alike? Two procedures commend themselves. The first procedure

is to do nothing. The second procedure is to eliminate, or else try to re-educate, all of them.

If we should do nothing the results might surprise us. This group of operators during the present year has averaged  $10098/96=105.8$  accidents each, while the remainder of the group has averaged  $6199/86=72.1$  accidents each; so the accident rate within the suspected group is  $105.8/72.1=1.48$  times as great as for the rest of the whole sample. Thus they are about as much worse than the rest of the population as they are likely to become; if they should change at all, the only way in which they are likely to change is for the better.

Experience has shown that there is a low correlation, although positive and very reliable—between the accident rates of the same group of operators in two different epochs. Let us be conservative and suppose that the numerical value of the coefficient of correlation is near 0.5. It can be easily shown (2) that we do not have the time to prove it now, that in the present instance the 96 operators who this year accumulated 10098 accidents will most probably accumulate next year, not 1038 accidents but 529. Thus the apparent saving in this subgroup will be  $1098-529=569$  accidents, or 49 per cent, and this apparent saving will have resulted by reason of our having done nothing, or by leaving well enough alone. Of course, in the mean time, the better groups of operators will have grown worse, since they cannot well change for the better. Particularly, the operators, who this year went accident free, cannot possibly have changed except for the worse. The apparent improvement among the worst operators may quite likely be offset by the spontaneous deterioration in the behavior of the best.

There are two ways of doing nothing. One way requires us to make no motions at all. The other way requires us to do plenty of busywork, that has no effect in one direction nor yet in the other. The net result of the two methods is the same, although doing busywork looks better than sitting idle.

Let us now imagine that following a course of re-educative treatment of the 96 had actors, we find that their rate for next year should become equal to the average rate for the whole group: namely, 72.1 accidents per operator. Their total number of accidents would, therefore, become  $96 \times 72.1$ , or 300

accidents instead of 1098. This gives an apparent saving of 798 accidents. But if, as we have seen, we should have saved 569 accidents by actually or virtually doing nothing, then the maximum saving that we could ascribe to the treatment is  $798-569=229$  accidents. This saving is about 22 per cent of the 1098 accidents that accrued to the group this year, and about 32 per cent of the 7197 accidents that accrued to the whole sample. The net gain may look small; nevertheless it is not to be sneezed at. If the net gain could be carried out on a national scale it would correspond to saving about 1,000 lives a year. But this is not nearly as spectacular a saving as has been told in some miracle stories as related in some popular magazines.

From what we have said it should have been clear that just as there is a tendency for the drivers who are best in one epoch to drive more poorly in another, so there is a tendency for the drivers who drive worst in one epoch to drive better in another. This tendency is called by some "regression toward mediocrity;" by others, "centripetal drift." It is always present, but it never becomes complete. Thus, although these bad drivers, even if they are left untreated, will show up better in the next epoch or in the last epoch than in this, nevertheless they will not regress quite to the average; and likewise, the 817 drivers who went accident free in this epoch will show up worse in next epoch or in the last epoch than in this, nevertheless, they will not regress quite to the average. They will always show up better than the average, as the others will show up worse than the average—provided, of course, that present trends continue.

Attempts have been made to solve the problem by examining multiple-accident operators for special weaknesses; and, if these weaknesses are found, by giving training, or applying special training, or applying special remedial measures. The results as reported thus far are for the most part invalid: first, because the censuses included only the class of bad actors, whereas they have to include all operators—the best, the mediocre and the worst. They are invalid, second, because even now, in the treatment of individuals as such, we should have to proceed without an experience table. If one limits one's consideration to dramatic instances alone, one not only commits a logical fallacy known as affirming the consequent—which ought never

to be committed in a public place—one may also be practically misled.

The final report of P. W. Cobb to the Highway Research Board and the Bureau of Public Roads destroyed the basis for advice that had been theretofore offered, based on the presupposition that specific weaknesses in the operator are associated with preferences for corresponding types of accidents. These hypotheses were definitely falsified:

1. That the tests enable one to select individuals whose general accident rates vary widely and reliably.
2. That over a long period the licensing authorities might do well to treat the operators selectively, according to the patterns of their scores in the tests.
3. That the personal weaknesses disclosed by Lauer's tests or DeSilva's are correlated significantly and usefully with preference for one type of accident over another. In particular:

3.1 Sensitivity to glare, as defined by either of these testing procedures, is not significantly or usefully associated with preference for night accidents over daytime accidents.

3.2 Defective color vision is not significantly or usefully associated with preponderance of accidents at signal-protected crossings.

3.3 Neither Lauer's nor DeSilva's tests of ability to judge distances are associated with preponderance of head-on-against-rear accidents over other types.

3.4 Inequality of vision in the two eyes as determined by either of these tests is not associated with a propensity toward head-on-against-rear accidents.

3.5 The time required for simple reactions to an auditory stimulus is not associated with a propensity toward head-on-against-rear accidents or passing accidents.

3.6 The variability of these reactions is significantly but not usefully associated with head-on-against-rear or passing collisions.

3.7 The subjects' scores on the Harvard "vigilance-test" (memory tracking a symbolic vehicle) are not significantly associated with a propensity toward head-on-against-rear or passing collisions.

3.8 The subjects' scores on the Harvard "vigilance-test" (tracking combined with steering a symbolic vehicle) are not significantly associated with a propensity toward head-on-against-rear or passing collisions.

The tests which we have been discussing

are those which Lauer or DeSilva had designed and were exploiting as the tests. They were administered by staffs that the authors themselves had trained and kept under their immediate supervision.

The results in several of the tests, though not statistically reliable, ran counter to the authors' prediction and counter to the interpretation upon which their advice to the drivers was based.

Concerning treatment of operators who are supposed to be accident prone, it looks to me as if we need to make a fresh start. First, the operators of large fleets should adopt safety devices and safety rules of operation and apply them to all drivers alike.

Second, these employers should use principles of selection that have already been validated for classes of operators (though not for individuals), before they hire their help. Even the tests that were analyzed in Cobb's study could be usefully employed in setting up actuarial tables, although better tests could probably be developed rather quickly for this purpose. Of course, all this is futile in those times when the labor market forbids selection.

Third, we should not expect any miracles from specific treatment of individuals derived from such tests as these or others that we are at all likely to develop. Whenever this country decides to minimize highway accidents it can do it. But it must accept as a condition (a) such training prior to licensure and (b) such regulation of traffic as would compare in stringency with that which is required in water and aerial navigation. These who hope for revolutionary improvement from non-dramatic measures might begin their self-education by reading the report of E. W. James presented before the 17th annual meeting of the Highway Research Board.

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#### CORRIGENDA

p. 492, 2d line from bottom of text: For "construe" put "ac-

p. 494, last line: For 0.84 put 0.79  
p. 510, par. 1, line 3 (under radical): For 0 put 1  
p. 512, par. 2, line 12: For 19 put 10  
10. SLOCUMBE, C. S. Reduction of automobile accidents by use of psychological tests. *J. Soc. Automotive Eng.*, August, 1925, 17, 143-166.  
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## Have Driver Clinics Any Traffic Safety Value?

(Panel Discussion)

Discussion Leader—EARL S. ALLGAIER, Research Eng., Traffic Engineering & Safety Dept., American Automobile Assn.

#### Participants:

- J. S. BAKER, Dir. of Research, Northwestern University Traffic Institute.  
Edmund J. Evans, Dir., Automotive Safety, Armstrong & Co.  
J. E. EVANS, Prof. & Head of the Psychology Dept., Iowa State College.  
MILTON D. KRAMER, Asst. Dir., Center for Safety Education, New York University.  
A. R. LAUER, Prof., Dept. of Psychology, Iowa State College.  
AMOS E. NEYHART, Administrative Head, Institute of Public Safety, The Pennsylvania State College; Consultant on Road Training, American Automobile Assn.  
CHAIRMAN ALLGAIER: I will try to ask a few questions of the panel members, and then I would like to throw the discussion open to the entire audience. "Have Driver Clinics Any Traffic Safety Value?"

There are apparently all kinds of definitions, all kinds of clinics, so in order to steer our thinking I will ask Milton D. Kramer if he will tell us what he considers, for purposes of this discussion, a traffic safety clinic.

MR. KRAMER: This is one of those as-quickly-as-possible answers, Earl. We do not consider a clinic to be a room into which someone has hastily thrown some driver testing devices, of questionable validity and reliability, which are administered by a person not familiar with their operation. We rather

envision, speaking generally, a program which includes the use of testing devices as one of the items of the program.

The clinic would include interviews; review past history—working experience and driving experience; a general medical examination; a knowledge test; a determination of attitudes, to the degree which present devices make that determination possible; a road skill test; and the use of certain testing devices, not only for whatever limited values they may give in screening driver potential abilities and limitations, but also for their educational value and their values in alerting the driver to certain limitations which he and other drivers possess when on the highways.

CHAIRMAN ALLGAIER: Professor Neyhart, do you have anything to add?

MR. NEYHART: I think Mr. Kramer has given us a very clear-cut explanation of what the members of the panel think we should include in a driver clinic.

CHAIRMAN ALLGAIER: Before we go into too much detail, Dr. Johnson has made several remarks that may have you a little confused. Perhaps you think our efforts in research are hopeless, we ought to give up. I would like to call on Dr. Lauer to give a few reasons why we have so much difficulty in sorting out these 86 "sinkers."

DR. LAUER: Mr. Allgaier, since my work was mentioned by Dr. Johnson, I will admit I have been guilty of doing some research to the field, and I think I should explain to

you some remarks that Dr. Johnson may not have made clear.

Our study in Connecticut was done through the Public Roads Administration. I was glad to co-operate in this study for a number of reasons.

If we had been interested in selling some kind of gadget, we probably wouldn't have gone into the study, because I already had made two very elaborate studies, covering the entire county, which indicated that one could not pick accident-prone individuals. So what Dr. Johnson has told you was perfectly evident to me when I went to Connecticut to help with this study.

But there are two or three points in Dr. Johnson's remarks, that I would like to call to your attention. One of the reasons why it is impossible to pick accident-prone drivers is the change that takes place in individuals with any passage of time. In the Connecticut study we went back in the records to the early 1930's, whereas our clinic was held in the late 30's. We also interviewed individuals who had had five or six out-of-state accidents, for which I have the records, but which were not recorded in the state. Also some of those interviewed had not reported all of their accidents in the state. Of course, Dr. Johnson mentioned that as one of the chance factors.

Too, there was no consideration given to the reliability of the data on night accidents. It is axiomatic that one's conclusions are no more significant than the reliability of one's data. I don't believe any one can make a prediction with reference to any one individual.

Further studies need to be made. We haven't yet the final answer to how to segregate good drivers from bad drivers. I believe the only way to hope to get the answer to our problem will be to catch your accident cases right on the spot, by means of accident squads similar to homicide squads; then take the drivers involved into the clinic and check them.

CHAIRMAN ALLGAIER: Before any more questions, are there any comments any member of the panel would like to make on Dr. Johnson's talk this morning?

MR. KRAMER: As I heard it, Dr. Johnson pointed out the very definite limitations of various forms of testing devices and testing procedures. We cannot believe that accidents are purely matters of chance. Isn't it true that one person, equipped with certain traits and characteristics, can turn what might have

been an accident into no accident?

Further, we would like to know much more about accident causes. Official records show a man failed to signal, or did not grant the right of way, or drove too fast. We want to know why he drove too fast, why he failed to grant the right of way, etc.

In other words, we are not satisfied with the last overt act. We would like to know the relationship between the individual's knowledge, attitude, emotional stability, personality, the results obtained from laboratory testing device, and the real driving situations faced by the individual—his ability to make proper decisions in complex situations that may arise on the highway.

We would like to see the continued use of testing devices in order that we may check further the relationship between those devices and actual driving. More than that, except for vision testing devices, I would like to be able to turn all the devices into the river. If only someone would devise a good method for determining knowledge, attitudes, emotional stability, and personality, with relation to the driver's decisions on the highway.

CHAIRMAN ALLGAIER: Have drivers clinics any traffic safety value? Mr. Emond, will you tell briefly what your experience has been?

MR. EMOND: I believe that clinics do help to improve traffic conditions. Driver clinics are only one tool in driver selection. An individual's background, past employment, and past performance, should also be part of the basis upon which an employer would hire a driver. The clinic may also be a tool to improve the driver's attitude.

MR. NEYHART: I would like to describe three clinics in Pennsylvania, operated by the Pennsylvania State Police at Philadelphia, Harrisburg, and Pittsburgh. When a driver gets into traffic difficulties, or when a traffic officer believes that the driver is conducting himself on the roadway in a manner that should be checked, the police send the driver to the clinic nearest his home. The driver is interviewed. He is given psychophysical tests for acuity of vision, peripheral vision, distance judgment; and a vigilance test. Then the driver is given a road test.

It has been the observation of those who check driving records, that, after the individual has gone through the clinic, his accident rate goes down.

I am wondering what affected the accident rate? I certainly would not say that it was

the interview, or the psychophysical test, or the road test. Maybe the very fact that the driver went into the clinic, where there were a number of uniformed officers, changed his attitude. I don't know, and I am sure that those who are operating the clinics do not know which part of their work has had effect on the individual.

MR. BAKER: I think the discussion so far has tended to leave us in an attitude of despair with respect to what may be accomplished by clinics in accident reduction.

The person in charge of the clinic is, in a large measure, the key to the success or failure of that clinic.

Of course, this is directly related to cost. If we could spend \$250 to \$500 on each bad driver, we could probably do more good. The usual fleet superintendent can't spend more than three or four dollars and very little time on a high-accident driver, therefore, he must take only the most obviously incompetent operators and the rest have to drag along until their records either become so bad that they are fired or treated. Sometimes bad drivers improve on their own account by virtue of maturing and developing better habits without treatment.

CHAIRMAN ALLGAIER: Questions from the audience?

MR. ROSS (Cleveland Electric): What is the attitude of unions toward clinics?

MR. EMOND: That's a ticklish question. On the West Coast the unions are co-operating by furnishing these clinics. In the eleven western states, before one can operate a truck as a union chauffeur, one goes through the clinic. In the Middle West, union officials have been favorable toward clinics.

CHAIRMAN ALLGAIER: Any other questions?

AL RUBER (Indiana State Police): I am pretty sure we all agree that a person going through a clinic, or a person taking an operator's license examination, probably will be on his good behavior. In other words, he is doing his level best at the time. I wonder if there is any examination that would measure a person's attitude after he returns to the highway.

DR. LAUER: We are working on attitude tests. Dr. Johnson has some measures which will probably turn out better and which show more promise than a lot of gadgets.

MR. HARRY FLICK (United States Post Office): If each operator respected the rights and privileges of the other fellow on the road,

what effect would that have on the accident rate?

MR. NEYHART: If everybody would respect the rights of others, we would probably have an accident reduction of about fifty per cent at the end of one year.

MR. HIGHTOWER (Greyhound): I would like to ask the panel if, in any of the clinics, psychological tests are given to determine what personality weaknesses or what attitudes make an accident-prone driver.

DR. JOHNSON: The best psychologists have attempted it, and have failed. There is no definite correlation between what a person says in a particular act of circumstances, and what he will do. The fact is that, although we have questionnaires about attitudes, and make syntheses, and validate those tests, and get a measure of something we call an attitude, there simply is no correlation between our conclusion and what a person actually does on the highway.

MR. KRAMER: One attitude testing device does exist—the Scheuch Attitude Scale. It is not a perfect instrument. The results must be considered along with other data.

MR. WARNER (Utah State Tax Commissioner): After the taxi driver has successfully passed an examination and been given a license to drive, is it safe to assume, if he has no accidents or violations, that he will always remain a safe driver and needs no further examination? If he does need further examination, how often should he be re-examined? In our state he must renew his license every three years. Should he be required to take an examination each time he renews his license, whether or not he has had an accident or violation?

MR. EMOND: I believe a taxi driver should be examined once a year. We would not need all these driver clinics, if the state did a thorough job.

DR. JOHNSON: A few years ago I published an article criticizing some conclusions that were drawn in a study similar to that of Sloan's. He took a group of bad actors in the state of Massachusetts, tested them, advised them, and found that, in the next few months, their accident rate dropped astonishingly.

I took a similar group in Connecticut, and found that it showed the same thing, and in just as high a rate.

There is a tendency known to statisticians as regression toward mediocrity. If you take a group of persons who are extremely bad

actors, there is only one way they are likely to change, and that is for the better. If you have a group of individuals who are accident free, there is only one way in which they can change, and that is for the worse.

**CHAIRMAN ALLGAIER:** I think we are all agreed that certain drivers are accident prone; that the tests we have are not very good; and that we need to do a lot more work.

### WEDNESDAY MORNING SESSION

October 8, 1947

#### Group Meeting on Physical Education

Presiding: **LEON G. KRANTZ**, Head, Dept. of Physical Education, Northwestern University;  
President, Mid-West Physical Education Association

#### What Types of Surfaces for Physical Education and Play Are Most Satisfactory?

(Panel Discussion)

Discussion Leader—**L. H. WATZ**, Field Secy., National Recreation Assn.

Participants:

**J. Z. BURGEZ**, Architect, Holabird & Root  
**JOHN T. CAZE**, Asst. Supt. in Charge of Business Affairs, Glendale (Calif.) Unified School District

**RAY O. DUNCAN**, Illinois State Dir. of Health & Physical Education, Office of the Supt. of Public Instruction

**EDWARD B. LANDRY**, Safety Dir., Office of the Foremaster General

**STANLEY MCKEE**, Principal, Lincoln School, (Highland Park, Ill.)

**EUGENIA M. ZEMER**, Consultant in Physical Education, Minneapolis Public Schools

**MR. WEIR:** Our subject is "What Types of Surface for Physical Education and Play Are Most Satisfactory?" I would like to refer you to "Surfacing Playground Areas, Supplementary Issue," by the National Recreation Association. It contains experiences gleaned from a great many communities throughout the country on the types of surfacing that is being experimented with, and is being used.

**MR. BURGEZ:** Our experiences have chiefly been confined to field houses and gymnasiums. I mentioned first the field house. For that type of floor we have usually specified a clay surface if a running track was to be a part of the activities for which the facility was designed. We used cinders, regular boilerhouse cinders, for the track area, and for other areas, such as pole vaulting, broad jumping, and high jumping.

The clay was sifted ground clay and was compact; it was also free from lumps. It was necessary to have good maintenance on this, because the clay surface is a poor one, in that it will dry and crack. If that occurs to any great depth it becomes quite a problem to resurface it, and recondition it.

In gymnasiums, and this would apply to field houses where they had a basketball court, you should have a maple surface. Maple floors, in some instances, resettle, and that is most desirable.

There are two types of maple floors: first, a solid subfloor, either a concrete slab or a foundation on which to support the beams of a subfloor, on the subfloor a layer of concrete, and on that a maple floor in short lengths; or, second, a concrete slab on which is embedded a resilient clay on top of which are sleepers, over which is a subfloor, and then a maple floor.

Sound is important, therefore the area between the subfloor and the sleepers is filled with a type of material to eliminate a drumming effect, which would be objectionable in any floor after it was laid.

On indoor tracks, there are usually small areas where back turns are necessary, and in such installations, if spikes are to be used, a cork surfacing is desirable and advisable—on the straightaway as well as the back turn areas. This, in time, will require replacement and maintenance.

Generally where they do not use an indoor spike, they use a cork surface on the

turning only.

**MR. WEIR:** What about showers, locker rooms, etc.

**MR. BURGEZ:** Naturally, when we get to shower rooms the question which has become very important is protection against athletes' feet. There is a germicidal surface on the market which is alleged to retard the development of germs.

The surface around an auditorium or shower area should be of nonslip material. If it is cement it should be sealed with a nonslip agate in it. A colored cement floor is not desirable, natural is the most desirable.

Around swimming pools, of course, the base is also concrete and usually a nonslip terrazzo, which is a cement surface made of marble agate, ground and polished to a smooth surface, and on that a waxed or a surface treatment is used so that it can easily be cleaned.

**MR. WEIR:** Does any one have any further questions?

**MEMBER:** How can you treat a slippery concrete floor around a swimming pool?

**MR. BURGEZ:** I would say that the only thing you can do is to use a nonslip surfacing, such as a nonslip wax or paint.

**MEMBER:** How about carpeting?

**MR. BURGEZ:** Well, a rubber felt mat usually defeats its own purpose because someone might trip on it.

**MEMBER:** What would you recommend for a concrete play area that has become dusty, and off of which it is difficult to keep the dust?

**MR. BURGEZ:** Well, there are a number of floor hardeners, most of which have a sodium silicate base. I believe I would say that any of those surface hardeners would eliminate the dust. These hardeners penetrate the pores of the surface.

However, a hard steel concrete surface should withstand a considerable amount of wear before it starts to dust.

**MEMBER:** How about the treatment of surfaces against moisture? I am thinking particularly of handball courts and squash courts where the ventilation is not adequate to take care of excessive humidity.

**MR. BURGEZ:** If it is a wooden floor, which most are, it should have been treated before it was installed. A sealer with a tung oil base could be used to treat it, after installation.

**MR. WEIR:** I have been in gymnasiums where the floors were badly bulged; what was

the cause of that bulge?

**MR. BURGEZ:** That could have been from a number of things. If it is a new floor, it might be that the material was not properly dried—it was green, or it might have been laid on a wet surface, or it may be that it is being subjected to a moisture condition.

It is desirable to seal a new wooden floor as quickly as possible after it is laid, because a new building has moisture in it for quite a while after it is built. The floor should be laid with little openings between joints, at intervals, to permit that floor to swell. It is going to swell a little after it is installed, and this technique will eliminate the bulging. The edges of the floors are often left free from the walls so that the floor has a chance to play back and forth a little without bulging.

**MEMBER:** What about the question of underdrainage in the indoor rooms?

**MR. BURGEZ:** The base of the floor should be solid, well packed and should be drained so that no surface water will seep through.

**MR. WEIR:** Now, we will take up the question—one which seems to be troubling most of the play, recreational and physical education people—the question of outdoor surfacing.

We are concerned here primarily with the kind of surfacing that will most likely prevent accidents. I suppose we need not pay much attention to the question of turf and natural soil surface, where the areas are large enough to warrant the keeping of that kind of surface. It is good if we can have that type of surface, but unfortunately the size of the individual school's grounds is comparatively small, and many of the municipal play areas also are small. In order to get the maximum efficiency out of these small areas we have to give consideration to the best types of surfacing for the purpose.

**MR. MCKEE:** I sent out a questionnaire from which I hoped to secure information which I might bring you today.

First of all I tried to get the answers to certain questions: Do you have a hard surface play ground? What type of surface is it? Approximately when was it constructed? Can you estimate the cost? What is the area of the play ground? If you have an all-weather playground, estimate how many more days of "out-of-doors play" the children obtain by virtue of having such a playground. Do you get the skinned knee complaints from



teachers and parents about your all-weather playground? How do you curb injuries on your playground? If you were constructing the ideal playground, in your judgment, what type would you construct? And, finally, why would you select the type that you desire?

Briefly I would like to summarize some of those points, because I think they are very important to us.

Many places did not have an all-weather playground. Where playgrounds had been constructed, surfaces varied from cement to macadam.

There was a general difference in viewpoint about the type of construction. However, those which had been constructed recently agreed on one or more things—have a good base and coat that with some type of topping.

The question of construction varied considerably. Three things seem to enter into this picture in the type of area that they were attempting to construct—what had to be done to get the area ready; the labor factor; and the type of material used.

In cases where they put in hard surface playgrounds, they have put in tiling which would drain it and make it more adequate for use on rainy days.

This question bothered me. I was concerned primarily from the physical education standpoint. When some of the playgrounds were constructed, no thought was given to the types of games which the children would play on these grounds. Some of the grounds had large play areas, but they were arranged in a hither-thither pattern of squares and rectangles. It seems to me that it is important, if you are going to sell a playground to your community or school board or PTA, to plan the play areas to meet the needs of the participants.

Now, about the skinned knee complaints, they indicated very definitely, at first, that they had that complaint but as time went on the complaints subsided. Why? Simply because the children were learning how to use such a surface; how to protect themselves; how to run, to start, and to stop.

And, finally they indicated that they had developed a certain type of supervision among the school personnel. The teachers learned how to direct the use of that playground.

In regard to the question, "If you were to construct the ideal playground, which type would you construct?" most said they would

construct one with a macadam base and a tarred top. They would make the playground with adequate turf. And, if, and wherever, they could use tamarack, they would do so for the little children, using tamarack under such apparatus as slides and swings. They said they would do that for two reasons: first, they felt it would keep down accidents; and, second, they felt that such a playground should become not only a place for children to play, but should also become a place for the activities of the adults.

MR. WELLS: Are you going to write up that survey so that it will be available?

MR. McKEE: My friend, Mr. Duncan, asked me to write the survey and send it to him and he would publish it in the excellent periodical which the State of Illinois presents to you or to any interested person or school personnel.

MR. WELLS: I brought up that question because there is a great lack of material on this question.

Now, we will call on Mr. Duncan. MR. DUNCAN: I am not an expert on playground areas, however, I travel all over the state, and have had some experience in seeing a lot of playgrounds and observing what the school people are doing to make them better areas for the children to play upon.

I just want to make two or three comments. I believe that the school playground is just as important as the classroom.

I believe every elementary school should have an all-weather play area. Down state principals tell me they can have the children out of doors 90 per cent of recreation time, if they have an all-weather area.

As to the type of surface, personally I like the asphalt surface, because it is much safer than a concrete surface. In most places, asphalt is much cheaper, and that is an important item to school people.

MISS ZIEGLER: In Minneapolis, we have two things to consider with. In the spring we have mud holes, and in the fall we have a regular desert; and, these conditions make it very difficult for our physical education program.

Our classroom teachers actually teach physical education. And, if any of you people want to experience a horrible feeling, go out to the playground to supervise the children in token shoes.

I appealed to our engineering department to put in a hard surfacing on our play-

grounds. They agreed. I asked for asphalt or blacktop—I am no connoisseur of surfaces, but I have a pretty good idea as to the type of surface that would be best for the children. I studied the playgrounds of the private schools in Minneapolis to find out the type of surfacing they had. I asked questions like this: How many years have you had your blacktop? What is the approximate cost?

Our engineer had said that we could not have blacktop because winters are too severe. The replies I received to my questions indicated that private schools had had their playgrounds for a period of from eight to ten years. The upkeep of those playgrounds did not amount to more than one hundred dollars. I thought that was very reasonable.

I gave my information to the engineer, and, of course, he paid no attention to it, but put in concrete playgrounds. They are better than mud holes, but that is the only thing I can say for them. We found them about double in cost to the bituminous. As poor as we are, our engineer is sold on the beautiful concrete playgrounds. We found the glare was bad, and the children slipped on the concrete. We found the playgrounds hard on the children's feet and shoes, and the mothers complained about the children's shoes.

We have concrete tennis courts, too, but the tennis players wear heavy rubber-soled shoes; they are not running around in light-weight shoes.

A softball which usually lasts about two years under constant use does not last six months on these concrete surfaces. Our softball hits have gone up tremendously.

Our accidents are different now. On the dirt playground, the children would slip and get abrasions, and the nurse would spend hours picking out dirt. When the children fall on concrete playgrounds, the injuries are cleaner and easier to take care of. We have had three fractures so far on the few playgrounds that we have. The children may have received those fractures on any other type of playground surface. I cannot prove other-wise. I do feel, though, that we do not have as many accidents on the concrete playgrounds as we had on the dirt playgrounds.

When we repair holes in our dirt playgrounds, we fill them with hard jagged rocks, which results in more accidents. Frankly, I do not know what our juniors do with our children, but they do not put them on

our playgrounds.

MR. LANDRY: I believe my participation in your discussion is a result of my interest in a research project that has been conducted under the direction of the American Society of Safety Engineers in the matter of walkway surfaces.

I have one or two comments to make about the treatment of a concrete surface around a swimming pool where the surface is smooth, and I am afraid my opinion will not be in accord with that presented here this morning. I would absolutely recommend that that not be used under any circumstances, and I say that for this reason: because the term "non-slip" has been rather loosely applied by manufacturers of such products. Non-slip is a relative term.

At the present time, in conjunction with the research project I mentioned a moment ago, tests have been made by the Bureau of Standards, who are doing the research part of this project, with reference to floor surfaces treated with various types of floor treatment material, and I can assure you those tests indicated there is no such thing as a non-slip wax.

I emphasize this point again. Do not use wax around swimming pools because you have a wet surface, and it is aggravating a condition which is already bad.

Now, there is available on the market a number of plastic materials that have an abrasive grit embodied as an ingredient of the material, and the material can be applied over existing surfaces. It has been widely used in industrial applications, but I cannot tell you of any specific instance where it has been applied to swimming pool areas.

I would like to make one observation on general matter of accident experience. I think you people in the field of physical education can make a valuable contribution to some of the problems that are facing us.

I am wondering if there is available any information to indicate what contribution various types of floor surfaces have made to injuries by accidents in recreational areas. I would like to urge you people to gather information. It seems to me to be a sensible approach to the problem which you are facing. If you can correlate this information and find out that certain surfacing materials serve as a high contributing factor in accidents, then I think that information should be passed along to your fellow workers.

### Should Activities Which Are Valuable for Physical Development Be Discarded Because They Are Potentially Dangerous?

By HARTLEY D. PRICE, Ph.D.

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We know that much time, effort and money is expended on safety promotion regarding automobiles, industry, travel, floods, fires, etc., etc. But what organization or association is trying to promote safety from falls—which cause 30 per cent of all accidents? This responsibility must be accepted by physical education, by athletics, by safety programs in our schools, by parks, Y.M.C.A.'s and other similar organizations.

Physical education has become a necessity in modern education in view of the lack of big muscle activity in modern industrial life. An effective program of physical education is beneficial to the individual physically, mentally, emotionally, and socially. Physical education should equip the developing individual with the essential habits, skills, knowledge, attitudes, dispositions, and conditions to make adequate adjustment to himself, to objects and events, and to other people. Together with training in regular sport activities, it is imperative that the student become proficient in safety functions. It would appear then that it is the responsibility of physical education and athletics to see that these skills are acquired. In order to obtain the desired results, activities must be presented which are satisfying, interesting, stimulating, and worth while to the participant. It is admitted that indirect learning through appealing activities is more effective in acquiring desirable patterns of conduct. However, the obvious need for accident prevention makes a special effort in safety education necessary.

Falls account for more than half the home accidental death total. Each year confirms more strongly the fact that this large total is primarily due to lack of knowledge and skill in the prevention of falls and in the method of falling correctly.

These statistics make it evident that everyone, even in ordinary walks of life, needs training and practice in the art of falling correctly. Those who are engaged in sport activities that may be considered potentially

dangerous assuredly need to master skills which can be interpreted as safety skills. Physical education in general can and should meet the need of teaching safety skills. Perhaps gymnastics and particularly tumbling under proper supervision can teach safety skills better than any other sport. An inspired tumbling instructor can teach the art of falling without injury, and can make his program interesting, stimulating, challenging, and extremely worth while. And if a person knows how to fall by breaking the fall, then perhaps a large number of injuries may be prevented.

The Metropolitan Life Insurance company has estimated that there are 300 people each year who meet with death by falling from ladders. The most prevalent reason for these falls is the loss of balance. Since one of the objectives of gymnastics is training in balance both upright and in the inverted position, its merit along such lines are obvious.

Strength with flexibility is another outcome of training in gymnastics.

The individual who has not had the opportunity to gain physical development and control of bodily movements is really at a disadvantage when confronted with an emergency.

In our physical education classes at the University of Illinois there are few accidents. A comprehensive study was made to determine injuries occurring in physical education classes from 1939 to 1944. Only 112 injuries were reported in service classes from September, 1939, to May, 1944. The total number participating in the program was 27,533.1 This low incidence is due to the fact that individuals are taught how to fall correctly; how to maintain proper balance; and, in addition, they acquire strength and endurance as they participate in activities. In such potentially dangerous activities as gymnastics and tumbling, football, basketball, or wrestling, the individual learns how to prevent dangerous falls by using safety devices and learns how to fall without getting hurt. In

gymnastics and tumbling perhaps more is learned about the correct way of falling than in any other sport. If everybody had the opportunity to acquire these fundamentals of safety, a large percentage of accidents in the home and elsewhere would be prevented. Accidental death is almost unnecessary.

May I emphasize that in my opinion, activities which provide the skill and knowledge to save both their own and other people's lives should not be discouraged or discarded because they are potentially dangerous. With proper supervision and teaching the potential danger may be eliminated. By mastering stunts which are considered "potentially dangerous" a fall may result in nothing more serious than a little bump. By learning to give with, rather than to fight, the fall the individual may avoid fractures. By learning to roll with the fall instead of dropping like a dead weight, he may avoid injury. Such safety rules become pronounced assets rather than liabilities to the individual in particular and to society in general.

The answer to the question, "should activities which are valuable for physical development be discarded because they are potentially dangerous?" is definitely "No" for the following important reasons:

1. Individuals should learn how to control their bodies so that they may *and* do the right thing, the saving thing, as it were, in emergency situations.

2. Individuals should learn to become oriented in upside down positions.

3. Learners should understand how to fall properly.

4. Individuals should acquire self-confidence to meet emergency situations.

5. An individual should develop a well balanced physique in order that he may handle his body adequately. In this respect, upper body strength is equally important as leg development.

The foregoing reasons clearly point to the need of gymnastics in general and of tumbling in particular in every physical education program at schools, colleges, clubs, camps, and playgrounds.

The typical physical education program in this country, before the war, had two main deficiencies. First, there was a tendency to sugar-coat activities in a recreational philosophy that stressed fun rather than sound physical, mental, and social training for the developing individual. With proper guidance there is no reason at all why recreation should

not contribute toward:

A. Self-disciplining by the individual.

B. The attainment of sound habits of self control.

C. The requirement of an ideal of physical and mental fitness.

Second, there was a lack of adequately trained gymnastic teachers; a deficiency due to the omission of gymnastic teacher training in teachers colleges.

The ideal physical education program should include professional schools of physical education that train teachers who are capable of promoting the needed gymnastic work in elementary schools, junior high schools, high schools, and colleges. Gymnastics should be one of the outstanding competitive sports in the country as it is enjoyable to the spectator as well as to the participant.

Under proper supervision gymnastics is not hazardous. Statistics show that swimming is the least hazardous, with gymnastics and tumbling next in order.

The well planned physical education program should offer training in six types of activities, namely: 1) aquatic, 2) rhythmic, 3) team, 4) individual, 5) combative, 6) gymnastic and tumbling. If the program of physical education and athletics is to be properly balanced in this way the developing individual is able to cope better with emergencies as they arise.

Swimming, too, is potentially dangerous if not supervised and taught properly. However, everybody should learn to swim and should understand swimming safety rules.

Certainly, football and basketball are potentially dangerous, but proper conditioning and wise coaching will keep injuries at a minimum. Mastery of the art of tumbling enables the player to fall properly.

Many accidents that occur in boating and canoeing may be due to a poor sense of balance. Training in balance then would seem necessary if emergencies both in sport and in work are to be met effectively.

Gymnastics and tumbling must be included in all physical education programs if the individual is to develop properly in both the hang and support position. Too often upper body development is neglected in our physical education and athletic programs where leg development is emphasized. However, the development of the muscles of the upper extremities is beneficial in contact games and in meeting the rigorous bumps received in life. Muscles cushion the effects received from

severe bumps and jolts which might ordinarily result in breakage. Gymnastics has a definite carry-over effect to other activities for it develops strength with flexibility, agility, and the handling of one's weight and balance. The work in the gymnasium should be constantly spotted or guarded.

Safety instruction need not be taught directly as safety education; it is preferred that it be acquired as concomitant learning. Eastwood indicates "indirect safety instruction has proven to be more valuable than direct instruction in reducing the accident rate."

Williams<sup>3</sup> indicates that too much direct emphasis on safety education might tend to develop a timid and safe generation. He further points out that "physical education must not only provide vigorous activities, but it must also promote courageous spirit and attitudes, or this American civilization will not be worth saving."

It must be recognized that physical education activities and athletics at their best contain many hazards, but that much of the beneficial training in these activities is the overcoming of such hazards both physically and emotionally. A program of safety is truly educative. Activities which teach the control

of balance and how to fall properly belong in the school. It requires practice to overcome the dizzy feeling which follows sudden spins, turns and rolls. It requires practice to regain balance when it is lost. Fright and complete loss of body control is overcome and confidence is restored.

I wish to emphasize that it is of paramount importance to include many potentially dangerous activities in the program because their values as future safeguards outweigh the hazards involved in learning them. Physical development is in itself a safety measure for the emergencies of everyday living. Everywhere in this whirling modern world there is potential danger. It is just as illogical to try to prevent people from crossing the street because it is a potentially dangerous undertaking, as it is to eliminate sound physical education activities from the program because the activities are potentially dangerous.

1. R. H. Johnson, "Analyzing Athletic Accidents", *Safety Education*, March 1945, pp. 260, 261, 278.  
2. Eastwood, F. R., "Causes of College Sport Accidents", *Research Quarterly*, Oct., 1934, p. 65.  
3. Williams, J. R., "The Inevitable Necessity", *School and Society*, May 4, 1940, p. 362, 423.

### Prevention of Brain Injuries and Brain Injury Mortality As Related to Football Players

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While the death rate from football injuries is considerably lower than that from hunting, swimming, motoring, and similar pastimes, yet a sufficient number of youths are killed annually in football to warrant our interest and action.

From 1931 through 1946, records of 430 deaths, 285 directly and 147 indirectly, caused by football injuries were collected. Of these fatal injuries, 45.7 per cent were due to skull fractures or brain injuries. Judging all injuries by their mortality rates, those to the head are predominantly the most serious.

From our studies of more than 8,000 cases, we have learned many lessons, indicating how the high mortality rate from these injuries can be reduced.

In order to answer this question, we sought information from football players, coaches, manufacturers of athletic equipment, and from Dr. Charles E. Shannon, for years surgeon to the University of Chicago football team.

Football players seemed to consider the base of the skull and the back of the neck as the most vulnerable spot, always inadequately protected. Some players considered that the present day stiff plastic helmet was largely responsible for injury in this vulnerable spot, stating that the helmet frequently is forcibly shoved back against the base of the skull and the neck during a tough play.

\*HOSPITAL DISCHARGE SYSTEM, Director E. F. Wallace, Welfare Council of New York, 1942.

Equipment manufacturers have sought to develop a helmet that would truly protect the players from head injuries, and we have studied literally dozens of helmets, all testifying to the manufacturers' efforts to solve the problem. In addition, we have studied many other types of protective apparatus made for the protection of the chest, spleen and kidneys, and the bony parts, such as the shoulders, hips and thighs. During the last 25 years, there has been an evolution in equipment from the soft cumbersome padded materials to plastic or other hard nonyielding material sometimes padded and sometimes held in place only by canvas. As we studied the present day equipment, we were impressed with the fact that much of it served better for purposes of offense than for purposes of protection.

Imagine a ten-pound powerful player, covered from head to foot with a hard outer shell, padded on the inside for his protection. His head, with this hard shell, represents a human cannon ball charging into the line. It does not take much stretch of the imagination to understand why the majority of skull fractures-brain injuries occur to defensive players. The manufacturers recognize this danger and agree that much of the equipment is better for offense than for protection but state that such equipment is demanded and has become a recognized part of the game.

Dr. Shannon points out that no football team should be without a doctor, present at practice periods, as well as at all games. Frequent physical examinations and early treatment of injuries are essential. When a player is knocked unconscious, only the immediate attention of a trained physician can prevent the inherent dangers of such an injury.

For example, a player at a recent game was knocked out on the field. The coach and two players half carried, half dragged him to the sideline. He lay on a blanket while a trainer worked over him. At a crucial point in the game this player was sent back into the game. It was evident that he was groggy and he was shortly removed. The minute he returned to the game could very well have been the lull period between the primary and the secondary consciousness of an extradural hemorrhage. Only a trained physician could have recognized this condition and met the potential danger, but none was present.

Coach Clark D. Shaughnessy, with his 40

years of experience, has given us the most enlightening facts concerning the possible etiological factors in head injuries in football players. The fact that Mr. Shaughnessy received the National Safety Council citation in 1945 for his work in prevention of accidents among football players gives weight to his statement, which we quote verbatim: "SITUATIONS ON FOOTBALL PRACTICE AND PLAYING FIELDS IN WHICH MOST HEAD INJURIES OCCUR."

"1. Head-on Tackling: Some coaches teach this form of tackling as the most effective way of bringing the ball carrier to a 'udden' stop, or at least with a minimum of gain. The tackler is taught to aim his head at a point between the pit of the ball carrier's stomach and a little above his knees. It is granted that this is an effective tackle from the standpoint of stopping the ball carrier, but it is dangerous in that two men running at each other, the ball carrier especially at full speed, develop a tremendous momentum. If the ball carrier's knee happens to come in contact with the tackler's head (and the ball carrier to protect himself has the right to bring up his knee to ward off the tackle), there is considerable danger of injury unless a headguard is worn that is capable of almost supernatural protection. This form of tackling should be eliminated.

"2. Frequently when a ball carrier is almost stopped by one tackler who has hold of only one leg, and the ball carrier is still twisting and trying to pull himself loose and is standing rather high, a second tackler running at full speed will hit him from in front with a shoulder or head-on tackle around 'midships' or higher with such force that the ball carrier's head literally will bounce on the ground. If at that particular point the field happens to be hard, or the back of the ball carrier's head comes in contact with something hard and unyielding, such as a stone or improperly covered drain, injury is likely to develop unless the ball carrier is wearing a well fitted, adequately protective headguard.

"3. During scrimmages, occasionally a player's head, not necessarily the ball carrier's or tackler's head, will come in contact with the heel of the shoe of some player who has swung his leg around backward with terrific force (usually accidentally but occasionally intentionally).

"4. Where permission is granted players

to indulge in games or scrimmages or any contact work without head guards, then there is always danger from blows to the head. This should never occur. Players should be forced to 'get used' to the headguards. A player with the confidence of having a 'good' headguard on his head can play better football than if he does not wear such equipment.

#### HEADGUARDS

"1. Headguards should be comfortable. If not, players will discard them entirely or loosen up the straps that hold them in place to ease the discomfort, and then the headguards will slip out of place when subjected to blows.

"2. Headguards should fit tightly and not slip sideways, frontwards or backwards when subjected to blows of any kind.

"3. Inasmuch as the sizes and shapes of heads vary considerably, a headguard that can be adjusted to conform somewhat to variations in the shapes of the head, and also somewhat to slight variations in sizes, is desirable.

"4. At no point should the head ever come in contact with the wall of the headguard. Any blow at any point on the outside of the headguard should be distributed over its entire extent. Material should be used that will withstand any possible blow without denting.

"5. Old headguards that no longer protect adequately should never be used.

"6. Players should be taught to adjust and to keep properly fitted their own headguards.

#### MEDICAL SUPERVISION OF FOOTBALL

"No scrimmage or game should ever be held by a high school, college, or university, or any other organization, without a doctor in attendance. The doctor's decisions about the physical condition and the fitness of players to participate should be absolutely final.

"No boy should ever be allowed to play football until he has been thoroughly examined physically and approved for participation by a competent physician."

Mr. Shaughnessy's statements concerning head-on tackling and other dangerous procedures during play have received, but still warrant, the closest attention of the Rules committee controlling the game of football. Mr. Shaughnessy and other coaches have designed numerous helmets aimed at meeting the qualifications quoted above concern-

ing headguards. Approximately 30 of these modern headguards which were made by various manufacturers were studied. The chief protective principle, common to all these guards, is the hard exterior shell. On the interior of this shell, one finds various types of material—canvas, rubber, etc.—attached to the shell and made to conform to the contours of the head in an effort to hold it snugly in place. The chief aim has been to make the headguard comfortable but not cumbersome.

Much of this material is so thin that a hard blow to the shell must result in bringing it in direct contact with the scalp and underlying skull. Instead of dispersing the force waves throughout the shell, this contact transmits force waves directly against the skull. Such a helmet may protect the skull against a direct fracture, but it does not protect the underlying brain from a direct injury or contrecoup injury opposite the point of contact.

In some helmets even a light blow to the shell seems to give an impact of force to the base of the skull and the neck. It is conceivable that a severe blow to these helmet shells could result in a brain concussion, a severe shaking up of the brain, a *commotio cerebri*, without any sign of injury to the head.

Unfortunately, the meager statistics thus far gathered do not give detailed autopsy findings concerning the location of the injury to the brain or the nature and site of the hemorrhage so often reported as cerebral. Is the latter extradural, subdural, or does the force to the vault cause a contrecoup tearing of the small blood vessels about the base of the brain?

Even when the material inside the hard exterior shell of the headguard is sufficiently thick to prevent direct contact with the skull, it is possible that the force waves in the shell are directed toward its periphery. In addition, the headguard may be shoved forcibly backward. Thus, the combination of these two forces centering at the junction of the skull and the neck may result in a hemorrhage at the base of the skull or a contusion to the brain stem.

Contusion could result in minute oozing of blood and gradual development of edema which finally reaches the point of compression of the brain stem. The vital centers, which control the heart, the respiratory mechanism, body temperature, etc., located

in the brain stem, suddenly fall from this gradually developing compression and sudden death ensues.

From our studies thus far of these headguards, it is apparent that those which have a foundation made of canvas or leather, similar to a bandage and adjustable to fit the contours of the individual player's head, with a snugly fitting chin strap and occipital wrap, and with a crisscross of canvas straps conforming to the front, top and back of the head, all attached to the fiber or plastic shell in such a manner as to prevent at all times contact of the latter with the canvas cap, scalp, and skull, is a fundamental principle of protection.

The fact remains, however, that the force waves transmitted to the periphery of the shell are carried through the bandage and across the canvas straps forming the cap over the head and thus can give a terrific jar to the brain or a contrecoup injury to the base of the skull or neck.

It would seem that a better cushion type of padding of spongy rubber of a thickness of up to at least one inch attached to the inside of any foundation meeting this principle would further prevent direct contact with the skull and would disperse force waves to a marked degree.

Those helmets which have a canvas, leather or rubber padding, regardless of their thickness, attached directly to the fiber or plastic shell, furnish less protection to severe jarring, shaking up or contrecoup injury to the brain than do those with an air space between the foundation cap and the shell. A force sufficient to break the chinstrap or a chinstrap loosened by the player for comfort, may cause a hard shell to be forcibly shoved back against the vulnerable spot at the base of the skull and neck. It would seem, therefore, that a thick, soft spongy rubber along this posterior margin of the shell might disperse these direct force waves to the point of preventing many injuries to this portion of the anatomy.

Finally, since the exterior of the headguard must be so hard "as to prevent denting," it is evident that it at once becomes an offensive menace to the player struck forcibly by this hard material.

In our opinion, these shells, including the headguard, must be covered by a thick spongy rubber or other material to prevent their becoming offensive weapons. It is possible that some material thick enough, but light enough not to be cumbersome, might

be made into protectors of the bony parts.

A volunteer physician who is present only at regular games is better than no physician, but does not meet the situation. The college physician is usually thoroughly trained in making the necessary physical examinations but lacks experience in meeting trauma problems which develop in contact play.

The football surgeon must be adamant in his decisions. The protection of the life and limbs of the players must be his primary thought—the winning of the contest is a secondary matter.

Many high schools and colleges carry accident insurance for their players, such insurance covering medical care. In spite of this, many of the schools have volunteer physicians who give their services free because of their interest in the game. In our opinion, there are plenty of good insurance companies who would find it to their interest to pay part or all of a surgeon's expenses in order to have him present whenever practice or regular games are played. For further protection, this surgeon, not the coach, should have the final word as to a player's fitness to play.

According to H. V. Porter, executive secretary of State High School Athletic associations, many of the football players who have died were, apparently, only slightly injured, often showing no injury about the head; yet several hours later they complained of dizziness or of severe headaches—or suddenly became unconscious and died within a few minutes to a few hours. The cause of death, as given by the doctor or coroner, was usually "cerebral hemorrhage." He stated that in football parlance these were often referred to as "mystery deaths."

A summary of a few of these deaths among high school football players during the 1946 season illustrates what is meant by "mystery deaths":

1. "J. T., injured in a six-man practice game. The boy tackled an opponent and, in the next huddle, complained of feeling dizzy. He was walked to the sidelines and collapsed at the bench. He did not regain consciousness. Death was due to 'cerebral hemorrhage.' There were no marks on head or body."

2. "L. J., 15 years old and a freshman, tackled an opponent rather high. It was assumed that he hit his head on his opponent's knee or heel. Helmet in good condition. Cause of death 'compound fracture and brain hemorrhage.' The nature of the

hemorrhage suggested the possibility of an earlier injury aggravated by the final injury."

2. "W. S., injured during a line charge while playing defensive tackle. He remained on the sideline and accompanied the team to the dressing room after the game and then drove seven miles to his home, ate a heavy meal and afterwards complained of a headache. During the night he suddenly became unconscious and died. Cause of death 'cerebral hemorrhage.'"

4. "H. F., 17, was carrying a ball and was tackled. He met his opponent head-on. The boy's equipment was in good condition. Cause of death 'brain injury.' In order to show the value of more explicit information concerning these deaths, we corresponded with the surgeon who attended this patient. From him it was ascertained that H. F., while playing football the year before, had a head injury and was unconscious for a short period. It was thought then that he had a small cerebral hemorrhage, but in several days he recovered perfectly. The final injury followed a very hard tackle. He was unconscious on the football field and was taken directly to a hospital (how he was carried from the field and how he was transported to the hospital was not stated).

"There was no evidence of skull fracture as shown by the X-ray films. There was no autopsy done, but Dr. Herman, the neurological surgeon from Oklahoma City, explored by open operation and found a branch of the meningeal artery was ruptured." (extradural). "There was considerable blood below the dura." (subdural).

This case raises the question of whether any player who has sustained a severe head injury should ever be allowed to play football again.

5. "J. C., a 17-year-old senior, was six feet in height and weighed 180 pounds. During practice scrimmage he was carrying the ball when he was tackled, and since he was slow in getting up, the coach examined him to see if he had been hurt. The boy indicated he was not hurt, but after practice session he complained of being ill. While being taken to the hospital, two and one-half hours after practice, he died. There were no skull fracture and no marks or blows. Equipment was in good condition. Cause of death was given as cerebral hemorrhage."

Here a trained physician, more interested

in the players than in the game, would have recognized the potential danger in this injury and would have placed the boy under immediate observation, certainly before death occurred. If there were focal signs indicating the location of the hemorrhage, most probably extradural or subdural, an immediate operation might have saved him.

6. "J. J., a senior was injured in a practice scrimmage September 29. In an off tackle play he tackled an opponent. He acted as if the wind were knocked out of him. He continued to watch the remainder of the scrimmage from the bench. The injury did not appear to be serious and he walked off the field and drove home. During the evening he was visiting a girl friend when he developed a fainting spell. Four days later he was taken to the hospital where an operation showed the kidney had been punctured in two spots. The X-ray did not show any rib fracture. During the operation the kidney was removed. The boy died on September 30th."

While this is not a head injury case, yet in our practice we have seen many associated internal injuries overlooked because the surgeon's attention was directed completely to the head injury. The signs of internal injury are frequently disguised by the unconsciousness and other symptoms of head injury. Further, this case illustrates the lack of adequate medical attention even four days following this boy's injury. It would seem that any enlightened school would have followed up such a case and would have secured adequate surgical attention before it was too late to be of help.

To the surgeon there is no mystery connected with these "mystery deaths." Education of the coaches, of all connected with the athletic departments, of the school authorities and of the players and parents, should go far to remove the mystery of such deaths from their midsts.

From the standpoint of educating the layman concerning the mystery of these deaths and concerning some of the common facts associated with brain injuries, we wish to emphasize some of the facts and common sense principles which have played such a material part in the reduction of brain injury mortality rates.

The heroic spectacle of a dazed or knocked out player being half dragged, half walked from the field to a blanket at the sidelines, and later being clumsily carried by fellow

players to the locker room, has thrilled the cheering audience but has done irreparable damage to certain of these victims. Only within the last two or three years have stretchers and trained stretcher bearers been seen at football games, and then only in very few instances. Transporting players to the hospital in an ambulance has not been as convenient as transporting them in the nearby automobile and, furthermore, stretchers and ambulances give the game a bad name. The need for expert stretcher and ambulance service for a seriously injured football player is apparent.

The X-ray was discovered just before the turn of the century. Its ability to show a skull fracture was lauded by surgeons as a great advance. In 1896, when the first skull fracture was demonstrated by X-ray in Philadelphia. Thereafter, a serious head injury, regardless of the condition of the patient, was immediately X-rayed.

Many hospitals have placed their X-ray departments next to the emergency admission room in order that an X-ray might be made before the patient was put to bed and treatment started. When the X-ray showed a depressed skull fracture or a bursting type of fracture, immediate operation seemed indicated and was advocated by many a good surgeon. Surgery within the first few hours after admission became the vogue.

Operations on skull fracture-brain injuries mounted to 25 and 30 per cent in 1900 to 1910. Today less than 10 per cent of these injuries are operated. It is now apparent that common sense measures directed toward preserving the patient's life are far more important than the early X-ray and operation.

Many an early X-ray today is made because the victim's relatives, an insurance company, or a lawyer demands "What does the X-ray show? Is a skull fracture present?"

We may draw the following conclusions from what has been said: x-ray every head injury which is the result of sufficient trauma to cause a cranio-cerebral injury. Don't x-ray in the presence of severe shock. Don't x-ray in the presence of wild delirium. Use portable x-ray if necessary, but if negative verify in x-ray lab. later. Remember no early x-ray in skull fractures ever helped save a life.

In studying the records of the deaths of football players, it was found that an x-ray usually had been made of patients who died within the first 24 hours after the injury. Walking or half carried to the sidelines from

the field, later walking to the dressing room, driving home, collapsing and being taken to the hospital, there being moved and turned in four directions to secure an x-ray, all before the patient died, bespeak neglect of the common sense measures which have played such a big part in reducing brain injury mortality rates.

No coach can be trained to recognize the early signs of a serious brain injury. Every practice scrimmage and every game carries the potential danger of a brain injury to some player. To prevent these "mystery deaths" a trained physician should be present.

In a few instances, early operation is absolutely life saving, but these instances are very rare, and the experienced physician will know when operation is indicated and will see that it is expertly performed.

Applying all we have said to football players and to the administrative staffs of football organizations, the following points must now be emphasized:

1. Any head injury that causes a victim to have momentary unconsciousness, to be dazed or mentally disturbed, or to have any other type of disturbed consciousness, is sufficiently serious to warrant immediate examination by a physician and continued close observation, preferably in a hospital, until satisfied that no serious brain injury occurred.

2. An average of nine football players died each year since 1931 from skull fracture-brain injury conditions. If football is to continue to be played, even these small numbers warrant the presence or availability of a physician at every football game—practice or otherwise.

3. Public opinion must be aroused, not necessarily against the game, but against the schools that fail to provide every facility for the preservation of life in every injured football player, as well as for the prevention of any permanent disabilities from such injuries.

4. Given the presence of a physician at every game, this same public opinion will prevent him from treating casually every "knocked out" player. The physician will hesitate to say "The wind was just knocked out of him."

5. Stretchers must be made available for every football game. A slight subdural or extradural hemorrhage occurring away from the vital centers may stop oozing and may never cause any threat to life if the pa-

tient is immediately placed in a recumbent position and further exertion, such as walking or being dragged from the field, driven home in an automobile, unduly moved for X-rays, or otherwise carelessly handled, is prevented. Many a small vertebral fracture or partial dislocation of the neck may never cause any serious damage to the cord if the patient is kept quiet from the first instant of injury.

The above mentioned exertions or careless handling can make the fracture worse or further dislocate the vertebra, which is chiefly responsible for the subsequently damaged cord and complete paralysis that may cause a life of helplessness even worse than death. The small tears or punctures of organs in the so-called internal injuries may subside if the patient is kept absolutely quiet, whereas exertion may cause continued and fatal hemorrhage from these injuries.

6. Absolute rest in bed, avoidance of damage by further exertions and close observation by a trained physician will reduce not only those "mystery deaths" to a minimum but will prevent many a permanent disability.

The death of statistics based upon a careful analysis of facts relative to every death from football is appalling. Cooperation between medicine, safety law enforcement and education in examining every contest but is needed to make a real permanent stop

against the hazards of the game.

Speaking from the standpoint of medicine, every football fatality should be followed by a careful autopsy with a very detailed report of the site and exact nature of the injury. Such general statements as "cerebral hemorrhage," "spinal injury," or "internal injury" are not sufficiently informative as to aid in a prevention fight.

If, in the case of head injury, autopsy reports should reveal that most of the cerebral hemorrhages were at the base of the brain, involving perhaps the numerous blood vessels making up the circle of Willis, then the vulnerable spot in each player would be the base of the skull where it joins that of the spinal column. Further study might reveal that the present hard, plastic headgear is the activating force at this vulnerable spot or enhances the danger of injury by concussion—the force waves centering at a spot in the skull or brain directly opposite the site of the blow.

The pathology responsible for deaths, as revealed by these autopsies, combined with a careful analysis of the type of equipment, the nature of the play that caused the accident, the condition of the player at the time of injury, his immediate care on the field, his transportation from the field, whether taken home or to a hospital, and the adequacy of the medical or surgical treatment rendered, all would furnish the basis for study of methods of prevention of football fatalities.

#### WEDNESDAY AFTERNOON SESSION

October 2, 1947

#### General Session

Presiding: President GORDON, Asst. Secy., Minneapolis Public Schools

#### Critical Evaluation of Safety Stunts and Features

By NELS ANDERSON

Supervisor, Section on Safety Education, Division of Instruction,  
Pittsburgh Public Schools

School systems are confronted with both suggestions and demands from many outside organizations that safety and other types of education be promoted through the use of various stunts and features. There is hardly a recognized safety organization in the coun-

try but that insists upon conducting a school program, and we can add rightfully insist. Coupled with the demands and suggestions to schools from such legitimate organizations, come offerings and enterprising wagers of countless other groups, seeking publicity by riding

the coattails of the safety movement. In the end result, the school is confronted with continuous pressure to sponsor safety projects. In self-defense, the school must evaluate these demands.

There are three major ways in which we can generally evaluate the desirability of so-called stunts and features, regardless of the educational area involved:

1. Is the end desired a proper one?  
2. Is the project in good taste; does it gain in value from its sponsor's identity?

3. Is the project educationally sound?  
In applying the first test—the desirability of the end result—to a safety stunt or feature, we cannot well quarrel that conservation of life and property are desirable objectives of school and society. The point is, however, that the same educational techniques can be used to teach the good or the bad—thrift or honesty, for example.

In connection with the second test—the nature of the sponsor—the fact that a stunt or feature has a sponsor does not per se make the project either good or bad. In fact a project sometimes gains better by its sponsorship, as in the case of the Carnegie Hero award. The test is: does the project gain value from its sponsor's identity, or is an organization publicized at the expense of good education?

I might give a practical example. Not long ago a soft drink manufacturer offered to provide metal effigies of a child, to place in the yards on the approaches to schools. The child on the effigy would hold a soft drink bottle with the sponsor's name shown on the bottle. Whenever one falling in yard to destroy children so early warning he advertising due to this proposal so it objectionable.

There are many organizations with national interest in safety with which the school can and should properly co-operate, both as a source of good community relations and as a means of better understanding of adult life. Among these are municipal police and fire departments, traffic commissions, safety councils, the Red Cross and similar groups. Other classification of organizations having community responsibilities or quasi-community service objectives and with which the school frequently and in good taste can co-operate are the newspapers, radio stations, service clubs, men's clubs, chambers of commerce and the like. A third group, having commercial safety interest, may occasionally be proper to work with—insurance companies,

automobile manufacturers and the like. Regardless of the sponsor, however, all stunts and features must meet the outlined tests.

The final test is perhaps the most important one—is the stunt or feature educationally sound? Does it advance learning? Does it benefit the whole child? Is it a valuable addition to existing education in the area concerned? Is it in proper perspective to the whole educational program?

With these tests in mind, let us consider various stunts and features that are proposed to schools. These ideas have the common characteristics of differing from the ordinary school routine, of being attention getting, of short duration, often involving a schedule of prizes, and invariably serving to publicize an organization or an individual.

Perhaps the most common stunt or feature is the contest—be it essay, poster, slogan, song or other variation. Writing under the title "Non-Allergic Contests" in *Safety Education Magazine* for November last year, Gordon Graham of Detroit notes that "many school systems have explicitly prohibited participation in all contests on the basis that they are wasteful of educational time and effort." Contests generally call for the performance of some specialized ability and are of interest and consequently educational value to the favored few. Most school officials see red when the word contest is mentioned. They engage in contests under protest.

The ordinary run-of-mine "write 100 words and win a new car" type of contest is educationally poor and has no place in the school. It is sometimes possible, however, to surround the motive of competition with sufficient safeguards so make it palatable to the school on a trial basis. Gordon Graham's article, previously referred to, outlines year-round safety effort by schools, with a carefully developed scoring schedule, as acceptable.

A somewhat similar project was conducted in Pittsburgh schools under the auspices of the Better Traffic committee about 10 years ago. Safety programs in the schools were evaluated over a semester along the lines of the National Traffic Safety contest. All schools reaching a reasonable level of attainment were presented materials for their school libraries. A follow-up was made in analyzing the questionnaires and reprinting interesting projects for the information of all schools.

I hesitate to give contest criteria, because contests so frequently represent poor planning. So popular is the contest media, how-

ever, that some suggestions may salvage a contest that otherwise would meet opposition, antagonism and poor participation. Individual prizes should be avoided unless the contest is designed to interest and encourage the gifted few; the contest should operate over a long period rather than a short one; all pupils, or better all classes and schools, should participate on an equitable basis; learning and classroom materials should be furnished pupils and guides should be furnished teachers; all types of safety education measures should be encouraged rather than asking for a single item, such as an essay or pledge; and, finally, rules should be drafted and approved by a committee of teachers.

To summarize contests: schools don't like them and feel that even if a drive or special emphasis is necessary, better mass education is possible in other ways.

There are many other projects, stunts and features. To name a few we have check lists, special weeks and days, parades, meetings, camps, inspections, puppet shows, outside speakers, exhibits, etc. All such ideas can be good or bad, depending upon their educational use.

Rather than discuss these many stunts and features in detail, let us rather consider a plan for bringing the school and the safety organization together, both working toward the safety educational advancement of the child.

Consider the safety organization. It is charged with or has assumed a responsibility to reduce the community's accident toll. It is manned by laymen and promoters. It gains its funds by subscription and popular appeal. Publicity is its lifeline to continuance in the public and school safety fields.

And now consider the school. It is charged with preparing pupils to live successfully in a democratic society. Safety education is but one of its many subsidiary aims. Its personnel consists of teachers.

Differing as they may in function and organization, both the school and the safety group are interested in the child. Shouldn't this be their co-operative goal, then—the good of the child?

The safety organization should meet with and consult with the school with the point of view "what can we do to help you?" rather than that of "this is our program; you carry it out." The matter of credit is of secondary importance and, as a matter of fact, credit and publicity will follow the dollar like the

dollar follows the flag.

The school, too, faces a responsibility of working with the safety organization. Through personal contacts, through membership on committees, the school should acquaint itself with community safety agencies, let them know its program and aims and problems, and be not afraid to ask for help.

If schools had taken this initiative years ago, we would not have the present complaints of contests and stunts and features. It is will to mention here the dilemma in many communities where a number of organizations, all of them reputable, seek to compete in safety for sponsorship of school projects. One solution to this problem is the development of a working arrangement through the years; another is to form a community-wide child safety committee.

When the school and the safety organizations are brought together at the conference table, the good of the child becomes the sole issue. There are many items for mutual consideration. We want to know, for example, is there a need to do more than we already are doing? Is it continuing stress or a drive that is desirable? What is the school doing now? What would it like to do that the safety organization can help make possible? And we, also, can mention, if the school refuses to face its community accident challenge, what should the safety organization do to stir the school to action?

If, out of the discussion, the need for increased safety emphasis is apparent, the discussion enters the planning stage of what and when and how, and the thousand and one safety stunts and features can be considered.

A few safeguards were mentioned in connection with contests. Additional considerations might include the following, although the list is by no means all-inclusive:

1. Accident reduction is not an overnight affair; it results from continuing rather than sporadic education.
2. Point the project to a specific need, as the bicycle problem in the fourth grade.
3. Follow the school's routine as closely as possible, without interruption of the day-to-day program. For example, encourage home safety activities at the time of year suiting the school, not during the third week of an arbitrary no-schedule month.
4. Provide safety materials for teacher and pupil use.
5. Place emphasis on programs rather than on projects or stunts. To print a course of

study that the school prepares is better education than to reprint prize-winning essays.

6. Except in unusual situations, don't force the hand of the school. Let the superintendent have the veto power.

7. If possible, test the project in a small way. At the very least have experienced teachers evaluate the idea and develop rules and regulations.

8. Be wary of prize awards. School or class-

room recognition is preferable to individual awards. The best policy is to have awards within the reach of all and to recognize all reasonable effort. As a corollary, avoid contests.

9. Have preparation and follow-up to all projects. Good education is like good grass. The soil must be prepared and sown and mowed and watered and fertilized and weeded. A momentary tonic will not produce a lasting stand of good turf.

#### THURSDAY MORNING SESSION

October 9, 1947

#### Group Meeting on Secondary Schools

Presiding: ROY C. BRYAN, Principal, Western State High School, Western Michigan College of Education; Chairman, Secondary School Committee, N.S.C.

#### Overcoming Obstacles to Safety Education National Safety Congress

By PERRY I. SANDELL

Supervisor of Health, Physical Education, Safety and Recreation,  
Department of Education, St. Paul, Minn.

Leading educators have recognized for a good many years that the teaching of safe living has an essential place in the curriculum. Like anything new, however, safety education has been slow to find itself in our schools. The need for safety is so apparent that it seems unnecessary that any justification be given for its inclusion in the curriculum.

If the need is so apparent and if educators recognize this need as they must, what then are the obstacles in the way of more effective training in safety?

Although safety is a condition which affects every individual of every family, every family of every community, and every community of the nation, safety still has not been recognized by society in general as an important force in prolonging and enriching life. This means that there must be a concerted, co-ordinated, effort to educate every individual, capable of education, to the importance of safety habits and attitudes in making the home and community free from "booby traps," mental and physical, that will cripple, maim and kill. Each individual must be made to develop the

sense of social responsibility which must be his if safety is to become a fact rather than a myth. If and when this final obstacle of individual lethargy is overcome, then all others will cease to exist.

A second problem or obstacle in the way of safety education is that of bringing together and co-ordinating the efforts of all organizations that are actively engaged in any phase of the safety program. Much duplicity of effort exists resulting in an enormous waste of money and energy. It is encouraging to note that the seriousness of this situation is gradually decreasing because of the splendid work of agencies authorized in the safety movement. The direction given is the greatest contribution toward the development of united action. An effective co-ordination of all agencies, public and private, official and nonofficial, is not only desirable but an absolute necessity if objectives are to be achieved.

Another serious handicap to the development of safety education from the state level is the lack of personnel in the state departments of education to adequately assist and

supervise schools in initiating and expanding their programs. In some states, safety education, in one or more of its aspects, has been made mandatory through legislation. In such instances a staff member may be provided in the department of education. Compulsory safety education in the schools, however, is not common, and very few states have a director of safety in the department of education. Whatever is done in this area is ordinarily delegated to some member of the staff who already has more than he can effectively accomplish. This situation will not be remedied until sufficient appropriations are made available to each state department of education so that the total function of education, as we recognize it, can be realized.

Education, during the war and since, has suffered immeasurably from the lack of qualified teachers in many of the subject matter fields. Schools have seen the results of this and are greatly concerned. Efforts are being made to encourage boys and girls from the upper 25 per cent of the high school graduating classes to make education their career. If trained teachers are essential in other areas of learning, it is logical to assume that the same is true in the field of safety. Still the number of teachers in our schools today, with any preparation in safety, is negligible. Specialists are needed in safety education as well, but the great need is for teachers in every field who have had a background in the rudiments of safety education.

Safety cannot be taught in the traditional textbook manner one or two years during the elementary school years and one year in the junior high school program. The development of habits, attitudes, skills and knowledge in safety, results only from a continuous presentation of experiences which will result in behavior changes in the individual. Why then are not our colleges and universities preparing teachers in safety? I have asked this question of several college officials. The answers given have all been very similar. First, adding something new to a college curriculum is a slow process. Secondly, there has been no demand on the part of school administrators for teachers with this special training. Why, you might ask, is there no demand for teachers who have had a background of training in safety education? Apparently the reason is that school administrators feel that sufficient emphasis is being placed on safety in the schools, and that it

is unnecessary that teachers have additional work in this field. The feeling exists that accidents are the price we must pay for the advantages and benefits of our many modern conveniences, and there is nothing that can be done about it. We must at all times, however, keep in mind that all accidents do not just happen; they are caused.

One of the difficulties which has been encountered is that of finding a place for instruction in safety in the elementary and secondary curriculum. There have been many discussions centered around the problem of whether safety should be taught as a specific course just as is English, mathematics, etc. should it be treated incidentally in the various subjects, or should it be taught as a separate unit in the several subject matter areas? Teachers, generally, believe that incidental teaching is entirely unsatisfactory, and that safety should be taught as a separate field or as separate units in the various fields. The answer, of course, is one which the local administrator must work out for his own situation. Recommendations are, however, that one of the latter two alternatives should be used.

In conclusion: I wish to turn again to the 1940 yearbook of the American Association of School Administrators. The suggestions concerning safety education, developed by the committee, if given careful consideration would do much to solve many of the difficulties which exist in the whole program of safety education. The suggestions are as follows:

1. Experience shows that many accidents are preventable through a program of education.
2. Instruction in safety is an essential part of the modern schools' program of producing good citizens.
3. The determination of the character and extent of the school safety program and the selection of teaching methods to be used are professional responsibilities of educators.
4. Rural schools operating under numerous conditions specifically different from those of urban schools should make an effort to adjust their safety programs to the special conditions of their environment.
5. Safety education for adults is a primary responsibility of the community and the state.
6. In each community it is the responsibility of the board of education and its executive staff to build and maintain school buildings which are safe.

7. Responsibility for areas of safety education not designated specifically by law should be assigned by agreement to the agencies most competent to achieve the desired goal.

8. Teaching the youth to be safe and intelligent operators of motor cars is a responsibility of the community.

9. The school has a responsibility for systematic instruction in all aspects of safety.

10. School systems embracing several schools should organize safety co-ordinating agencies.

11. A formal or informal safety council or committee, or other liaison among safety agencies, should be established in every community.

12. In their effort to advance the safety movement, educators should recognize the need for appraisal and research.

13. It is remarkable how much can be accomplished if no one is too anxious about who receives credit.

14. Effective programs of safety education should be adequately financed.

15. The time has come for educators to prepare themselves for leadership in safety education.

These statements, although submitted in 1940, have not outlived their usefulness, and if these suggestions would form the core around which to build better safety education programs and a safer world would emerge.

### Overcoming the Obstacles to the Introduction of Safety Education in a School System

By HERBERT E. MOREY

Supervisor, Health and Safety Education, Curriculum Div., Los Angeles City Board of Education

An inherent trait in mankind seems to be the desire to save something or somebody. Some people save junk, others money, some save souls, and some just save lives. Therefore, we have antique dealers, bankers, missionaries, and the National Safety Congress.

There might be some question as to which is the hardest to save. If you are looking for Chinese pottery of the Ming dynasty, no doubt you will argue for antiques; in my own case, I've found the elusive dollar very difficult to accumulate; missionaries work hard at their jobs and the result is usually discouraging. I suppose the hardest thing to save, though, is lives—human lives. The difficulty is that we must save man from himself.

Man spends his life inventing new devices and gadgets with which to kill himself. He fights any attempt to make the world a safer place in which to live. He puts every imaginable obstacle in the way of any safety program. And he continues his depletion by violence at an alarming rate. Of course, man doesn't do all of this intentionally. He doesn't mean to kill or maim. That is just the result of a hurry-up program which man hasn't learned to control. The victims, however, are just as dead or maimed as though man had thoroughly organized the forces for destruction.

The only way to save man from himself is by means of education. The educational program must go much further than the school. It must include the home and industry, and it must be carefully planned and be continuous. It should be carried on intelligently in the home long before the child enters school. The schools and the parents must work together with no relaxation, from the first day of enrollment until the child is graduated or leaves school. Then, as he goes to work, industry must protect itself by never relaxing in its program to save man from himself.

It is during school that the child develops attitudes and habits that will remain a part of his personality for the rest of his life. Thus, if the schools are to turn out citizens properly equipped to meet the needs of life, it is imperative that the program be carefully planned with an eye to the most common safety needs of the individual.

There are many obstacles to a desirable safety program in a school system. Before a satisfactory program can be inaugurated, some or all of these obstructions must be overcome. While it is unlikely that any school system will ever overcome all of them,



it is essential that as many as possible be cleared out of the way. The administrator or supervisor charged with setting up a program will find the overcoming of obstacles his most important and most difficult task. Many of the obstacles have been discussed before but let us look at them briefly from the viewpoint of a school system.

The obstacles seem to fall neatly into two groups, those of inertia and those of administration. Inertia, or the inability to start the ball rolling, is usually caused by apathy on the part of any or all of the persons or organizations that are vitally involved. Inertia is the greatest stumbling block in the way of a successful program and is the hardest of all obstacles to remove. There is some way around every other problem, if all parties involved really want to solve it, but the one necessary ingredient to solution is the desire to reach a solution. Thus, apathy on the part of the community, the city government, the board of education, the administration, the faculty, or the pupils will seriously handicap any program.

The desire to overcome inertia may originate from any source within the community. Too often the parents have to build a fire under the principal, superintendent, or board of education. Many different methods have been used to accomplish this. Radio commentators and newspaper editors have been extremely successful in pointing out to school authorities the wishes of the community. Service clubs often arouse the interest of lagging administrators and originate very constructive programs. One large service club has taken an active interest in driver education and training and has been instrumental in introducing it in many schools. Through their efforts in one California city, four dual control cars were presented to the local high school by the four automobile dealers in the community.

The school authorities are not always the ones guilty of inertia. In many systems, the schools want to install an adequate safety program but they are blocked by the members of the community. Usually cost is the factor involved. Here the problem is to overcome the apathy of the taxpayers. Again, the service clubs and local organizations may help. This time a community educational program is needed. Successful work in this direction is often accomplished through the pupils. We find that the most successful method of getting at the parents is through

their children. We are experimenting in our elementary schools with a series of safety check lists that the pupil and parent fill out together following a lesson in the classroom.

After inertia has been sufficiently overcome to get into the planning stage, all kinds of administrative hurdles lie in the way. The most common difficulties with which we have been confronted in our school system have been the cost of the program, finding a place in the curriculum, teacher load, and lack of properly trained personnel.

There are several ways in which the problem of cost may be met. In most systems it is just a question of selling the school authorities and the taxpayers on the importance of the program. If they are convinced that it is necessary and the money is available, they will usually pay the bill. Where they cannot be sufficiently sold on the importance of the program or where there just isn't the money to spend, many systems are accepting help from outside. Materials and equipment may be donated or loaned by local business firms and money may be subscribed by clubs or organizations. In one of our schools where we are using one of the cars loaned by the American Automobile Association and the manufacturer, the local dealer has offered to service the car at no cost to the school.

The problem of finding a place in the curriculum has been a hard one in our system. With a program already heavily overloaded by state and local requirements, principals are reluctant to add anything new. Our answer has been to ask for as few new courses as possible and to encourage adding safety units to other courses. We have been quite successful in getting safety added to senior problems, social studies, and science, as well as the old faithfuls, homemaking, physical education, and shop. Where we have tried to set up special classes, as in driver education and training, principals have been reluctant to crowd in one more course. Community pressure seems to be the answer.

Teacher load is an excuse that is frequently used by disinterested principals. Again it is mainly a case of the principal deciding which part of the program is most important. We have found the teachers to be the easiest personnel to sell on a safety program. They are quick to sense the value of their contribution and usually will give generously of their time and effort. In one of our schools the question came up as to what would be done with the driver education and

training class while the teacher was on the road in the dual control car. There were no study halls to take care of the students who were not in the car and the principal was about to drop the entire plan. Six teachers came forward with offers to teach driver education during their free periods. In order to qualify themselves, all six attended a summer workshop.

We have experienced little difficulty in securing properly trained personnel in the field of safety. As part of our in-service training program, we regularly run safety conferences and workshops and they are always well attended. Last summer, the Los Angeles city schools and the Los Angeles county schools joined efforts and conducted a 40-hour workshop in driver education and training. Even though none of the teachers received any compensation, more than 60 attended.

The problem of actually building the program is not to be overlooked. If it is to fulfill the needs of the community, representatives of the community should participate in the planning. Every one of our 400 principals is encouraged to work closely with his community and we wouldn't think of starting a project without having representatives from interested groups sit in as an advisory committee. Recently when we wanted to start a "firearm" program, we called together representatives from 11 interested organizations. Not only do the civic leaders know what is needed in the community but they represent the people who pay the bill. Their stamp of approval will draw a large following. President Truman, by endorsing the Highway Safety Conference, assured nationwide backing.

No school system can afford to overlook the co-operation of local organizations. Parent-Teacher Associations, church groups, Boy Scouts and Girl Scouts, American Legion, National Safety Council, American Red Cross and service clubs have contributed invaluable service to our program. Recently, when we were faced with the problem of selling to parents the idea that getting their children safely to and from school was a parental as well as a school responsibility, the district safety chairman of the Parent-Teacher Association stepped forward with the suggestion that she conduct a campaign among the parents. Our county council of the American Legion has just completed a back-to-school safety program in which the Legion, the

schools, the local police department, the National Safety Council, and many other interested organizations of Los Angeles County worked side by side in a very successful program that stressed the safety of school children.

Through the co-operation of these organizations and the local newspapers, radio stations, and other advertising media, the program was beamed to the parents, the motorists, and the children themselves. Several of our local service clubs have shown more than passing interest in driver education and training and we are hopeful of securing some constructive aid from them.

It is imperative that the schools work closely with other governmental departments. The police department, the fire department, the city engineer, the state motor vehicle department, and the state highway patrol are all usually glad to help. At least they will be glad to offer free advice. Accept it and then put them to work. Once you get them working you have them on your side.

It is necessary to be wary of over-enthusiastic organizations. While we have found these organizations helpful in most cases, much of our time has had to be spent in directing their enthusiasm into constructive channels. Recently an over-zealous committee nearly put our driver education and training program on the rocks. In a very determined manner, they set out to force a class into a school where the principal was already planning to start one the following semester. The trouble was that they wanted it to start immediately without waiting for the new term.

There was no qualified instructor nor car available, but they wanted it right then and there. An attempt to start a student strike failed, and the unpleasant manner of the members of this organization alienated several of our board of education members. Although the course is now installed and running smoothly, we still haven't overcome the setback.

Last spring several representatives of a large and influential organization called on us. They had heard that the schools were doing nothing about safety and had decided to set up a driver education program for us. We suggested that they investigate the present program and then determine where they could help. They thought that was a good idea and the investigation amazed them. They still haven't come forth with any help but we have hope.

Frequently we are placed in the embarrassing position of having to turn down, for use in our schools, materials that present a negative approach or are otherwise unsuitable for school use. We are still trying to educate our friends and would-be helpers to take us into their confidence from the beginning. How many headaches we could save if we planned with them instead of having to say "No" after the material is printed!

An important part of a school program is that of evaluating it and keeping all participants, from the members of the community to the pupils themselves, properly informed. Methods by which programs may be evaluated may be established by the same group that helped plan for the program. Of course, the main yardstick by which its success can be measured is the degree to which accidents have been controlled. In determining this, the growth of the community and increased hazards must be taken into consideration.

Citizens of our system were quite interested recently to find out that although the population of Los Angeles has more than tripled during the last 25 years and numbers of school children and motor vehicles, as well as traffic deaths, have increased proportionately, pedestrian traffic deaths among school children have decreased. The use of radio programs, newspapers and motion pictures

should not be overlooked in keeping the public informed about the results of the local program.

In the space allotted it has been impossible to discuss all of the methods of overcoming all obstacles, but through education of the members of the community and through cooperation of the educators and parents, most problems can be worked out to the advantage of society.

We, as educators, must realize that we are training future citizens for the environment in which they will be placed. The desire for the type of program we will introduce must come from the students and parents. Often they are ahead of the schools and it is our responsibility to bring our school people up to the standards desired by the public. On the other hand, we of the schools cannot shoot off on our own. Sometimes we may recognize a need before the public does. In that case it is our responsibility to see that the seed is planted in fertile territory. At any rate, the program must evolve from the needs of society and to serve a democratic society it must be kept democratic.

Only by the combined efforts of the citizens of the community and their representatives in the schools can we produce a safety education program that will save man from himself.

#### THURSDAY MORNING SESSION

October 9, 1947

#### Group Consultation on Safety Education in the Elementary School Conducted by the Elementary School Committee, N.S.C.

*Presiding:* MARY MAY WYMAN, Supvr., Safety & Special Education, Public Schools, Louisville, Ky.; Chairman.

*Participants:*

JAMES W. MANN, Principal, Hubbard Woods School, Winnetka, Ill.; Chairman.

*Editorial Subcommittee, N.S.C.*

Mrs. L. E. Nicholson, National Chairman, Safety Committee, National Congress of Parents & Teachers, Salt Lake City, Utah; Chairman, School & Community Coordination Subcommittee, N.S.C.

J. E. WINDROW, Dir., Public Relations, George Peabody Teachers College, Nashville, Tenn.; Chairman, Public Relations Subcommittee, N.S.C.

Pupils and former pupils of the Hubbard Woods School, Winnetka, Ill., who have had accidents typifying those happening to elementary school boys and girls on a nationwide basis, will tell briefly of their accidents and how, they think, the accident could have been prevented. The members of the audience and the consulting board will then endeavor to outline a program for the elementary school and for the community of which it is a part in an effort to help prevent these accidents and so prepare the boys and girls for hazards they will meet after leaving the guidance of the school.

Consulting Board Members Composed of the Elementary School Committee, N.S.C. CHAIRMAN WYMAN: I think we have a very interesting program, and I hope the audience is going to be so interested that everyone will participate.

We have a unique program today. We have some real boys and girls participating. Sometimes we teachers and parents get far away from boys and girls when we talk about school accidents.

I am not going to make any attempt to do the introducing; I am going to let Vivian Weedon do that. Why were Hubbard Woods children chosen to be on our program? Were they chosen because they have more accidents, or because they have fewer accidents? Were they chosen in order to stimulate Hubbard Woods to do something about accidents, or was Hubbard Woods school doing such an excellent job that it was a natural? Miss Weedon is going to tell us why Hubbard Woods school was chosen.

VIVIAN WEEDON: Those of you who have been coming to Congress for the last nine years know that somewhere in the Congress I have always jumped up and said, "What does this mean to Tibbie and Jim and the rest? What does this mean to our boys and girls?" We often get so tangled up in organizations that we forget our youngsters.

Today I wanted us all to look at the material with which we work—you might say the "clay".

I thought at first we would just bring in some five- to fourteen-year-old youngsters and let you look at them so that when you started

to work you would have in your mind a clear picture of what you were talking about. But we decided it would be even more interesting if we could have boys and girls who had had some experience with accidents.

I want to say that I am very proud of Hubbard Woods because they accepted this invitation without a question. People to whom I have talked since have been dumbfounded. "Do you mean to say there's a school that is willing to put their accidents on a national program? After all, we're supposed to be ashamed of our accidents!"

Only a school like Hubbard Woods, because it is so secure in what it is doing, can question what it is doing.

We have tried to select accidents that were typical, from a national point of view, but there are some accidents in the national picture that Hubbard Woods does not have.

Another reason for choosing Hubbard Woods is that it keeps the standard student accident reporting system and it uses the records.

MR. JAMES W. MANN: When I asked the boys and girls about coming here I told them that they weren't selected because of their names, but because of their accidents.

We will get right on with our story. I remember, one April afternoon about five years ago, something connected with a big blue dog which Jimmie Mable is going to tell us about.

MASTER JIMMIE MABLE: Well, it was in the afternoon, after school, that the tragedy happened—if you care to call it that. We didn't have much to do that afternoon, so we started to go on the swings. I hopped on one and it started to go up, and one of my friends pushed me. I was going higher and higher, and suddenly a dog appeared. I didn't know where he was because I was having fun. He started to walk in front of the swing, getting hit all the time. I tried to shoo him away but he wouldn't go away.

I asked the person who was pushing me to stop, but he said "No, this is fun." So he didn't stop. Finally, when he did, and I got off, I was a little mad at him. The dog came up and bit me. It didn't cause me too much inconvenience. It tore my pants and I had to go to the doctor. It could have been prevented. The dog could have been penned up at home, or the boy who was pushing me could have stopped when I asked him to, because I knew trouble was going to start.

MR. MANN: That's fine, Jim. At the time we impounded that dog it turned out he had just gotten out of the pound in the village of Kenilworth for having bitten another child. Jim's point that the dog should have never been loose was a good one.

Nick Kronwall's folks bought a farm recently. Naturally he spends a lot of time there. He likes the farm. One day he had a little difficulty.

MASTER NICK KRONWALL: When I went out to my dad's farm that day I was over at the next door neighbor's farm near a stream. There is a little crevice running along the top of the cave that I had previously built, so I put sod over the top of the cave to cover up the crevice to make it more like a cave. When I was digging in the cave, dirt and sod fell down and got in my ear. The only way I think this accident could have been prevented would have been to put boards over the top of the crevice and then sod on that.

MR. MANN: Thank you, Nick. These two boys are in junior high school. Sally, who is next, is also in junior high school. After we finish with her we will start with children from the sixth grade and lower.

Sally, will you tell us about your two accidents? After all, people have two accidents instead of one, sometimes.

MISS SALLY ROOS: The first and most serious accident I have ever had was when I was in kindergarten. It was after school, a nice day out, and a girl and I were playing around on the horizontal bars. They aren't very far from the ground, but neither was I at the time. I was hanging by my knees and she started to talk to me. I don't know what happened, but I fell. I fell on my shoulder, and it hurt me pretty much, so I decided we'd better go home.

We were playing around home, and not until later did I tell mama that I had fallen, and she took me down to the doctor. It turned out that I had a broken collar bone. We couldn't go any place after that. I had to go to the hospital, and I had to wait there pretty long, and by that time I was feeling pretty bad. So I had x-rays taken, finally, and I got sick after that.

I think a couple of things that could have prevented that would have been to have someone supervising the playground after school hours, and I guess maybe if the hospital had sort of hurried up a little bit it

could have done something.

In my other accident I had just gone out with dad to put the car away in the garage. The garage is pretty far away from the house. I was running back. We have a stone driveway and I was racing along. We have a dog. He was just a puppy then, and he ran out, and I was just racing along and Casey ran out in front of me. I stumbled over him and I went down on my face. My knee and my shoulder and everything was all bloody. I think maybe if the dog hadn't been let out, or if I hadn't been racing so fast, that could have been prevented.

MR. MANN: You don't mind if I mention the fact that you are one of these quick, active children. Sally? Sally moves around pretty fast.

Charles, you were about seven and a half when you had your last flying machine adventure, weren't you? Tell us about that. Charles was a real adventurer at that time.

MASTER CHARLES CLARK: It was a summer afternoon and I thought I could parachute with an umbrella. I was on the second step and there was a sidewalk right down below me. I was trying to jump across the sidewalk from the second step to the grass. So I took the umbrella and jumped across, and I hit my eye and it got all bloodshot. One way it could have been prevented was not to have moved around with an umbrella. That time I was pretty young and I didn't know any better.

MR. MANN: I repeat—Charles was seven and a half when this happened. The second grade seems to be one of the periods for adventure.

Tibbie, would you like to tell about the time you were skating?

MISS TIBBIE MacFARLAND: One Sunday afternoon I went skating, and I went off the ice and caught my skate toe in a crack. I just about turned around and I fell down. I broke my leg. I think it could have been prevented if I had been a little more careful watching where I was going.

MR. MANN: We did have a little discussion about the crack when we were talking about coming here, as to whether the crack could possibly have been noticed by the Park Board, and that part of the pond could have been blocked off. Tibbie doesn't remember enough about it to know whether it was big enough or how long it had been there, or anything of that sort. It was one

of the things we might keep in mind for discussion later. Tibbie was just five when it happened.

Just the other day Tibbie was getting ready to leave school and a girl was roller skating in front of the school and was walking up a flight of steps to the sidewalk elevation where Tibbie was. We recalled the fact that you could get hurt on roller skates as well as ice skates. Do you remember what the little girl told you when you said it was not a good thing to do? What did she say, Tibbie?

MISS MacFARLAND: I don't remember too well, but I think she said, "I know how to do it."

MR. MANN: It was almost that. She said, "Oh, I'm not afraid!" Tibbie and I recalled that Tibbie wasn't afraid of skates, either. But she still got hurt. Tibbie had quite a few days in the hospital and quite a little time out of school—11 days to be exact.

Albert, would you like to come over here? This is Albert Wald. Albert remembers something about a new climbing rope in the gym. It was a good rope, too, wasn't it?

MASTER ALBERT WALD: Yes, it was pretty good. We went up there and we were going to pass our goals that day. I was all excited, so I got up to the top, and somebody jiggled the rope. Down I went on my seat. I said, "Ouch! My back hurts!" Then I think Miss Coeds got a board and brought me down to the office, and finally an ambulance came and brought me to the hospital. I had some x-rays taken, and my back was taped up for a couple of days. I think that could have been prevented by my being more careful and the person who jiggled the rope being careful.

MR. MANN: Albert was in the second grade. We were frightened about what might have happened to him. As he told you, he was complaining about his back. We used the board for a stretcher and sent for the ambulance just to be sure. It turned out all right, but it might have been worse.

Jerry Olmstead, I think, has quite a story to tell you. I wish lots of boys and girls could hear Jerry's story, especially boys and girls about the age he was when it happened.

MASTER JERRY OLMSTEAD: We lived down near the school, and we had gone up to see the Catholic church that was near there. Then we were going to go over to our garden, west of the school. It was on a main road. I came out of the church and I came across

the street, and then I went back across the street and went up the steps. By that time my mother and father and my brother were coming back. When they got near the corner I went ahead of them. I saw a car coming, but I thought I could beat it, so I went across, and the car hit me, and my brother says I just went right through the air. I hit my head smack right on the forehead. I was in the hospital for three days.

MR. MANN: Now we come to Billy. I discovered that things can happen in Winnetka and the same thing can happen in Boston. Suppose you tell us about it, Billy?

MASTER BILLY FISHER: I was in the car, and I think I was rushing for a soccer game. I wanted to be first up at the game. I ran out of the car. I wasn't looking where I was going, and my thumb accidentally caught on the door, and I slammed it right on my thumb.

The other time, in Boston, it was just the time when Mom was going to leave. I was getting out of the car, and the man that was driving me didn't see my finger, so he slammed the door right on my finger.

MR. MANN: The same finger?

MASTER FISHER: No. MR. MANN: Thank you, Billy. That brings up another point—accidents always seem to happen at the worst possible times for mothers. Maybe you mothers have noticed that.

(The children were dismissed at this point.) These eight children have told you about accidents which have happened to them. Their explanations of how the accidents happened and how they might have been prevented will be our topic of discussion.

First, however, I want you to think about those eight children—lively, attractive, lovable youngsters. They have left the room now. I could not say this in front of them, but they represent statistically one-half the number of children between 5 and 14 years of age who will have been killed by accident today and every day this year in the United States, if the 1946 rate continues. Double their number (19,1) have been and will be killed on an average day unless we can be even more effective in our safety instruction.

An accident, you know, is a happening which could have been prevented. Even though we were proud this year of a reduced rate of fatalities at this age, we can never rest as long as even one is killed accidentally

or suffers pain or disfigurement.

We have a further obligation in the fact that the accident rate for children 15 years and older has increased.

We must remember that these older children reflect what we taught them when they were younger. What can we do to help them to live more safely in the future? It may well be that what we do with them during their more formative years will outweigh all the efforts on their behalf later by teachers, parents, and the community. We must know what to do now and we must attempt to measure the results in terms of future values.

CHAIRMAN WYMAN: Now may I read this statement to you: "77.1 children between the ages of 5 and 14 are accidentally killed each day in the United States. The error of one or more adults lies at the root of every child accident, for it is adults who guide the child in the development of the knowledge, skills and attitudes which lead to safe living or the reverse. It is the adult who decides when the child is sufficiently matured to assume responsibility for his own safety and the safety of others. It is the adult who underprotects, or overprotects, the child. The question for our discussion is: How can the elementary school, acting as the nucleus of the community, set the stage for the development of 24-hour-a-day, 365-day-a-year environment in which children may live safely and may grow in the ability to plan for their own safety and that of others?"

I think I would substitute the word "happily" for "safely" in the last sentence.

Consultants are going to chime in, and I hope the discussion is going to be lively. I rather thought the children accepted a great deal of responsibility for their own accidents.

MR. NILES ANDERSON (Pittsburgh, Pa.): May I comment first that the word "happily" as a substitute for "safely" is a good choice. I wonder sometimes if it would not be a more appealing word to children than the very deadly word "safety".

The second point I would like to make is that "the school acting as the nucleus" means the school should take the initiative to explore the community and find out what agencies are usable, and work with the schools in the program for a happier place in which to live.

Too much of the motivation has been from the other side. A community group will come to the school. I think that the school should

survey the current resources that might be used in a well-rounded program.

MRS. L. E. NICHOLSON: I would like to ask Mr. Anderson this question: Could not some of the community groups co-operate in helping the school to make this survey?

MR. ANDERSON: Yes, I believe they could. Someone has to start the ball rolling, and I believe it can well be the school who could call the community group in to sit around the table and discuss, "Where shall we go? Here is the problem."

MISS JOSEPHINE TORO (Baltimore, Md.): That has been the trouble. We haven't called in the community nearly often enough. I speak as a representative from Baltimore. In our school, we are now trying to have what we call "open house," at every one of our safety meetings, and the parents are becoming more and more interested. In that way we hope the members in the community will know our problems, and will help us solve them.

MRS. NICHOLSON: Would it not be a bombshell if you could throw into your meeting the fact that the adults are back of all these accidents? We find that in the statement read to us. It was rather a bombshell to me, but I recognize it is true.

MISS TORO: That is right. Sometimes children could point it out to them, too. They meet with them and discuss it much better.

MR. MANN: Those adults were all children at one time, weren't they? I think there is a fundamental question which we have got to ask ourselves and which I am becoming more and more interested in. I am a little doubtful and skeptical about adults, and quite hopeful about children.

The accident rate has decreased in the 5-to-14-year group, and from there on it begins to shoot up. I am not a psychologist, but I think I know enough psychology to at least make a tentative statement—probably we can do quite a few things with the 3-to-14-year old child which will carry over into the 14-to-20-year age group, things which will not only cut down accidents but will make children more conscious of what happens to other people.

Maybe we should spend more time exploring not only how we can help the children to live happily today and to prevent accidents that are happening to them at the present moment, but what kind of attitudes we can build for the future so that those youngsters will have a different outlook.

Just as a concrete example, can't we do something, when we teach the child bicycle safety, that will make that child a better driver when he starts in driving the family automobile?

MRS. FRANK J. DOWD (Winnetka, Ill.): Don't you think the recent legislation requiring safety instruction in all grades is starting the ball rolling toward what you have in mind?

CHAIRMAN WYMAN: I think these points are good enough to list on the blackboard.

Your point, Mr. Anderson, was that the schools should take the initiative in calling groups together. The point Mr. Mann made next was that schools try to be so effective in teaching now that results will carry over into the future; think of this teaching being projected—not just keeping boys and girls from having an accident today.

I would like the audience to discuss legislation. Mr. Yeager, what do you think of this matter?

MR. W. C. YEAGER (Sioux City, Ia.): There are places that the legislature can help in improving the standards of the physical equipment of the school by not allowing certain inefficiencies to be put into the building when it is constructed, and that sort of thing. The legislature can have standard highway laws and rules on the streets and roads around the schools. I suspect it could even go so far as to demand that teachers and pupils alike have certain courses of study in safety. But I believe that we have to make our safety habits as natural as our language habits.

CHAIRMAN WYMAN: Thank you, I wonder if you would like to state the Illinois law, Mrs. Dowd?

MRS. DOWD: I can't state it word for word, but the sum and substance of it is that all schools, throughout all the grades, kindergarten through ninth, must give students at least one period a week in safety instruction.

CHAIRMAN WYMAN: The question is whether legislation is the best way to get safety education in the schools. I see you folks are sitting on the edge of your chairs.

MR. ROBERT CAMPBELL (Peoria, Ill.): I am Bob Campbell of Peoria, manager of the Safety Council there. I have some knowledge of this state law that has just recently been passed relative to putting safety into the schools. I think legislation in this par-

ticular case did have some effect and did do us some good, because it forced the schools to consider safety, whereas possibly they had not done so previously.

In the interpretation of the law, it also said you could correlate this thing—you could make concurrent instruction, which I think we have done down through the years. We have tried to teach safety along with other subjects.

Are teachers prepared to teach safety? It is true that many teachers perhaps have specialized in safety—those just coming out of college. On the other hand, many teachers who have been teaching for years haven't had a chance to prepare themselves. To assist that particular situation I might remark that I got together with the Red Cross and we arranged an instructors' training course in accident prevention for our teachers.

MR. FRANCIS S. CHASE (University of Chicago): I wonder if that isn't a highly questionable use of legislative authority. I have no doubt it may accomplish some temporary good, but when the legislature begins to tell schools how many periods a week and how much time a week shall be devoted to a given subject, I think we are getting on very dangerous ground.

In the long run I think it will defeat its purpose. You are likely to have a hectic period of an hour once a week, when safety ought to be a part of the whole school program. I would agree with what the gentleman over here seemed to intimate, in that it can establish certain standards for buildings and for equipment, and so on, and that perhaps, if it took its next step into the field of instruction, it could instruct the State Department of Education or school systems to work out effective programs of safety education.

The legislature ought not tell the schools how to teach safety—how many periods a week, how long the periods shall be—nor attempt to specify content. As a matter of fact, if school people were sufficiently alert, the legislature ought not to have to step into that field with any sort of directive at all.

MRS. DOWD: But they haven't been alert all these years, and the children have been killed. It seems to me that legislation has started the ball rolling. It may be dangerous, as you say, but it certainly has started something.

MRS. HANSON (Evanston, Ill.): I am sorry to have to disagree with you. I have taught

in three systems, and it seems to me we teach safety from 8 a.m. until 3:15 p.m. We try to ask the parents to carry on after that. I am in charge of the Junior Patrol. My boys come to me and ask, "What are we to do?" We have certain rules that the school has set up. We find that when children are accompanied to school by parents, often parents do not follow the rules.

We ask them politely, "Will you please go to the corner where the policeman is stationed, when you cross the street?" And the parents say, "That doesn't matter—I'm with the child!"

We are trying our very best. You say we should teach safety for an hour. Little children's muscles and bones have no co-ordination allowing them to sit for a long period of time. It is better that we teach safety incidentally. As a school, we should make rules for safety, walk single file, without regimentation of course, and take one step at a time. Our playgrounds are supervised in the three different systems where I have been. I don't know what else we can do. The police department and our school system are co-ordinating very well, and we also have a council, on which our Junior Patrol boys are represented.

MRS. DOWD: When you say three different systems, do you mean all in Evanston?

MRS. HANSON: No.

MRS. DOWD: Evanston is exceedingly safety-minded.

MRS. HANSON: I mean in the State of Illinois.

MR. CAMPBELL: I think we in safety councils and other agencies probably feel there is not enough safety in the schools, whereas there really is.

However, such things as driver education and safety school courts and bicycle safety week help to put emphasis on safety.

MR. HAL KENT (Racine County Safety Council, Racine, Wis.): I am another outsider, perhaps, but we are interested in this sort of thing. We also have legislation in Wisconsin.

In one of the schools, a safety program was given last year. The teacher had the parade which consisted of six placards, 12x12 inches, on sticks. Each placard had one letter on it, S-A-F-E-T-Y. Six children marched around the schoolroom with those cards. That was the entire safety program. Safety was legislated. The teacher had apparently made an honest attempt to do all she knew to put

on a safety program. She had no book, nothing had been placed in her hands, she apparently knew no source of further information—that was our legislated safety program.

MRS. MARY REECE (Wilmette, Ill.): I, too, am worried about things that are legislated because, pretty soon, if we don't watch out, everything is going to be legislated and we are going to be told what to teach and when to teach it.

In our school, the police department sends a policeman over every Monday morning for about a half hour session with our safety council. He is coming next week with a safety film. Our safety patrol boys are well instructed; they are on the corners at all times. They come to the rooms and explain the various rules; they explain bicycle rules; they bring demonstrations and put on safety programs.

In Wilmette, for several years, we have had licensing of all bicycles. Those licenses are registered. Yesterday I was at our student council, and for 45 minutes children from the first through the sixth grades were there. For the most part, because it is the beginning of the school year, safety topics were brought up and discussed constantly. "What about the jungle gym? What about standing on the teeter-totters? What about this and that on the playground?" Each one of those little children went back to their rooms and talked it over with their group.

So you have to think in terms of "Am I doing this for an hour a week, or is it part of the whole general living—building day after day on the problems that arise in our school?"

MR. F. F. GILLIS (Boston, Mass.): I don't believe legislation is the best answer. I think from the time the child leaves home to go to kindergarten, until he finally finishes with a PhD or any lesser degree, the child is bumping into safety in every classroom and every school in the United States, and sometimes the best learning that child gets, and the best teaching, is when he doesn't realize he is being taught.

If you have ever been to any school where they have formal classes in character training, you know that the sentiment of the child after 30 or 45 minutes of character training is, "Thank God we can raise hell for the rest of the day! We've had our character training."

But the clever, successful character training is performed by every teacher in every grade, in every subject. The same holds for

safety. (Applause)

The classroom teacher does teach safety. The duty of a legislator is not to go to the legislature and dissent—is not to come into a school in a critical frame of mind and find fault. The object of outside organizations is to help the school. We have set up in Boston a good safety program. We have a safety representative in every school who co-ordinates the work of the teachers in traffic and fire and other fields of safety. We have a safety council where all phases of safety are represented.

We invite the police, the Red Cross, the registrar of motor vehicles, and others, to come out to speak to the group; we invite the National Safety Council, and we are glad to co-operate. We welcome all organizations in to help the school.

When we have a dangerous district where the children are inclined to play on the tracks in the summertime, we have the railroad police come to all those schools and talk to the children before the close of school for the summer. When a group has to ride on the elevated or the subway, we let the representatives of the Metropolitan District Transit commission come in and talk to the group. We show safety films from different organizations. We co-operate with any organization that has anything new to give us.

Sometimes we repeat the fact that organizations come in, as one did three years ago, and say, "We are going to set up a fire prevention program for you. Will you let us talk to your group?"

I said, "Delighted! What do you plan?"

He said, "Well, we haven't any plans at present, but we think fire prevention should be taught in the schools."

I replied, "My dear man, we have been teaching it as long as I can remember, which is half a century of school experience."

So I talked to his group and said, "This is what we are doing in fire prevention." I explained that we had representatives of the fire department go to every school. We have a lieutenant in the fire department who does nothing but inspect schools. Since the Coconut Grove fire in Boston, we have representatives of the State Department of Safety in Construction come to the schools. We outlined what we were doing in fire prevention. We went over and spoke to his group that evening, and in the end they were a bit flabbergasted because it had never dawned on them that the idea of fire prevention wasn't brand new.

Another group of famous name and distinguished career in aiding the unfortunate came in and said, "Now we are going to plan on home safety, and we want our people to go into the schools and teach home safety to the children." I replied, "Fine! Do you have anything to offer in addition to what we are already doing?" I presented that representative with our home safety study course. I said, "Here is what we do. In the classrooms we do this; here is the course of study for the teachers to follow; here are the different branches which they take up. If you have anything else, we will be glad to welcome you, but not if you're just coming in to duplicate something which the schools are already doing. If you're coming in to find out something, we will be glad to teach you." Let us say, for the classroom teacher who is sometimes neglected, that safety is an integral part of every activity of the child's life, whether it be walking down stairs, sitting on a kindergarten chair, finding out what the blanket in the lab is for, being careful not to burn his fingers, being careful not to hurt himself in the cafeteria, in the gymnasium and other places.

For specific courses in driver education, for specific training in swimming, all right. But I feel that instead of legislation, if we check on what every teacher is doing every hour of the day in safety, like character training, by example and by instruction, we shall probably attain much greater success—cut down the accident record—by instruction rather than by legislation.

Safety is taught in every classroom by every teacher in every subject, and much of the learning, on the part of the child, is unconscious—which is a grand way to be taught.

MRS. NICHOLSON: I would like to ask a question: should the school's instructional programs furnish vicarious experiences for children, such as taking them out into the community to watch traffic?

CHAIRMAN WYMAN: May I ask that we postpone the answer to that question? There are a couple more points that ought to be cleared up on legislation before we go into that question.

MR. RAYMOND AIGERS (Rahway, N. J.): In New Jersey our legislation makes it sort of mandatory to teach so many minutes of safety during the school week and the school month, but it does not tell how, when or why. It is left up to the discretion of the teacher when she shall exercise that respon-

bility.

That can be taken care of in a good many ways. For instance, in an elementary school (we have a number that go only to the fifth grade), at the beginning of the school year the children who enter the building during the opening days of school are instructed to use the fire escapes when entering the building. That teaches them safety and shows them where the fire escapes are located.

We also have a law governing the conduct of children. It mentions specifically that the teacher is responsible for the disciplining of the student from the time he leaves home until he returns home. You perhaps may have the same law. That fixes the responsibility for traffic violations, double riding and other violations. When the police department and the safety council notice violations on the part of children riding bicycles, and by the way we also have a bicycle licensing program, the names of the violators and the schools which they attend are noted, and the names of the violators are forwarded to me as Chairman of the Committee on Child Safety for the municipality. In turn I pass that information on to the principal of the school in which the violator is taught, and it goes right to the classroom teacher for proper disciplinary measures.

On the whole, with really sensible legislation and a proper exercise of good judgment on the part of the classroom teacher, you will have nothing to fear from legislation.

The teaching of safety education has been classified as an ordinary school function, and as such must be administered by school personnel. No outside agency can come into the school building and attempt to teach safety. That instruction must be given by the classroom teacher and other school personnel.

CHAIRMAN WYMAN: You have brought us right back to the point that the school is responsible for safety education. I think we are divided into two camps. The school teachers, who have to do the teaching and are responsible for giving the children attitudes, don't like to see laws on the books that they can't live up to. And, in general, school people don't want anything legislated into the schools. On the other side are the individuals who don't think we are doing enough of a job, who try to get safety legislated. Has that been the consensus this morning?

MR. D. W. ZAHN (Philadelphia, Pa.): May I add that I don't think the objection to legislation, as a means of insuring safety

education in schools, is confined to school people. I know many, many solid citizens of the United States who believe that it is fundamentally improper for a legislature to continue to legislate this, that and every other thing.

We would rather have such laws as directives to the superintendent of schools, to insure a proper program of safety, giving considerable leeway to the individual districts. It seems to me that is the heart of democracy.

I thoroughly agree with the original statement that was made—it is hardly a proper function of a legislature to continue to legislate such things as safety into the schools. It can be done in many other ways. Laws, in my opinion, are the result of public opinion and are dependent for their support on public enlightenment. I don't think you get safety through law.

MRS. MILDRED MAIN (Wilmette, Ill.): I think the point boils down to the fact that we might all agree that perhaps legislation might be necessary for certain districts, but we certainly all disagree as to the amount of time safety should be taught.

My own feeling in the matter is that no time should be mentioned. One word might do more than six hours of so-called teaching, because sometimes we need by over-emphasis.

I happen to have two grandchildren, one of whom visited me for a month this summer. Nothing happened to her. The other visited me for one day, and she had three accidents in that one day. One child needs more emphasis on safety than the other.

MISS NELL HASEHAGEN (LaGrange, Ill.): Sometimes there are areas that have few hazards and few needs for safety education, yet you are regulating them into a certain amount of time devoted to the subject. Their accident reports may show that they haven't many accidents and hazards do not exist.

CHAIRMAN WYMAN: I know that in my own city we thought our own program was well organized. Our teachers were well able to go on with the program as we had it outlined.

Now let's get back to this point of the schools organizing the program. How can the elementary school, acting as the nucleus of the community, set the stage for the development of a 24-hour day program?

MISS VIVIAN D. VON QUALEN (Glencoe, Ill.): Your point is, how can the school set up a program?

CHAIRMAN WYMAN: Yes, using the community and everything else, so that our children will really become safety conscious and be safe.

MISS VON QUALEN: I am from Glencoe, and I have been sitting on the edge of my chair, too. This summer I became quite concerned. I was asked to work with a committee from the state department on the revision of a safety program that could be put into the hands of every teacher in Illinois as a guide. I believe the guide had been made in 1938 and it was set up something like this: September, safety on the way to school. (The months aren't right, but this is the idea.) October, fire prevention. November, safety with toys. December, safety on the playground.

I am very much opposed to that sort of program because you teach all those things probably in one day. You certainly don't wait to teach safety on the playground until December, and you start it the very first day and live it all the time. The same thing is true with fire prevention and with coming to, and going home from, school. I personally don't believe you can set up a program of any kind like that and follow it.

Finally, the committee that worked on this guide felt something would have to be put into the hands of those who wanted it. I think when you have anything like that, whether a safety book or anything else, it is merely something a teacher can pick up and refer to sometimes—when the need arises. Ordinarily, I think, we teach how to meet and take care of needs as they arise. We can't segregate anything; we have to live with it all the time.

You teach safety in the halls, single-file going upstairs, and you have fire drills at school, and children learn from the very beginning what to do in case of a fire drill. You have safety motifs brought in occasionally, and you try to cover all these different areas that a child needs, without segregating them.

I am a primary teacher, and I have no intention of setting aside 15 minutes a day and saying, "Come on, children, now we are going to have a safety lesson." I don't believe we can do that. I personally am opposed to it.

CHAIRMAN WYMAN: Then your point is for the schools to integrate their activity and make safe and happy living a part of their program. Does someone want to take it up from there?

MR. MANN: I think point No. 2 is how

much the children have to do with this program, and how much of it is an adult sort of thing. It hasn't been mentioned, and I am sure a lot of people who have spoken about this business of living with children do it in this way:

A problem comes up. Do you point out the problem, the danger, and ask for the answer, or have you a system whereby your children themselves come to you and say, "This is dangerous and should not be done. There were two boys riding double on a bicycle on the way home." Does it come from them or does it come from you? I am sure it comes from the children.

Isn't that point No. 2? Safety isn't going to get anywhere with the child, it isn't going to project itself into the future, it isn't going to stick with him long, if it is the teacher's idea. But if the children can build, through their committees, patrols or whatever it is, the idea that they themselves are working on their own safety problems, then safety will become a part of them. I think they are then going to begin to draw some parents in and teach the parents something; aren't they?

CHAIRMAN WYMAN: That is pupil participation.

MR. J. E. WINDROW (George Peabody Teachers College, Nashville, Tenn.): I don't share the optimism that some have this morning with reference to our teachers doing such a good job in this whole matter of safety education.

I represent a teachers college, and I know that teachers colleges are not doing very well the job of helping teachers to understand the needs and the basic concepts of this whole problem of teaching safety. Certainly mine is not.

It is one thing to have a good paper plan or organization in your school, and it is another thing to have a basic instructional program that will develop in the children those attitudes and skills and concepts that are necessary for safe living. We have a very important document that came out of Boston some time ago on "Education for a Free Society." It made this statement: When children in school must choose between the patterns of the school and the patterns of the adult population in the community, they are likely going to choose the patterns and the ways of living and the ways of working of the adult population.

Where I come from and where I move

around, the schools aren't doing a good job. They are so enmeshed in the routine of assignment, study, recitation and review, and the processes of subject matter teaching and the skills of reading, writing, speaking and spelling, that this matter of safety isn't being taught.

I know it is being done well in certain areas, but I think in general we are not teaching children the important things of happy living or safe living.

I think the schools can improve. Somehow we are going to have to get these one million teachers to have the right concept and attitude toward the whole problem of safety. I don't think it prevails generally. I think it exists superbly in certain areas and in certain communities, but I am not optimistic about the general outlook.

I think the teachers colleges must face this issue directly. We must send the teachers into the schools with a basic understanding of what is involved in a safety program.

We must deal then with our children, and with our community. I don't like to have legislation forced upon me, but it might be well to inquire why it had to be. If we were doing our job well, and if our programs were well understood, there would be no need for legislation.

Of course you can't drive downtown and park by a fire plug, or you can't drive through a red light, and you must drive on the right side of the street. We have legislation all around us, and we don't worry about it too much; but we somehow get excited when somebody puts a little legislation over on a matter that deals with schools or instruction. Some folks say the legislature is meddling. It is meddling, because we are not doing our job well.

My point is that the teacher training institutions, the teachers colleges and the people who are educating teachers, must somehow give teachers the thing that Mr. Mann has referred to here—the understanding of child nature, the understanding of the learning processes, the understanding of what happens to a child when you are teaching him to be safe and to live happily and safely, and to be honest, and to have integrity and character and the proper attitudes and the skills that seem to be desired. That is basic and fundamental.

I don't think you can teach safety by lining children up and saying "Walk in a row down the stairway." There are a lot of schools

that do that.

**CHAIRMAN WYMAN:** Thank you, Dr. Windrow. Open confession is good for the soul, and, as you said this morning, people have to be baptized in safety; I commented that they have to continue to go to church. We hope Peabody is going to take this leadership for the South, which we need so badly.

You would subscribe to Jim Mann's idea that pupil participation is extremely necessary, and we will apply it to pupil education on the teacher education level as very necessary.

**MISS HASHAGEN:** I don't know whether I can express this well or not, but tying up two or three things that have been said here makes me very much interested in the attitudes Mr. Mann speaks of, and an interest in what Dr. Windrow had to say about the job being well done.

We have an organized course of study in LeGrange which we have been pursuing for six or seven years, and I think we can point with pride to some of the teaching done in our system.

Finally we reach a point where the thing breaks down. Regardless of what the children know about a thing, it is so hard to get them to put it into practice. The children this morning took the responsibility and said what they might have done to prevent an accident, but they think about prevention afterward instead of before.

In our village the children can give you all the answers about the safe things to do—what they should and should not do. They have a part in planning. Yet you go down the street and you see them riding all over the street instead of along the right-hand side, as they well know they should.

Where does the thing break down, if you supposedly have a fairly good quality of teaching and are following it through?

**MR. B. E. WESTERN (Quincy, Ill.):** I should like to make two points in this matter of attitude. First, I want to say that not much can be accomplished out of ignorance, as you know. Teachers will not be able to teach safety unless they are informed, unless they are educated in safety.

Secondly, those organizations, in addition to the school, who think they know safety—and I am thinking more particularly of cop, police and other departments now, who think they know what the schools ought to do and what the patrols and other organizations ought to do—will oftentimes be derogatory

about what you are trying to teach. For instance, in holding a school of instruction for patrol boys, I learned that one policeman said to one patrol boy, "Get on out there in the middle and direct that traffic, and you'll accomplish something!"

I was able to tell him that at the Columbus, Ohio, meeting we went on record opposing the idea of making patrol boys junior police, and I was able then to put across my point in opposing it, and I was able to carry it through the other schools.

I don't know whether any of the patrols, as an illustration, go out into the middle of the street and direct traffic or not, but I am quite sure they should not. I am very certain of that.

The point I am making is that it is the business of the co-ordinator, or whatever you call the director of safety, to co-ordinate things and to make decisions, whenever any directive outside of the school seems to impinge upon the functions of the school and its organization.

The next point I want to make is that attitudes follow slowly as apart from the ordinary actions of life. It is easy enough to say to children, "Be honest," but honesty does not follow. And so you could recite all day safety poems, or say, "Children, be safe," but aside from the actions in which they are involved, there is very little attitude attained.

Carrying that further, we find that we have to re-teach safety on every level. There is no data that supports the fact that a child who is a safe walker in kindergarten is safe when he becomes a bicycle rider, or is safe when he becomes a driver of a car. And so we have to continue on teaching at all levels.

**MISS TORO:** Let's stop confusing our children. We set up with them certain standards in the school. Then they go outside into the community where, many times, there are different standards. It is quite confusing to the child.

**MRS. NICHOLSON:** Is it not true, too, that the standards of the home are different?

**MISS TORO:** That's right. Let us, as educators, go out and see what those standards are in the community and in the home, as far as possible, before we guide and direct those children in school.

I think that is what the schools need to do. We as educators need to go out and study the community, and study all the outside agencies, and before we guide and direct the standards in the school, we must know that

the other influences on the child—the home and all his environment—go along with us.

**CHAIRMAN WYMAN:** Coming back to this question of how the schools can act as a nucleus, we will say "Schools, adopt your program; know what you are doing. Know your community. Use pupil participation. Integrate your activities."

Maybe legislation will help, and maybe it won't. We sort of got off the subject that the error of one or more adults lies at the root of every child accident. Do you agree with that statement?

**MR. ZAHN:** I don't agree with it except if you go back to Mendel's law and say people a long time ago had something the matter with them, and that therefore the children now are going to have something the matter with them, in whatever degree the genes united in making the organism.

To lay the responsibility entirely on the adults, although we have made an awful lot of mistakes, is less important than to put the responsibility properly on each individual person. I think the emphasis is wrong, in the education of children, to forever say that the responsibility for the things that happen to them rests with someone else.

**MR. R. W. COSSUM (Chicago, Ill.):** Would it be an adult error not to put the responsibility on the children?

**MR. ZAHN:** You mean that would be an adult error, and therefore the accident would be the responsibility of the adult?

**MRS. MAIN:** I was most interested in the youngster who got his thumb caught in a car in Boston and then was a repeater. I am interested in repeaters, because I was a repeater as a child, and that is why I wrote my first safety book.

What is there in some children that makes them get into hazardous situations?

**MR. MANN:** I think that is a field for some study.

**MISS WEEDON:** I am willing to say that Mildred didn't reform all by herself. She had home help somewhere along the line.

I want to call your attention to this pink sheet. The sheet is mine, and I gave it to you in case you didn't have anything to discuss during this meeting. It is not a statement of this committee or of the National Safety Council. Only the side that has the statistics is official.

**CHAIRMAN WYMAN:** Thank you, Miss Weedon. Who would like to pick up the ball from here? I think there is something to this

business of adults being responsible.

MISS CATHERINE JENSEN (Elinburg, Ill.): Nothing can be substituted for ignorance. It seems to me that we as teachers must see that as much education is given the child as possible. Children must learn to be better than we adults are, or there can never be any progress.

Too many times we teach children to follow our example. But too many adults don't set the right example. A child must be wiser and, therefore, must carry on any improvement that is to be made.

CHAIRMAN WYMAN: Miss Trunnell, how can you in the elementary school in Auburn, Ky., utilize community resources in this 24-hour-day program?

MISS BERTHA TRUNNELL (Auburn, Ky.): We have been able to reach the home and get the adults to work with our program through child participation. We have done it through our lunch program educationally, and we are doing it with safety. I grant you it is gradual and doesn't come overnight. You have to plug at it all the time.

The child goes home and talks, for instance, about fire prevention. This week they are removing fire hazards at home. They will make a list of the hazards they remove with their parents' help. I find that, after talking with the parents, the children really have done it. A child doesn't just come back and say he did it when he didn't do it.

CHAIRMAN WYMAN: Then you utilize the children themselves to get back into the community to the parents?

MISS TRUNNELL: Yes.

MISS EMILY FORBRICH (Chicago, Ill.): I think there are two things we might do as teachers: one is to get over the idea that we teach safety. It has been used here so many, many times, "teaching safety." I think it should be living and practicing safety.

Another thing might help: if all people connected with education would think of teachers knowing something about safety, it would help. I don't see how a teacher could be in a room without knowing something about safety. Those things might be pointed out to teachers so that they would realize that everyday living things in safety are the important things to put before children.

MISS HASHAGEN: We have a very active man from the Parent-Teacher Association who battles for us in all such things as parking regulations and things that help to make the school environment safer for boys and

girls. The PTA has been very active in meeting with the village board, and together they have accomplished a lot.

CHAIRMAN WYMAN: Some regulations may be necessary from community agencies. You may need a little law enforcement around your program.

MRS. O. F. POTTER (Oak Lawn, Ill.): I come from the suburban village of Oak Lawn. We live at Columbus Manor. There we have no protection whatever for our school children except the patrol boys. Last year I started to battle alone to get some protection for the children crossing Southwest Highway and Ridgeland Avenue. That crossing is a terrific hazard. We also have double sections out there. Last year the first graders in the afternoon session had to cross the highway, and they had no protection, not even at five o'clock when they got out of school. If any of you are familiar with our intersection, you know there is a lot of traffic moving there.

The teachers don't have a great deal of time; but they will co-operate in whatever we suggest. Ours is a new community and we are simply stymied for signs or anything else.

CHAIRMAN WYMAN: Maybe I am wrong, but I seem to sense that creeping into this is the idea that the school as a nucleus puts the community agencies to work doing the jobs which they are paid to do.

MRS. POTTER: In today's newspaper, which is distributed out there, I have written an open letter to the parents. I have walked down the street to note how the children co-operated by staying on the shoulder off the highway. Last Wednesday I made my last inspection and I saw the children all over Ridgeland Avenue. I wrote an open letter to the paper, addressed to the parents of those children, because without the parents' co-operation in telling their children to stay on the shoulder and not to walk on the highway, we couldn't accomplish much. There aren't enough who do come out to the parent-teachers meeting to know what we are trying to do. That is my last hope of getting to the parents and having the children obey the safety rules.

CHAIRMAN WYMAN: There is this idea of teaching the parents of the children and utilizing the community agencies to work at the jobs which they are paid to do. Let's have the police doing things the police ought to do. Let's have the highway engineer put

up signs.

MRS. POTTER: I have contacted the highway engineer for signs, and they all say they are working on it but don't know how soon it will be done. I have done all I could.

MR. MANN: I think there is a gap you would have to fill in your community relation reaching the parents, and that is to start the children home with an idea of something regarding safety. They can work on it, they can interest mother and dad—in bicycle safety or anything else the parents ought to know.

Also, you need to plug another gap by following up with some sort of publicity. You mention an open letter. Any kind of a bulletin to parents which will apprise parents of what the school is doing should explain this sudden questioning about safety at home. To the parents it is not only a matter of working with the child and doing what we want them to do, but knowing how to do it so that the teaching at school isn't confused with that at home. This extra boost is very valuable, particularly if your timing is good.

CHAIRMAN WYMAN: Dr. Windrow, have you had any experience with that as principal of a training school?

MR. WINDROW: I don't know that I have had any that would be helpful. In an hour and fifteen minutes in Nashville there will be a funeral service for Robert Dixon, who was killed on a motor bike two days ago. He was 16 years old and a sophomore in the Woodbine school. Robert was just out of elementary school about two years ago. Three weeks ago I sat with a committee from the Chamber of Commerce, with Ora Wakefield, who is supervisor of the safety education program in the city of Nashville, and she told the committee that there could be no safety education program in the high school because the children had lost interest.

I keep coming back to the feeling that with all of this emphasis we place upon our safety education program in the elementary school, why do the children give it up so quickly? Why is it so difficult to carry on through high school?

Somewhere, getting back to the chairman's question, I believe that there must be some adult education program we have probably not attained. It comes back to the Harvard report which says there must be an adult education program along with the school program, if we are going to achieve some

of these major ideas and goals. If children have to choose between the patterns of the community and the patterns of the school, even though the patterns of the community are wrong, they are probably going to choose the patterns of the community, and the school's best efforts will be nullified.

I think it is through the PTA and through the community agencies and the community civic clubs that we must reach the adult population. Maybe we will have to wait for the next two or three generations in order to have a new group to work with. We certainly ought to work out some adult education program, and through some means try to carry the two groups along together.

MR. COSSUM: Is it the parents' fault that the children lose interest in the high school program?

MR. WINDROW: I think it is the community's fault, and the community is made up of parents. We, as a community, go our ways and we don't want any too much instruction. We don't want to be told, and we don't want to be interrupted too much. We are interested, but the weaknesses inherent in human nature operate against educational processes that we haven't had.

MR. COSSUM: The teachers have got to see that safety education is interesting to children, and probably must make them feel responsible not only for their own safety but for the safety of others as a matter of civic pride.

MR. MANN: Someone has to keep the parents from working at cross purposes with the children.

MISS HASHAGEN: If the child sees his own father drive in an unlawful manner, then why should he apply what he has learned is the safe thing to do?

MRS. JULIA GAULT (Cahoon City, Ill.): I am not a member of this Council; I was called in through a member of the school board. I think we don't have enough practical application in the elementary school. The teacher does a daily living job of teaching safety, but practical application should come from the child.

How about a traffic safety court in your school? You could have it in your whole school. It would be a question not of penalties but a question of prevention. When these cases come up, your experience is your best teacher, sometimes very hazardous, but you could have cases brought up before the pupils



themselves; let them outline what could have prevented the accident or violation.

**CHAIRMAN WYMAN:** You are introducing another idea we haven't discussed this morning, and that is the schools organizing, shall we say, extracurricular activities in safety, or school organization for safety as one of the things the school can do.

The schools must call in outside organizations to help in their program. The school must go out into the community, must know the community facilities existing, and must use them. In other words, we are putting the responsibility for a good safety education program squarely on the heads of schools.

## THURSDAY MORNING SESSION

October 9, 1947

## Conference of Organizations Interested in Safety Education

*Presiding:* PAUL V. SANGREN, Pres., Western Michigan College of Education, Chairman

## Successful Projects of the Year

American Assn. of Health, Physical Education & Recreation

JAMES J. GRIFFIN, Representative

American Assn. of Teachers Colleges

PAUL V. SANGREN, Representative

American Automobile Assn.

AMOS NEYTRANT

American Home Economics Assn.

GLADYS OLSON

American National Red Cross

IRMA GENE NEVINS, National Director, Accident Prevention

American Vocation Assn.

L. H. DENNIS, Executive Secretary

RALPH HOWARD, Chairman, Safety Committee

Automotive Safety Foundation

STEPHEN JAMES, Representative

Center for Safety Education, New York University

ROBERT J. STACE, Director

National Board of Fire Underwriters

CLARENCE COLSBERT, Asst. Chief Engineer

National Commission on Safety Education

STANLEY AMERSON, Representative

National Congress of Parents & Teachers

MRS. L. W. HUGHES, President

National Council of Chief State School Officers

ROY DUNCAN, Representative

National Safety Council

WAYNE F. HUGHES, Dir., School & College Division

U. S. Dept. of Labor, Wage & Hour Div., Child Labor Branch

SEYMOUR W. HOBAN, Safety Engineer

U. S. Office of Education

W. F. LOOSE, Specialist, Supervisory & Teacher Training

Teacher Training

CHAIRMAN SANGREN: Perhaps a word to two about this Conference on Safety Edu-

cation is in order. I don't know how many of you have participated in previous meetings of this group, so, for the benefit of those who haven't met with us before, let me give some background. Nineteen organizations met January 17, 1946, in New York City for the purpose of trying to bring about a maximum of co-operation between various organizations, interested and active in the safety education field.

It was our feeling, at that time, that there were perhaps certain duplications in our work which overlapping could be eliminated if we would get together occasionally, take stock of ourselves, and report on our work.

We have had two general meetings and one meeting of the administrative committee. An inventory of the activities of the several organizations has been made. You will see, soon, this inventory which will give you a good over-all view of the scope of the activities of the safety education organizations in the United States.

At Atlantic City, last spring, representatives met for the purpose not only of promoting this inventory but of determining what should be done next. Our meeting today is the result. It was decided that it would be well for us to plan for at least one annual meeting, and the most logical time for this meeting was during the National Safety Congress. We are together today to review what has happened during the past year and to determine what we may do in the years to follow.

As you know, there are a number of reports to be made. All of these will be relatively brief.

While I have the floor, I will report for the American Association of Teachers Colleges. At present, Roscoe West of the State Teachers College of Trenton (New Jersey) is the association's representative in the safety education field. Mr. West is a member of the National Commission on Safety Education. In so far as the organized activity is concerned,

the American Association of Teachers Colleges is now working with the National Commission on Safety Education. About all that would be reported, so far as I see, for the organization this year is that they have published and circularized what we feel are two rather outstanding pieces of work in safety education of teachers, and you will see them on display back there with the National Safety Commission's material.

Dr. Lee of the National Safety Commission reports to me that 2000 copies of Parts I and II have been circularized to date. These are being used in a large number of institutions to help originate and perhaps promote a program of safety education for teachers. These two publications, although just getting under way last year, have been circularized during the present year. Now we are trying to evaluate the effectiveness and worth of these two publications for teacher education.

I think I should report just one other thing. In the first place, the National Safety Council annually makes a survey to determine the number of summer session courses in safety offered in teacher training institutes. This survey isn't an activity of the American Association of Teachers Colleges, but the report gives us a complete list and description of all of the courses in safety education offered in summer sessions at teacher training institutions.

The American Association of Teachers Colleges is an organization of about 185 to 200 institutions primarily interested in educating teachers. Some state universities and some private colleges also are members, at the present time. All institutions primarily devote their attention to education. The AATC has existed for many years as an accrediting organization for teacher training institutions throughout the United States. It has maintained a rather active interest in all sorts of educational programs. There is about to be a merger between the American Association of Teachers Colleges, the National Association of Deans, and Departments of Education. There is about to be a merger between all of the schools and colleges of education and the departments of education in the United States that are really active in teacher training. This will mean about 100 additional organizations—the private and state universities and the municipal universities that have been doing work in this field—coming into the AATC. When we use the term "American Association of Teachers Colleges," we will

include a far larger group.

If the American Association continues its present activities—and it will in the field of educational programs—then all these other institutions that are training teachers will be involved. There will be one main accrediting organization for teacher training in the United States. We expect this merger to be consummated at Atlantic City next February.

MR. NEVEHART: I am just going to mention some of the activities of the American Automobile Association during 1947.

I was thinking yesterday how, back in 1930-31-32, when we used to come to meetings such as this, we did well to get 10 to 12 people at the meetings. Yesterday we had to move into a larger room because we had hundreds at the traffic safety meeting. I think great changes have been taking place in the attitude of the people. It is certainly a lot different than it was years ago in this particular field.

I think there are a number of things that occurred during the past year which we would like to highlight. One of them I am sure many of you know about, the publication and release of our new textbook, "Sportsmanlike Driving." This book has been rewritten from cover to cover, with a new approach and with new cuts. This new book is available for high school use.

A second publication that is brand new is the teacher's manual and set of standardized tests that goes with the textbook.

The next important step we have taken is making cars available. Educators, some years ago, felt they could do a good job of behind-the-wheel training if they had automobiles.

The automobile, itself, is a very small part of the actual cost of driver training. I have played around with costs ever since I have been in this work, and I have found that any time that the car costs more than around \$2 per pupil, we are just spending too much money. It is the teacher's salary that is the expensive item.

However, the question of car availability is now settled. In my own state, the Pennsylvania Automobile Association has pledged 645 cars for the use of the high schools of Pennsylvania. Any school in the United States that wants to do a good job of driver training can now get the cars.

I think those of you who sat in the meeting yesterday were aware of the fact that there are too many cars available. Four or

five dealers now go to the schools saying, "We have a car for you." Unless there is some control and unless we have enough trained teachers, we are going to have a lot of cars standing around with no one to use them. This may hinder the program markedly.

So far this year, we have conducted 75 one-week, 40 clock-hour courses in the United States for training teachers. We trained more than 1,500 teachers during 1947. Other staff men have planned a number of teacher-training courses. One state alone has five coming up before January 1st. Altogether this makes 180 teacher training courses, and the total number of teachers trained is more than 6,000, possibly 6,500.

I mentioned this because, at the meeting yesterday, the fact that we need trained teachers was brought up. You may be sure that we are going to do all that we can to train the teachers, and I know other national organizations are doing what they can along this line.

Each year we offer college professor seminars, and in this past year we have trained between 40 and 50 college professors for driver education and training work.

There are two other things that are not concerned with driver training. (1) We have again gone back to our program of inviting representatives from the school safety patrols to Washington. Last year more than 12,000 boys and girls had a trip to Washington. They enjoyed several days of fun as a reward for the good work they did during the past year.

(2) The national safety poster contest has been very successful. It has been really wonderful to see the work that the boys and girls have done. I had the pleasure of seeing some of the posters as they were being judged in Pittsburgh, and the posters looked like the work of real artists. There were more than 2000 entries.

The posters that receive the first ten prizes, we print and release to the schools for use during the succeeding 10 months of school. Prizes amounted to \$2,075.

In conclusion, let me say, if there is ever a year when traffic safety education is really going to take hold and move forward—in fact, if we don't look out, we will move ahead too fast—that year is 1948.

MR. GRIFFIN: I haven't a long report, but, before I talk about the American Association of Health, Physical Education and

Recreation, I want to express a personal opinion. I am working in the field of safety education in a large city school system. I devote all of my time to safety education. I am glad that the National Safety Council has brought all interested organizations together. I think, by working together, we are going to do a lot better job in the field of safety than if all of the various groups throughout the country were going off on tangents. I think through co-ordination we will do a much better job. The final product of our safety education—making safe boys and girls and good citizens—will be more readily attained.

I am representing Mr. Blanchard of the Association of Health, Physical Education and Recreation.

Those of us who have been engaged in, or are now engaged in, physical education know that, in the school, the physical education program can be the most hazardous program of any. We in physical education don't want to curb our program. We think the challenges presented by the activities of the school physical education program are the very things that make the program worth while. We are not offering any alibi for the accidents that occur in gymnasiums, swimming pools, on our playgrounds or any where else. I think most people with a little common sense will recognize the fact that, in a gymnasium or in any athletic activity, children move around, therefore, there is bound to be more activity than there is while sitting in a classroom.

Mr. Blanchard told me to bring three things to your attention:

(1) We have a joint project with the National Association of Secondary School Principals and the National Commission on Safety Education, the result of which is a booklet which is to be released shortly. This booklet has to do with safety and the physical education teacher.

(2) The association, through its members in various districts throughout the United States, has scheduled, at local conventions, safety meetings on their programs, and at the national convention last year in Seattle, quite a bit of emphasis was given to the safety section.

(3) Since the American Association of Health, Physical Education and Recreation is a part of the N.E.A., and since the National Commission on Safety Education is part of the N.E.A., it is the feeling of the officers and the members in the association

that we should work closely with the National Commission but in no way duplicate their activities. Our relationship with the National Commission has been very close and, whenever possible, we have emphasized its program.

MISS OLSON: Because of the character of the organization which I represent, the American Home Economics Association, our safety emphasis is mainly on home accident prevention.

Our work is mainly promotional. Our work goes on through the divisions and departments, which form the sections that make up our association.

Three years ago it was possible to formulate a home safety education committee. You people who work with organizations that are over-committed have some idea how difficult it was to get that committee started. Then it just about died this summer. It has been a difficult committee to keep going.

For three years, we had assistance in this work. The home economics' consultant of the school and college division of the National Safety Council activated the work of the committee and really made its continuance possible.

Practically all of our work has to be carried on by correspondence. There is only one meeting a year of our association. If we don't have some other means of carrying on our work, we are not going to be too successful in implementing the program we would like to continue.

For the past three years, the committee has been under the chairmanship of Hazel Thompson, the state supervisor of home economics of Kansas. Her committee was made up of representatives from the different divisions and departments included in all phases of home economics—dietetics, home economics in business, food nutrition, textile, clothing, etc. These committee members shift yearly, but the chairman has continued to serve for the past three years.

This year there has been a change in chairman, and there is also to be a change in emphasis.

I said that I would report some of the things this committee has accomplished in 1946-47. Our main efforts were pointed towards two goals. One was to interest our educational journals in publishing articles on home safety. Our own journal of home economics was the first one contacted and did co-operate with us. Committee members

also were able to place articles in other national magazines widely read by home economists.

The second goal was to secure state chairmen, in our state home economics associations, who would be committee chairmen for home safety education. This has been the main work of the national committee during the past three years. In the past year, 24 chairmen have been appointed. In other words, half of our states now have official home safety chairmen. These chairmen were very active in some states but less active in others. The national committee chairman helped the state chairmen by making available materials from the National Safety Council. These materials make it possible for our committees to carry on.

The committee chairmen send in reports each year. I might give you a few examples of some of the things being done. For example, in Louisiana, a self-check survey in home safety practices was prepared by the committee. Members sent these check sheets to home economics teachers, home demonstration leaders, and to home management supervisors in the FHA. A large number of these surveys have been returned and are being tabulated. In Michigan and Missouri, articles were included in the state newsletters of the home economic action and safety exhibits and posters from the National Safety Council were shown at the state meetings. California prepared and distributed a safety newsletter to all home economic teachers this past year. From these examples you can get some idea of what has been attempted.

We will try to co-ordinate home safety in every program of each department and division. We don't know how successful we will be there. We are going to have quite a selling program in order to really get a successful program. That is our new goal. But we hope to continue with the old one of carrying on state work, under state committee chairmen, for state associations.

DR. NEVINS: I represent a three-fold service, held together administratively in our office and in the area offices of the United States. In the traditional plan of operations of the American Red Cross, from national headquarters we provide materials and information for use by the field staff in setting up and organizing constructive changes in various communities. The program is carried on by the local committee, the Red Cross Chapter,

in each community.

We have, under this plan, offered first-aid training courses with which many of you are acquainted. This program, as it has been carried on for a number of years, also is part of our safety activity. I represent, particularly, the accident prevention program.

During the past we have made available, through our local chapters, instructional material. We have our instructor's manual, "On Guard Against Accidents," for use in seventh, eighth, and ninth grades.

Also, we now have available a new illustrated workbook and notebook, which is called "Youth on Guard Against Accidents."

We have been making available to elementary teachers "Suggested Outlines for Guidance of Teachers in Presenting Safety Instructions." These are in two series, one for the primary grades, and one for the upper elementary grades. They are to be used on a monthly basis from September to May. These are distributed in a limited number and are available, through the Chapters, to teachers in the local community. We are working these out on a topical basis, each topic relates to a specific activity in a particular month. These are instructional outlines. They are not lesson outlines. From this material we hope the teachers can get suggestions for the organization of lesson outlines for teaching safety.

We also have available, through our local chapters, visual aids bibliography. We have included information concerning different types of motion pictures, sound slides, and so forth—how they can be obtained by the schools, and what they cost.

Also, through our chapters, we have made available the bibliography on pamphlets and bulletins which relate to various phases of the accident prevention program. Traditionally, these relate to the home and the child, because the American Red Cross plan of operation relates to these fields.

We are very much interested in the person, whatever his occupation, who goes from his home into traffic. We also have made available material which can be used for promotion of this program.

Another thing we worked out this year is our "It's Smart to Be Safe." The premise we are working on in our elementary school program is "It's Smart to Be Safe." It is that, there is a check list based upon the habits of boys and girls in the performance of their particular activities. This is a little

unusual because we suggest that the list be sent home to the parent. We have a letter which goes to the parent. The check list is based upon having the boy or girl take the letter and check list home to the parent, in order to get co-operative action between school and home. This material also is available through the local chapters of the American Red Cross.

MR. HOWARD: The different areas in vocational education throughout the country are doing so many good things in safety that we do not have an accurate record. Commercial art students have made some of the posters that were mentioned earlier, but such things as these we make no attempt to record or tabulate.

I want to report particularly the activities of the joint committee of the American Vocational Association and the National Safety Council. The American Vocational Association representatives come from the various fields of vocational education: agriculture, home economics, trades and industries, industrial arts, and distributive education in the guidance field. The National Safety Council members of that committee are lay people interested in those same areas. We work together as a joint committee. Our primary purpose is to determine the needs in the field of vocational education and to note the development of definite active safety programs. We felt that the greatest need was the development of a greater safety consciousness among supervisors and teacher trainers in the field of vocational education. We hope to provide more definite safety instruction for these teachers present in the classroom and for in-service teacher trainers, so that safety instruction may carry on down to local communities.

There are some definite accomplishments from this committee, and I shall just enumerate those. Suggested state programs have been developed. There have been articles on safety education in the American Vocational Association Journal, the home organ of the organization. There has been developed a uniform accident reporting form. We have already held two meetings this week and are holding a third, to develop and project our program for the coming year.

We feel that the right way to do the job in vocational education is the safe way to do it.

MR. JAMES: Except for deep interest in the subject of safety education, I feel, in a manner of speaking, I have no place here

at all. We have no branches. We have no representatives in the field. We issue no literature. In fact, the Automotive Safety Foundation has no action program.

We do attempt to make grants-in-aid to those organizations that have all of these things.

We must depend upon the educator to put this safety education program into effect. It is the job of others of us to give the educator such aid, counsel and assistance as we may.

I refer, of course, to the work of the National Education Association, through the National Commission on Safety Education, to the work of the National Congress of Parents and Teachers, and express a great deal of pleasure at the bulwark that is being provided by the American Red Cross. By no means do I pass by those old stalwarts in the field of safety education: the National Safety Council, the AAA, the Conservation Bureau, and others.

But all of us together including those of us who are not in the field of education, should be able to do what organized education can and must do.

DR. HERBERT J. STACE: I am going to report very briefly on the work of the Center for Safety Education.

As you know, our primary responsibility is that of training teachers, supervisors, and engineers. During the year we offer 28 different courses in safety education and safety engineering. Eight of these courses lead to master and doctor degrees. This year we have 15 doctorate candidates, the largest number we have ever had. We have approximately 800 students in our various safety classes. You will understand, of course, that this does not mean in safety education alone. Many of these are in the field of industrial safety. We also have monthly classes for the army air forces and for the War department. But it is significant to note that, in the eight-year period, we have had more than 6,500 registrants in the various courses offered at the Center.

We are especially, of course, interested in research and are particularly proud of the doctorate studies that have been carried on at the university. We are particularly proud of the holders of fellowships and scholarships which have gone out into the various states as leaders in safety.

We do not prepare many publications, except abstracts of doctors' theses and research

of various kinds. This year we have a grant of funds for carrying on research into the problem of the automobile driver. We feel that this topic is so important that we are not going to try to undertake the entire project at New York university but are asking the co-operation of Iowa State and California to assist us in certain of the basic studies.

We at the Center are interested in all phases of safety. We have elementary school and high school teachers, as well as vocational school teachers studying with us. Interest in driver education, perhaps, is a little greater this year than ever before because of certain things that are happening throughout the country. But we are interested in saving the whole child, not only in traffic but in every way.

The field work of the Center is largely that of aiding the various states. In fact, we have just come from a 15-state conference, attended by representatives of the state departments of education, motor vehicle departments, and others, in which the aim was to encourage teacher education in the various states. We are trying to get the work so organized that every state will have, in teachers colleges and universities, trained safety instructors who can train teachers within the state.

We do that training by providing fellowships and scholarships. We send the scholar back to the university from which he came or to the state from which he came.

I am particularly interested in continuing the work of this conference of organizations. We have one common program, one problem and one goal. We may have different ideas and functions, but we have one common goal—safeguarding the lives of children and adults. Therefore, we should cooperate.

MR. GOLDSMITH: Our director of conservation, T. Alfred Fleming has asked me to present his report for him.

The National Board of Fire Underwriters was organized in 1896 as a service organization for leading stock fire insurance companies. At the present time Underwriters is sponsored and supported by 57 of these companies. While originally known as a medium of exchange of information between companies, it soon reached national scope and became one of the first national public services supported by a trade organization.

Following the Baltimore configuration and other large municipal fire losses, a committee of engineers began the survey of cities of

25,000 population and more, in order to supply the authorities with engineering counsel relative to their fire defenses. These engineers study and report on the water supply, fire apparatus, fire department efficiency, construction of buildings, fire alarms, width of streets, and, in fact on everything that might impede or improve the fire control of the municipality. This is done entirely free of cost to the community.

A second function of the National Board of Fire Underwriters is to study and supply suitable recommended rules and regulations for the safe use of new products which enter into our public economy. As an example, when electricity was first introduced, it was found to be hazardous in many respects, but the adoption of the National Electrical Code has removed practically all of the fundamental dangers. The same is true of petroleum products, nitrocellulose, and hosts of other fire hazards that have to be controlled by specific rules. Following the Coconut Grove disaster, the Hartford Circus fire, and the recent scourge of old folks' homes tragedies, the National Board of Fire Underwriters was called upon by city authorities to supply an outline of necessary safeguards for these places.

Almost from its inception, the National Board of Fire Underwriters has been active in stimulating interest in fire prevention education. In the years immediately preceding World War I, this organization worked with other national associations in encouraging state legislatures to enact laws requiring schools to teach fire prevention and to establish proper fire drills in all school buildings. Following the enactment of legislation in a number of states requiring that fire prevention be taught, the need for instructional material arose, and in 1916 the National Board prepared a pamphlet, "Safeguarding the Home Against Fire," which contained an introduction by the Superintendent of Education of the United States. Millions of copies of this book have been used by schools throughout the country. It was intended for the lower grades, and the demand has been so great that reprints have been made periodically, and copies are still in demand.

Answering requests from rural and agricultural districts for a similar text on fire prevention as for the needs of the farm, a text, entitled "Safeguarding the Farm Against Fire," was prepared and published in 1928. This was followed in 1930 by the publication

of a more advanced text, entitled "Safeguarding the Nation Against Fire." This textbook which was designed for the upper grade levels was more comprehensive in its coverage of the subject than the earlier books. All of these are kept up to date and are still widely used.

In 1919 a "Home Inspection Blank for School Children" was developed and each year since that time millions of these blanks have been provided, upon request, for the schools of the nation to distribute to students for their use in making fire inspections of their homes. Since a large majority of deaths and injuries from fire occur in homes, it is logical that, from the very beginning of the program, great emphasis should be placed upon home hazards.

Paralleling the development of fire prevention and protection in the school curriculum, there has been a steadily growing concern for the protection of people in the schools themselves. Many of the schools were found to be in anything but safe conditions. In order to raise the standards of school building construction, the National Board of Fire Underwriters made a careful study of present school structural conditions, and prepared and published in 1937 a manual, entitled "Construction of School Buildings and Improvement of Existing Structures." This was later supplemented by another guide, entitled "Fire Prevention and Protection as Applied to Public and Parochial Schools." There are few school authorities in the country today who are not aware of their responsibility to provide fire-safe conditions for the children. Guide materials such as we have mentioned are being requested daily by school authorities.

In 1944 the publication of an article, entitled "Is Your School a Fire Trap?" in the *Ladies Home Journal*, aroused the interest of the National Association of Public School Business Officials and prompted them to review the hazards existent in schools under their care. Shortly thereafter the co-operation of the National Board was requested, and a special school blank was prepared, entitled "Self-Inspection Blank for Schools." This blank was reviewed and endorsed not only by the National Board of Fire Underwriters, but by the National Association of Public School Business Officials and the International Association of Fire Chiefs. This blank is now in use in thousands of schools for their regular monthly fire inspections.

The National Board of Fire Underwriters has co-operated with the New York University, Center for Safety Education, in the production of the latest and best text material supplied on the subject of fire prevention and protection. It is entitled "Fire Prevention Education," and is acclaimed by school authorities and teachers throughout the country as the most complete presentation in the field of fire safety. Several state departments of education have approved its use as the official textbook on the subject. It has been widely adopted by individual school systems in cities and towns of all sizes throughout the United States. The Dominion government in Canada is at the present time planning to adopt and reprint this manual for use throughout Canada.

The adage "Eternal Vigilance is the Price of Safety" applies equally to fire prevention and protection. There can be no relaxation in the interest and sustained activity of this national program. More effective methods and better materials to aid in this campaign must be developed. The National Board of Fire Underwriters will continue to devote its resources and the knowledge gained by long practical experience to the development of more effective weapons to be used in fire prevention educational activities in schools. The National Board will be very happy to join with all other organizations to this end.

MR. ABERCROMBIE: Mr. Chairman, Ladies and Gentlemen: The National Commission on Safety Education is a part of the National Education Association. In the rear of the room there is a display of material which has been produced and published by the National Commission. Most of the work that the Commission does results in publications of administrative materials and of instructional materials in the field of safety. The materials are not restricted to any single area but touch upon a great many areas of safety. During 1947 the dissemination of the publication entitled "Let's Teach Driving" was one of the major projects of the Commission.

This guide book was largely developed during the year 1946, and the technique which was followed in developing it is followed in nearly all of the projects undertaken by the Commission, which technique is to make use of the various backgrounds of experience among the Commission's members themselves, and then to go beyond the Commission, out into the field, to draw upon the experience

and background of many other persons and organizations. Approximately 50 persons had a hand in developing this guide book.

Not on display are two little publications. One is "Nineteen-Ten Driving Skill" and "Good Enough Today." The purpose of this little leaflet is to provide guidance for lay leaders in communities throughout the country—to help them take the proper steps in assisting the schools to provide driving instruction. On the back of the leaflet are mentioned four organizations which have been particularly active in the field of high school driving instruction.

Another little leaflet, "The People Want Safety," is an abstract of certain educational material from the public opinion survey made a year or so ago by the Opinion Research Corporation, sponsored by the National Safety Council, co-operating with the National Committee for Traffic Safety. The purpose of this is merely to bring before people the implications of the poll regarding public opinion on traffic safety.

Some of the current and planned projects of the Commission follow.

A survey of college and university activities in or related to safety education is now under way. Here is a preliminary report of that survey. Questionnaires were sent to the presidents of 199 colleges and universities in the 48 states, and replies were received from 173 institutions—better than an 85 per cent return. The final outcome of this study will be to stimulate colleges and universities now doing little or nothing in the field of safety education, by before them material which will describe what is being done by institutions active in this field. Case studies of outstanding programs in some of the institutions of higher learning will be made available.

Another project under way at the moment is suggested policies and standards for the acquisition and use of materials for high school driving instruction. A short time ago Professor Neyhart mentioned that, in some places, too many cars are being made available too rapidly before schools are able to make use of them, because the schools have no program worked out and no trained teachers available. This suggested policy will be completed, probably in the same format, and made available to help the school administrators to see the things that need to be done prior to putting in the new teaching program of driving instruction.

Another project on the way and planned for completion by the end of the year is a silent slide film entitled "Smart Driving," which is being made by the Commission in co-operation with the National Highway Users conference.

Another project is a joint one between the Commission and the National Association of Secondary School Principals. A bulletin on the administrative phases of safety education in high schools is being developed.

Then we have a publication dealing with high school safety in the social studies program. This contains helpful suggestions on how traffic safety may be incorporated in the various social studies units. That is another joint project, one between the Commission and the National Science Teachers Association. This particular publication is mimeographed and is being put to trial use first. The revised published report will follow the recommendations of those who try out the mimeographed one.

There also is a visual education project which will be published in a folder describing the safety program in a small West Virginia county. That is now under way as are most of the other projects I have mentioned.

MRS. HUGHES: I call your attention to the exhibit of the National Congress of Parents and Teachers.

We have a safety manual, which is available to our 18,000 local units. We also have an outline of the manual for discussion groups, home study courses, etc. We have our National Congress Bulletin and the National Parent-Teacher magazine.

The safety program of the National Congress of Parents and Teachers is carried on by a standing committee on safety and through the traffic safety education project. For more than 30 years, the national standing committee has given impetus to the activities of comparable state and local safety committees.

The organization has taken an active part in the follow-up of the President's Highway Safety conference, especially on the committee on education and organized public support. Copies of the action program, as well as copies of the reports on the committees on education and organized public support, have been distributed among state leaders. Forty-one responses have reported the they actually participated in state-wide conferences called by the governors to implement the conference. At their request, meet-

ings, local parent-teacher associations also have given study and earnest consideration to the recommendations of the conference.

The current four-point program of the National Congress stresses four major areas of endeavor: school education, health, world understanding, and parent and family life education. All safety chairmen share in the responsibility for aiding in the development of the program and are undertaking suitable action projects. Safety fits into the objectives of the program in several ways. A well-rounded school education program should include more and better safety education. Moreover, health and safety are such close neighbors that they cannot be easily separated. And a community free from hazards, in other words, a safe environment, is essential, not merely for the individual, but for his fellow men, since it will help to promote world understanding in that it eliminates fear of hazards to children's security. Lastly, of course, the homes should be admonished to discontinue unsafe practices, since home safety means happier home and family life.

But we cannot be too proud of the results so long as 33,000 persons annually lose their lives in accidents in the home. To me, the most tragic and pathetic ones of this group of 33,000 are the 3,000 infants under one year of age who die of accidents in the home, before they have ever started to live. These infants are not, because they are under one year of age, running around the house, getting into trouble themselves; they are not on highchairs, or climbing up to reach into the medicine chest. They are helpless. Why do 3,000 infants under one year of age die in our homes? It is tragic beyond words.

Local P.T.A.'s, in countless communities, are sponsoring study groups in home, community, school, and traffic safety. Safety chairmen are closely co-operating with other P.T.A. committees in the observance of American Education week, particularly to promote health and safety.

The legislation program for 1947-48 includes recommendations urging (1) the enactment of state driver licensing laws in conformance with national standards; (2) uniform traffic laws and ordinances; and (3) a universal requirement for owners of motor vehicles to carry liability and property damage insurance.

The organization is also actively carrying out the action program of the President's conference on fire prevention. Copies of the

report have been distributed, through the state congresses, to our 18,000 parent-teacher groups in order to stimulate community alertness in this field of safety.

And this year, as in previous years, the publications of the National Congress have stressed safety consistently throughout the year. The National Parent-Teacher magazine and the National Congress Bulletin have provided excellent channels for emphasizing various aspects of safety to our membership.

We feel that ours is a safety program that is both varied and comprehensive. We intend to see that parent-teacher work will always receive the emphasis it deserves.

The National Congress has planned a vigorous safety program for 1947-48, continuing many of the projects now under way, but also adding our activities to current needs.

This year, as in the past, we intend to do everything we can to educate parents and teachers, as well as children under their care, in the importance of safety. And we shall again throw the support of our organization behind the enactment and enforcement of worthwhile safety measures.

Throughout the year, there will be a consistent follow-up of the recommendations of the President's Highway Safety conference and the Fire Prevention conference. The publications of the National Congress, the state parent-teacher bulletins, and district and council news letters will encourage the implementation of the action programs of both these conferences.

"The National Parent-Teacher and the National Congress Bulletin will again allot generous space to various aspects of safety. Our weekly radio program, "The Buzzers," will give its customary emphasis to control phases of accident prevention. This coming year there will be a special series of five radio scripts dramatizing the importance of safety education. These titles speak for themselves: "Death on Wheels," "Driver Training," "Making a Community Safe," "Safety to School," and "Safe at Home." These scripts, which will be available for radio broadcast sponsored by parent-teacher groups, should do much to make radio listeners more safety conscious.

On November 14-15, 1947, a National Congress of Parents and Teachers will hold a safety conference in Washington, D. C. All state chairmen of safety and all presidents of the state congresses will come together at this conference to survey the field of safety

with which we concern ourselves. Then, having evaluated existing conditions, we shall see how our P.T.A.'s can help to strengthen and further the safety program of the National Congress.

**CHAIRMAN SANGREN:** The next speaker is Roy Duncan, who represents the National Council of Chief State School Officers.

**MR. DUNCAN:** I am here this morning in the role of No. 2 substitute. Rex Fennema, state supervisor of public instruction in Oregon is the president of the National Council, and he couldn't be here, so he asked Mr. Nichols, superintendent of public instruction in Illinois, to appear for him and represent the Council. But Mr. Nichols, also unable to attend, requested me to pinch-hit for him.

As you perhaps know, the National Council of Chief State School Officers is not a program making organization. It represents the chief executive officer in each state. In some states that is a superintendent of public instruction, and in some states it is a commissioner of education. In some states these officers are elected by the people and in other states they are appointed. They get together in the National Council and interchange ideas, but they do not make programs. However, I know, from my correspondence with various state departments and divisions dealing in safety education, that there is perhaps greater concern at the present time, with safety education than ever before. To find out the program to know what is going on, one would have to look into each state department of education.

Dr. Stack said a moment ago that we had a common goal and there should be co-operation. I think that sums up the philosophy of the national chief state school officers. They recognize the goal, and they are happy and willing to co-operate with all agencies that are attacking the problem.

**CHAIRMAN SANGREN:** The next speaker will be Wayne Hughes, for the National Safety Council.

**MR. HUGHES:** Mr. Chairman, Ladies and Gentlemen: During the past year, the School and College Division of the National Safety Council has continued its regular consultation and field service in the schools of the nation. I see no need for indicating the exact spot or check number, and so on. I don't think you are particularly interested in that, except to know the type of service the division affords.

Our consultation and field service deals

with all areas of child safety. In our material service, we keep in mind this one principle: our materials are prepared primarily for our membership services. I think the materials fall generally into three categories.

In the first category are those that continue year after year, such as "Safety Education" magazine. We also have our monthly lesson units and posters. The lesson units are broken down into four grade levels: the lower elementary, the upper elementary, the junior high, and the senior high. Each month's lesson unit and poster fit together. Also in this category is "Accident Facts," which is an annual publication of the National Safety Council but not of the division.

In the second category we have new manuals, bulletins, pamphlets, and so on. During the past year we have developed "Hazard Detector." This is for the field of home accidents and was produced in co-operation with such other organizations as the American Home Economics Association.

We have released four in a series of social science units: one in agriculture, one in industry, one in traffic, and one in transportation.

I also selected some of our industrial department deals, primarily because I think they are especially good for the school shop, a deal that can be transferred on the danger spots in the school shops.

In selecting the materials for display here, I brought only those that I thought were especially new and interesting.

In the third category, the most important thing that we finished during the past year was the revision of our Standard Student Accident Report form. It is now ready for distribution. We firmly believe that every school in the nation should keep complete student accident reports. We also believe that if a school keeps accident reports, there is considerable advantage in having some standard accident reporting system throughout the nation. We know all of us will benefit, especially our school people, if there can be some standard procedure in accident reporting and analysis. We get a truer picture of the situation. The National Safety Council is presenting, recommending, and urging the adoption of standard student accident reporting in all the schools of the nation. We are depending on this conference of Organization to assist in getting widespread use of the Standard Student Accident Report form.

There is one other publication that falls

into the second category that I had hoped we would have ready to show you today, but it is not back from the printers yet. Our new elementary school manual, which is entitled "Foundation for Safe Living," should be off press early in 1948.

We are also revising two of our other manuals during the coming year, our manual on physical education and recreation, and the one on rural education.

**CHAIRMAN SANGREN:** The next speaker is Sheldon W. Homan, of the U. S. Department of Labor, child labor branch.

**MR. HOMAN:** It is not difficult to make a report on the activities of the U. S. Department of Labor and the accomplishments in the field of safety education during the past year, because matters of an educational nature are not the primary function of the labor department. There are, however, some activities which are, in part, of an educational nature and which I should like to report.

The branch of the Department of Labor which I represent is concerned with the safety of young workers, boys and girls of 16 and 17, who are taking their first jobs in industry. It is our responsibility to see that these are safe jobs, jobs which are so relatively nonhazardous that these young persons can expect to work without too much possibility of a disabling injury. Cataloging jobs as particularly hazardous, or relatively nonhazardous is not as simple as it sounds. In fact, there is a tremendous lack of information on whether any particular job is, in fact, dangerous or not dangerous. Our job is to supply this information so that young and inexperienced workers can be kept out of the dangerous jobs, but still not be denied employment opportunities.

Our task requires research into fields where statistics on injuries are lacking and where little factual information on the relative hazardous nature of individual occupations is available.

During the past year, we have made two investigations of this nature. One investigation deals with pulpwood logging. This research project is completed and a report of the investigation is now being prepared. The other investigation covers the operation of metal-working machines of all kinds. Strangely enough, there is very little information available as to which of the machine tools or other metal-forming machines cause the greatest number of accidents and the most severe injuries. Some safety engineers con-

sider grinders the most hazardous; others, punch presses; still others, shears. We hope to supply the factual data which will show not only which machines cause the most accidents, but which cause the most severe injuries. This investigation is not quite complete, but we hope to issue our report late this year or early next year.

There are several other projects of an educational nature which the Department of Labor has completed during the year and which I should like to call to the attention of this conference. Mr. R. P. Blake of the Division of Labor Standards is a member, committee on colleges, of the American Society of Safety Engineers. This committee is drafting an outline and is preparing text material for instruction in safety at the college level. The report of this committee is to be presented during the Congress.

The Division of Labor Standards is continuing its training courses for factory inspectors, and, during the past year, courses of training for factory inspectors were conducted in New Jersey, North Carolina, South Carolina, Indiana, Kansas, Nebraska, Iowa, Missouri, Rhode Island, and Connecticut. These training courses have been extremely popular in the past and will be continued. The material has been revised and broken down into five separate courses of 30 hours each. These separate courses are progressive and are given at four or five month intervals, thus extending over a period of about two years time. The capacity of the Division to give these courses is entirely pledged for the coming years.

That briefly is a report from the U. S. Department of Labor, and now I should like to call to the attention of this conference a matter of re-organization within the Department of Labor.

When I was first appointed to this conference, I represented the Children's Bureau of the U. S. Department of Labor. In July, 1945, the Industrial Division of the Children's Bureau was transferred to the Division of Labor Standards and became the Child Labor and Youth Employment Branch of that division. In July, 1947, the Child Labor and Youth Employment Branch was again transferred, this time to the Wage and Hour and Public Contracts Divisions of the Department of Labor, and is now set up as the Child Labor Branch of that division. These changes have to do with organization, not functions.

The Child Labor Branch of the Wage and

Hour and Public Contracts Divisions will continue its functions of protecting young workers from dangerous employment through means provided by law under the Fair Labor Standards Act and through whatever educational means are available to us. I bring this fact to your attention so that you may determine whether protection of young persons at work is within the scope of activities of this conference. The conference may also wish to expand its representation from the Labor Department by bringing in someone who is more closely allied to activities having to do with safety education of adult workers.

I think it might be up to the conference to decide whether activities such as ours, which are partially legal and partially educational, should still continue to be a function of a conference such as this. I should like to say that, in addition to our legal responsibility, we expect, during the next year, to carry on our activities by using every educational facility at our disposal. I think the conference might also wish to decide now, or at a later date, if it would like to have additional representatives from the Labor Department, who might more closely represent some of the other activities.

**CHAIRMAN SANGREN:** The last item on our agenda is the election of officers for the coming year. I wonder if it would be smart for us to appoint a small nominating committee which could prepare some suggestions so that we won't get into a jam later with numerous nominations, and run into a complicated election. Do any of you have any objections to my doing that arbitrarily? I shall just appoint a small committee. There are two officers, our chairman and our secretary. I have been chairman of this conference more or less by accident, because I happened to meet with you at the first meeting together in New York City, and Mr. Hughes of the National Safety Council has been secretary since that original meeting. We now are faced with the necessity of electing a chairman and a secretary. I am going to ask Mr. Dennis, Mrs. Hughes, and Mr. James to take a little time out now and prepare to report, after Dr. Stuck has talked to us. The last report is from the U. S. Office of Education, and Mr. W. F. Loomis will make that report.

**MR. LOOMIS:** The functions of the U. S. Office of Education are consultative and advisory in nature. Our work includes not only safety education but all phases and levels of

education from the elementary school to the college and university. Because of the nature of our responsibilities, we co-operate with other agencies even more than we produce safety education material ourselves. Our report for the U. S. Office of Education will be based upon the activities of the several divisions of the office.

The Division of School Administration, of which Dr. E. B. Norton is director, has the following to report:

A bulletin, entitled "School Bus Maintenance," has been completed and is ready for the printer. This bulletin is for school administrators and includes maintenance factors dealing with safety.

Dr. Nelson Viles, who appeared on the program two days ago, of the Division of School Administration, as well as a representative of the Division of Elementary and Secondary Education, co-operated with the President's Conference on Fire Prevention in preparing the report of the Committee on Fire Prevention Education. In this connection, you may be interested to know that a proposal is pending to make available 50,000 copies of this report for free distribution. Copies of this report, if the proposal is approved, will have an initial distribution to state, county and local school officers, as well as to state universities and teachers colleges. Copies will be available to other persons upon request.

Probably the most interesting and valuable publication of our office during the year, comes from the Division of Elementary Education, of which Dr. Ben Goodykootz is director. I am speaking of Bulletin, 1946, No. 8, "A Curriculum Guide to Fire Safety." This bulletin is primarily for the use of elementary school teachers and principals. It was prepared by Dr. Helen E. Mackintosh under the direction of Dr. Goodykootz. Dr. Mackintosh was assisted by consultants of state and local school systems, the National Committee on Safety Education, the National Congress of Parents and Teachers, and the International Association of Fire Chiefs. The

bulletin's contents include the following:

- (1) Importance of and Reasons for Fire Safety Education.
- (2) When the School Can Teach Fire Safety.
- (3) How the School Can Teach Fire Safety.
- (4) How the School Can Measure Results of Fire Safety Teaching.
- (5) What the School Can Teach About Fire Safety.
- (6) Dictionary of Fire Safety Terms.
- (7) Brief Bibliography of Sources.

There has been a second printing of the bulletin, and it is available from the Superintendent of Documents for 10 cents a copy. We were able to get a few extra copies of this bulletin, and I have brought a limited number along with me.

Frank S. Stafford, specialist in health and physical education of the Division of Secondary Education, prepared, during the past year, a list of films made between 1940 and 1946 on safety. This is a three page list of films and film services and is intended as suggestions related to safety education in secondary schools.

The Division of Vocational Education, of which Dr. R. W. Gregory is director, reports the following:

The Agricultural Education Service has co-operated, during the past year and will continue in co-operation this year, with the National Commission on Safety Education in writing a chapter for a bulletin on Safety Education for the Farm. In developing material for this chapter, the writers are co-operating with manufacturers of farm equipment and materials and supplies used on farms.

The Home Economics Service of the division is in the process of preparing a bulletin on equipping home economics departments. A full chapter of this bulletin will be devoted to safety. Each chapter will deal with equipment for various rooms used in instruction, and will contain specifications that are intended to promote healthful and safe utilization of equipment.

## What Activities Need Special Stress During the Coming Year?

By HERBERT J. STACK

Director, Center for Safety Education, New York University

An analysis of the check sheet that has been submitted by the Conference of Organizations interested in safety education shows that there are 18 national organizations that are interested in child safety, of which 16 have responded to the questionnaire submitted by the committee. You have already been furnished with the checklist and can see for yourselves the complexity of the problem.

You will note that in general the checklist was divided into five parts: (1) Areas, (2) Educational Levels, (3) Administrations, (4) Materials, and (5) Services. Going further into an analysis, we find one difficulty that has not been covered in this questionnaire: the quantitative and qualitative side of the various activities reported by participating organizations. For example, one organization may have one individual doing full-time work, while another may have ten; or one magazine may carry all of its articles on safety, while another may have two or three articles a year.

There are certain obvious conclusions that can be drawn from the final tabulation of the checklist: (1) All of the educational levels are included in a general way in the reports. (2) This is likewise true of the administration of safety education. An examination of the materials shows that most organizations are providing a variety of types of materials, such as tests, publications, courses of study and the like. (3) You will note also that the number of services runs high.

A frequency distribution of the areas in the first column shows that six of the 18 organizations reporting are concerned with all phases of safety. As would be expected, there are certain organizations whose primary interest is in one area, such as, in the case of the National Board of Fire Underwriters, fire prevention, and in the case of the U. S. Department of Labor, industrial safety. The writer first endeavored to get some plan of assigning a numerical value to the various activities, in order to determine how closely the interest in specific activities correlated with the needs, as indicated by the accident frequency for various causes. It was felt that such a correlation might show whether or not the school safety movement in the country was being

directed along the most needed lines. Such a correlation was not possible because there was overlapping in the various areas, and any statistical interpretation by the rank-difference method would be mostly just hokum. However, there are certain natural observations that one can make that may have more or less validity.

1. Not nearly as much work is being done in the field of home safety as would be justified by the home accident situation in the country. For example, there are close to 100 different types of publications—courses of study, textbooks, work books and the like—on driver education, but comparatively few on home safety.
2. The same thing can be said for vocational and agricultural safety.
3. There is ample justification for the extension of our activities in encouraging courses for teachers. The U. S. Office of Education figures for last year show that there are 1250 colleges and universities throughout the country, not including junior colleges, yet during the academic year hardly more than 50, or 4 per cent of these colleges, offer courses in the various phases of safety education. Actually, however, the number is higher during the summer sessions. We will have to continue to strengthen our efforts for a long time to get any large number of colleges either to offer courses or provide institutes or conferences on safety.
4. It is refreshing to see that all of the organizations are in favor of co-operative activities or projects. While this does not necessarily indicate co-operation with other organizations within our Conference, nevertheless it is a fact that much of the strength of these organizations lies in co-operation. As a matter of record, during the present year, the publications of practically all of these organizations were used as textbooks or supplementary materials in the courses offered this year by the Center for Safety Education. In addition we utilized eight paid exhibits and distributed several

thousand publications of member organizations of this Conference during our visits last summer to 56 colleges. We feel that each of the organizations should take advantage of the publications of the others and distribute them as much as possible in connection with our field visits.

5. Some of our friends have been alarmed over the fact that there is an apparent duplication of effort on the part of national organizations. I have not been greatly concerned about this because the total field staff of our organizations is pitifully small. For example, the records show that eight of our organizations are interested in driver education. In spite of the work that has been done in the past ten years, the number of high schools—as compared with the 50,000 in the country—having satisfactory courses is still comparatively small. It is doubtful whether even one per cent of last year's high school graduates have taken driver education courses. There are some states in which the surface has never been scratched. At the rate at which we are progressing it will take many years of hard work on the part of all organizations before there will be a satisfactory program.
6. Every effort should be made by organizations to take advantage of the recommendations of the two recent President's Commissions on traffic safety and fire prevention. These conferences not only set up good objectives, but also should give as much needed public support.

The total circulation of magazines published by the various organizations is 645,000. This is a very fine figure and indicates the possibilities in the use of magazines in encouraging safety education. While it is true that some of these magazines carry safety articles infrequently, nevertheless, an article appearing in the *N.E.A. Journal*, for instance, with its tremendous circulation would be most helpful. Everything that can be done to have more safety articles appear in these magazines and in the many other kinds of educational publications would be just that which is our favor. Undoubtedly there should be a definite attempt on the part of our organizations to get articles into the publications of state educational associations, which have a very big circulation. The same thing

might be said for stories in the popular magazines, which have a tremendous circulation. While it is difficult to measure the relative effect of the various types of articles, it can be assumed that good articles in the *Readers' Digest*, for example, would have unusual value.

Anyone who has been familiar with the field of safety education during the past 15 years will realize that there has been a tremendous growth in the variety and types of publications available for schools. While there are no figures given in the reports that have come in regarding the number of publications distributed free or sold, the year's figure would undoubtedly run into several millions, exclusive of the textbooks and manuals sold by book publishers during the same period.

At one time the number of books on safety published by the book companies could be counted on the fingers of one hand; today the number under different titles is more than 100. It would seem that all organizations should continue to improve their publications and to get as wide distribution as they can.

It has been said many times, and should be repeated again, that one of the weak links in the work of all of our organizations is undoubtedly in the rural schools. When you take such states as Kansas and Iowa and remember that from 80 to 90 per cent of the total school populations are in rural districts or villages, this group is a very important but difficult one to reach.

All of the organizations represented in this conference have one objective that is identical: all aim to reduce preventable accidents to children and adults. All may have certain vested interests, and each organization may be striving to justify its work—its "place in the sun," but each profits from the successful work of the other. Everybody profits, of course, when accidents are reduced.

We have clearly demonstrated in the President's Conference that we, as representatives of organizations, can work together for the mutual good. But co-operation is predicated on giving and taking and, of course, it involves occasional meetings to learn what the other organizations are doing and publishing. There is no halo around the heads of any of our organizations; with our small staffs and limited budgets, the influence that any one organization alone can have on safety education practices in the country is negligible. We need to utilize every effort possible to get the local schools and other



agencies to take over their responsibilities for safety education programs. As a representative of one of these organizations, the

Center will continue to co-operate in every way that is possible. It is our hope and conviction that other agencies will do the same.

#### THURSDAY AFTERNOON SESSION

October 9, 1947

#### General Session

#### Demonstration Meeting of a School Safety Committee of a Local Safety Council

(Panel Discussion)

**Presiding:** HENRY T. HEALD, Pres., Illinois Institute of Technology  
CHILD & SCHOOL SAFETY COMMITTEE OF PLEASANTVILLE SAFETY COUNCIL

Mrs. NORMA F. WULFF, Pres., Board of Education, Cleveland; Chairman  
Representing the School Administration  
TERRY WICKHAM, Supt., Hamilton Public Schools, Hamilton, Ohio

Representing the Elementary Schools  
MARY MAY WYMAN, Supt., Safety & Special Education, Louisville Public Schools  
Representing the Secondary Schools  
LAWRENCE CLARK, Chairman, School Safety Committee, Lansing Public School

Representing Driver Training in the Schools  
RAY McFARLIN, Supt. of Safety, Dept. of Instruction, Board of Education, Cleveland

Representing the Parochial Schools  
THE REVEREND THOMAS J. QUINLEY, Supt., Pittsburgh Catholic Schools

Representing the Local PTA  
Mrs. E. B. SAMSON, Member, School & Child Safety Committee; Chairman, Women's Safety Council, St. Joseph Safety Council, St. Joseph, Mo.

Representing the Headquarters Staff of the Local Safety Council  
BRAXTON B. CAUL, Managing Dir., Jefferson County Safety Council, Birmingham, Ala.

**Discussion—**By members of the audience  
CHAIRMAN WULFF: This particular

meeting has been "staged" today to give you an idea of how we carry on a child and school safety committee of a local safety council.

Will the clerk, Mr. McFarlin, call the roll of those present?

CHAIRMAN WULFF: You have received a copy of the minutes of the last meeting; I trust you all read them. Are there any corrections? If not, is there a motion to approve?

MR. CLARK: I so move.

MISS WYMAN: Second the motion.

... Motion put to a vote and carried ...

CHAIRMAN WULFF: Anything in the line of communications since the last meeting?

MR. McFARLIN: No communications, Madam Chairman.

CHAIRMAN WULFF: At this time we will have reports from the various committees. We will start with Terry Wickham, who will report for the School Plant Safety committee.

MR. WICKHAM: Madam Chairman and members of the committee: Before making my report I think it would be well to remind you that in Pleasantville we have an organization in which safety is stressed from the grass roots. In Pleasantville every public and parochial school has a school safety committee or council. On those school safety committees we have major representation from the student body, but we also have members of the faculty, parents, and other citizens as members.

At our last meeting in August, your School Plant Safety committee made three recom-

mendations which were approved by the general committee. These recommendations were:

1.—That the persons in charge of safety measures in each school throughout the city be urged to develop a program for getting all new pupils thoroughly familiar with their new school building, its safety facilities, and its hazards.

2.—That the safety organization in each school be urged to make an inspection of its playground so as to discover any safety hazards which might have developed during the summer—while the playgrounds were used in the city recreational program.

3.—That each school be invited to develop its own program for the proper observance of Fire Prevention week, October 5 to 11, 1947.

Your committee is pleased to report that the schools have responded wholeheartedly to these recommendations. Among the specific activities reported from various buildings are the following:

(a) With respect to recommendation 1: Safety councils in some schools have caused maps of the building and grounds to be drawn by the pupils and have helped new pupils use the maps in learning to get about. Locations of fire alarms have been highlighted on such maps. Spots where dangers lurk have been identified, and proper precautions have been suggested.

(b) With respect to recommendation 2: Almost all the playgrounds have had the benefit of a careful inspection and, through the co-operation of the school administration, a great many unsafe conditions have been corrected. Among the corrections are: filling of holes and removal of pegs used in horseshoe pitching; removal to proper storage of temporary bleachers and ground-keeping machinery left from summer baseball; repainting (white) of steps where summer traffic had darkened them.

(c) With respect to recommendation 3: In many buildings the School Safety Council has invited parents to come to the school building during Fire Prevention week to participate in programs presenting the dangers of fire and methods of prevention. Others have proposed a general inspection blank in which pupils may use in their own homes. In each building the safety organization has conferred with the administration in attempting to improve the procedures to be followed in case of fire, and in drills upon these procedures.

Your School Plant Safety committee has two recommendations which it wishes to submit for your consideration at this time. They are as follows:

1: In practically all our school buildings, regular inspection of the premises as a means of eliminating fire hazards is a routine procedure; nevertheless, there is a wide variation in the procedures followed in different buildings.

It is therefore our recommendation that a city-wide committee be appointed to study the problem of school plant inspection and to develop the following:

(a) a list of the points that ought to be covered in a school plant inspection (list should be as short as possible);

(b) suggested personnel to do the inspecting.

A number of accidents which have occurred in school buildings this fall have been due to some of the following unsafe practices: careless handling of sharp instruments, such as scissors, pens, pencils, etc.; overcrowding of stairways; running in corridors and on stairs; crowding and jostling at drinking fountains.

It is therefore recommended that the safety council in each building study the problem in its own area and, in co-operation with the school administration, develop a program which will tend to eliminate these unsafe practices.

CHAIRMAN WULFF: You have heard the report. What is your pleasure?

MR. WICKHAM: I move to adopt plan No. 1.

MISS WYMAN: Second the motion.

... Motion put to a vote and carried ...

MR. WICKHAM: I move adoption of recommendation No. 2.

MISS WYMAN: Second the motion.

... Motion put to a vote and carried ...

CHAIRMAN WULFF: These two recommendations will be laid on the table for the time being, and we will take them up at our next meeting.

We would now like to call on Mary May Wyman, chairman of the Accident Facts committee.

MISS WYMAN: We had a total of 946 accidents to our children. Only 18 per cent of these accidents happened in our buildings and on our school grounds. We are working through our safety councils to eliminate drinking fountain accidents, and through our teachers to eliminate classroom accidents.

One of the schools where most of the accidents handling school occurred, has produced a plan on how to handle these incidents.

Only 34, or 3 per cent of accidents, happened to children as they were going to and from school, and 10 of the 34 were motor vehicle accidents.

Forty-five per cent of all the accidents that happen to children in the elementary schools of Piesantville occurred in their homes—414 out of 946. I hope the local safety council is going to get back of us in helping to organize the home program. We can do our share through the Parent-Teacher Association, but we need the aid of the entire council as well.

There were 390 so-called "other" accidents—accidents that happened when children were at play; in the afternoon on the streets when they were pedestrians; at the skating rink, which probably needs some investigation; and at the amusement park. We actually had 5 accidents in churches. I would suggest that there might be a campaign put on to have the churches do some work in safety.

These 946 accidents occasioned a loss of 3,477 days. That is really a very great loss of time when you consider our children are not getting education during that time.

With the cooperation of our superintendent, a directive was sent to all schools, asking that they make a study of their street intersections to see which ones needed police guard. We have some very complicated situations. The principals, with the help of the teachers, studied the intersections, noted the number of automobiles that actually passed, the number of children crossing, the number of turns that were made by the cars, and the speed of the cars. On that basis, working with the police department, we have assigned available policemen to the intersections and we are now very seriously considering putting patrols in all of our elementary schools.

We worked with the Fire Prevention committee. Through our Curriculum committee we brought out a unit on fire prevention so that fire prevention would be taught not only during one week but throughout the year.

Madam Chairman, if it is in order, I would like to move that the safety council consider very seriously a concerted effort to improve the home safety program.

We are teaching them one thing in the schools, and in the homes they are doing other

things. I think our program will be far more effective if all of us work together.

MR. CLARK: As chairman of the Industrial Arts sub-committee, I would like first to report the completion of the little project on the decimal equivalent card (I think each of you has a copy) which I outlined for you briefly at the last meeting. This has been distributed to all junior and senior school shop students, and from observations and reports coming in so far, it seems to be quite worth while.

In distributing these little cards, I sent along a short mimeographed letter to each teacher, calling attention to the opportunity that the card offered to teach a safety lesson, and I recommended, as strongly as I could, that such a lesson be taught with the distribution of the cards.

I believe a good deal of teaching did result. Of course, you must remember that teachers are human, and to expect a 100 per cent return on a thing like that is too much. But I personally have had reports from various sources and I believe that after several class discussions, the youngsters went home talking about safety.

Another interesting thing in connection with the little decimal equivalent card is the number of requests for samples we have received from outside the school. In fact, there have been a number of requests from industrial shops.

The second matter I would like to report on is uniform shop safety rules. These have been agreed upon, and the final copy for the poster is now in the process of going around to the different school shop chairmen for approval. When approved, the posters will be printed and distributed to every school shop in town.

Our aim is uniformity throughout the school shops. Incidentally, one of the most beneficial outgrowths of this project has been closer cooperation and better understanding between shop teachers.

Third, I am happy to report that the Curriculum committee of the Industrial Arts department of the school system is reviewing the whole industrial arts curriculum, at the present time, and safety is going to be adequately stressed.

A fourth matter that I think ought to be reported separately, although it is really an outgrowth of this curriculum plan, is the feeling that was evidenced among shop teachers who got together on the revision. Many

shop teachers were weak in their safety education "tricks", if I may use that term. It was agreed that all could be improved by a more general knowledge of safety experience. This is a little nebulous, but the shop teachers reached the decision to attempt to make a survey and try to compile a handbook of safety education devices which shop teachers had found successful in their own shops.

That concludes my formal report on activities which are under way and which have been completed. I would like to take this opportunity to toss out other things into your laps.

Miss Wynman brought out the need for public support. I am at a loss about this age-old problem of getting proper equipment, repairs and alterations needed to make our school shop safe. This problem is not confined to school shops, but to the entire school.

We find an unsafe condition—I am thinking now particularly of a junior high school shop—in which the ventilation is inadequate to take care of soldering and furnace fumes. It has been reported and complained about at least once a year for the last six years, but still no changes in the ventilating system has been made.

The problem is not just one of putting the "heat", so to speak, on the Board of Education. The "heat" is on them continuously from all sources for new equipment or alterations. From a safety viewpoint, is there anything we can do to help correct the matter and get the essential alterations, repairs and equipment needed for safety?

MR. WICKHAM: If the chairman of the committee had checked with the administration, he would have found that we have just appropriated money to take care of those things.

CHAIRMAN WULFF: Next we have Ray McFarlin, reporting on driver training in the schools.

MR. McFARLIN: For the information of the members not present at our last meeting, I am going to present to you again the aims of the driver training course in Piesantville.

Our general aim in driver training is, first, to prepare high school youths to assume the responsibilities involved in the operation of a motor vehicle; second, to help reduce the toll of traffic accidents; third, to prepare the youths of today to support sound traffic programs as citizens, and in some cases to be better prepared to cope effectively with

traffic problems if and when they become administration officials.

Our specific aims in our driver training course are:

1—Again to develop safety consciousness and proper attitudes toward driving;

2—To encourage the formation of safe driving habits;

3—To develop a proper understanding of the physical, mental and emotional characteristics and limitations of motor drivers and pedestrians;

4—To understand the proper attitude toward the causes of accidents;

5—To impress students with the reasonableness of driving laws;

6—To teach the function and operation of the elements of the automobile;

7—To develop a consciousness of the importance of preventive maintenance in the conservation of the motor vehicle;

8—To train students to drive an automobile and to develop an understanding of the physical characteristics of street and highway situations, including the significance and value of signals, signs and markings; and

9—To qualify the student for a driver's license.

Last year in Piesantville we had a very successful year, and this is the report for the school year, 1946-47:

In Piesantville last year all of the high schools offered driver training to boys and girls more than 16 years of age. About 1,400 students were enrolled. Of these, more than 1,300 were qualified for drivers' licenses. It is interesting to note that in the February-30-June-1947 class slightly more than 4 per cent of the total number of boys enrolled did not pass the course, while only one-fifth of 1 per cent of the girls enrolled failed to pass. It would appear that the "weaker sex" does very well in driver training.

The value of driver training throughout the United States, as well as here in Piesantville, is shown by a recent survey made in different sections of the country. A postwar study in Pennsylvania showed that drivers between the ages of 16 and 20 drove less than one-fifth as far per fatal accident as those between 45 and 50. In a Connecticut study, their fatality record was three times as high as that of the 40-to-50-year age group, in proportion to the number of miles driven.

In terms of miles driven, the 18-to-20-year age group has eleven times as many revocations of licenses as motorists in the 45-to-50-

year group, and they also have the highest death rate.

These studies of past experiences with the young driver suggest that the question is no longer, "Can we afford a scientific training of our young drivers?" They are the most dangerous group of drivers on the road, and the drivers of age 60 are next dangerous.

The Delaware State Police compared the records of trained and nontrained drivers over a recent four-year period, and they found that nontrained drivers had 46 per cent more violations than trained drivers. In Pennsylvania a study of 250 drivers trained at State College High school and 250 youths of the same age with no training, during a period of three years, showed that 5 reported accidents involved trained drivers while 13 accidents were reported by untrained drivers. Also, untrained drivers caused 11 injuries, while trained drivers caused none.

A study made in Cleveland, Ohio, some time ago showed that persons who had driver training were involved in 50 per cent less accidents than those that had no driver training.

The Pleasantville Safety Council and the other co-operating agencies in Pleasantville should be complimented for their far-sightedness in helping to establish driver training in the Pleasantville high schools, and also for being willing to share their experiences with others who are anxious to establish driver training courses in other towns and cities.

The report that just came in, before we came to this meeting, showed that this semester there are more than 685 boys and girls in Pleasantville now enrolled in driver training.

Finally, we have a new textbook in driver training that has just been put out this year. I would like to urge this Committee to read it. I will see that every member receives a copy of the book. Possibly, at one of our next meetings, you will want to urge adoption of this text as a regular classroom book for driver training.

FATHER QUIGLEY: At a recent meeting I was appointed chairman of a sub-committee to investigate the existence, and the proper use, of instructional materials in the schools of Pleasantville. Your subcommittee felt that its first task was to discover the use to which teachers were putting such materials as at present were available to them for the teaching of safety.

With the short time at our disposal, and

the limited personnel of our subcommittee, the survey of course could not be exhaustive. First of all, we discussed the matter with the local public school superintendent and with his supervisor of safety. We obtained opinions from those gentlemen as to what use the teachers were making of instructional materials they had. Then we obtained permission from the superintendent to send a brief questionnaire to a selected group—a sampling of those on the secondary and elementary level—asking them what they thought of the materials placed in their hands, and so what use they were putting them. Briefly, the results of the subcommittee's study were as follows:

The course of study in safety in the schools is an outline of materials and references and suggested activities. The teachers tell us that it is too vague, that there are copious references but they are references which are unfamiliar to the average teacher, and the teacher simply hasn't the time to look up all those books.

We were also told by the teachers that the course of study contains many suggested activities but none of the activities are worked out in any detail. And again the teachers complained that they hadn't the time to work out detailed activities, because most of the teachers are not trained in safety education.

The superintendent of schools, in this particular survey, maintained that he did not want a new course of study, and the teachers bore him out in that. There are enough courses now, the curriculum is already overloaded, and the teachers want material they can integrate with already existing courses and programs.

The teachers again maintain that, with the present course of study suggesting activities to them, they haven't time to work out the integration with the other subjects in their curriculum.

I am pleased to note that one of the other members of the committee mentioned today that the industrial arts curriculum revision is going to try to take care of this matter by working in safety activities with their industrial arts curriculum.

The next item we investigated, in addition to the course of studies, was the available material that is distributed to teachers by organizations like the Pleasantville Safety Council, various automobile clubs, and so on. Our study demonstrated to us that most of this material is excellent. Units are worked

out in detail, and the teachers like them; but, unfortunately, despite that fact, a large proportion of this material finds its way to various and sundry wastebaskets around the school.

The reason for that, according to the teachers, is that much of this material arrives at unexpected times and at irregular intervals. The teachers are busy with something else at the time this material comes to them in the mail, and they have a tendency to put it aside until they finish what they are doing. The result is that it usually is left on the desk for some time and, finally, it is discarded altogether. Sometimes these units are used by some teachers for busy work. It is questionable what particular value is derived from that.

At any rate, such units are not tied in with the course of study, not tied in with the school program, and it is difficult for the teachers who are planning their work weeks in advance to take into consideration material that has not arrived, and which may not arrive within the period for which they are planning it.

The committee concluded that most of the money spent on this material was being wasted, not because the material was poor in itself, but because the average teacher either had not the time to work it out or was unwilling or unable, because of her lack of safety education background, to correlate these units with other courses.

Finally, we asked also about audio-visual aids, and found that most of the teachers like them very much, but are unfamiliar with much of the material in the visual field that touches upon safety education.

We found that where safety materials were sent, teachers were enthusiastic about them. The value of the motion picture, it was agreed, was very great for developing safety education, particularly the use of such films as we have available on school safety patrols and driver education.

The committee also sought suggestions from teachers as to the nature of the materials they needed to make safety education important and effective. These suggestions, and the study of teachers' responses to the questionnaire, led to certain conclusions and recommendations which I would like to leave with you today:

1—The present available materials are not being used effectively.

2—The stated objectives of safety education

are too general in the mind of the classroom teacher. They are not understood by teachers in terms of application to classroom experience. The objectives seem to develop rules of safety but do not develop in the student a safety consciousness that transfers to his out-of-school life or that may carry over into his adult life.

3—The present materials assume in the teacher an interest in, a zeal for, and an understanding of, safety which simply does not exist. Teachers have not the time, finally, nor the training to work out whole classroom activities in safety.

Therefore, we make the following recommendations:

1—That teacher training, in-service or otherwise, emphasize the need of safety education, and impress upon all teachers why safety is necessary in the curriculum, why it is fundamental to the development of healthy, happy and efficient citizens. The teachers must be convinced and must become themselves zealous about safety, if they are to use any of the materials sent to them.

2—We recommend that there be no special course in safety, but that safety lessons must be worked out in existing courses. The correlation, however, must be definitely made and indicated and not left to any haphazard whim of the teacher.

3—We recommend that such handbook or safety materials, be placed in the hands of every teacher. The nature of the source book should be as follows:

It should be graded for the level at which the teacher is working. The activities in it should be worked out in detail. All activities should be listed by subjects wherein they may best be included—civilics, history, social studies, health, biology, and so on.

Thus, when a teacher plans a week's work in civics for eighth grade, she may turn to her handbook or source book on safety education and find listed thereunder "Civics, 8th Grade," some detailed activities which she can use in the classroom, and some readings that are worked out completely for her so that she doesn't have to go to the library and look into 15 or 20 books.

The committee submits these recommendations for consideration.

CHAIRMAN WULF: I would like to appoint a committee from the Pleasantville Safety Council to consider Father Quigley's recommendations. I would like to ask Father to serve as the Chairman, with Miss Wyman,

who represents elementary education, and Mr. Carr, the representative of the National Safety Council, to serve with him. Those three will get together with the local safety council and with the local board of education and take up these matters. You may appoint additional members on the committee, Father Quigley. We will expect a report at the next meeting.

At this time I would like to hear from Mrs. R. B. Sampson, one of the physical education subcommittee members.

MRS. SAMPSON: You recall that the subcommittee on Physical Education and Playground Safety was asked to investigate the situation in Pleasantville schools. We have done this, and our recommendations are contained in the reports which have been prepared by Muriel Loomax, supervisor of physical education.

We recommend that this report be printed and distributed to all teachers. The report follows:

Safety is an essential element of physical education for two vital reasons: first, because the high incidence of accidents is a challenge to teachers charged with physical education; second, the program of physical education is suited to practical instruction, safe procedures, techniques and skills.

It should be accepted that safety and efficient playing are synonymous. The correct way is the safe way.

To realize safety in physical education and on the playground, three factors must be right: first, the environment and the equipment used. Under teacher guidance, pupils should learn the proper place to play. Gymnasiums and equipment should be safe and sound. Second, activities should be adapted to the pupil, considering age, strength and ability. An adequate period of preparation should precede an activity. Relaxation should follow strenuous activities, and third, constant supervision of activity should be maintained. A pupil should learn to play the game according to established rules. They should learn the relation between safety and sportsmanship in athletics.

The teacher should be an expert in diagnosing symptoms of unsafe situations such as fatigue, excitability and inability to adjust to the situation.

Passing between gymnasiums and playgrounds and schoolrooms, pupils should go in an orderly fashion. There should be a quiet game at the close of the physical edu-

cation period, to reduce the chance of hurried movement.

Under no circumstances should pupils be allowed in the gymnasium without a teacher. The dangers of this are obvious.

There should be at least one member of the faculty who is proficient in first aid, and this person should be familiar with the administrative routine in handling cases requiring first aid.

The complete report lists 35 specific suggestions to insure safety. I will mention a few of them:

1—Children wearing glasses should not be allowed to participate in physical education classes unless glasses are removed.

2—Jewelry, such as bracelets and rings, might be the cause of an injury and should not be worn during games.

3—Gym shoes should be fastened securely and laces shortened to prevent slipping. The wearing of street shoes in the gym should be prohibited, except in such special activity as tap dancing.

4—Every accident or near accident on the playground or in the gymnasium should be the occasion for safety instruction.

5—The instructor should regularly inspect all equipment.

6—Movable apparatus, such as jumping standards, when not in use, should be kept in a storeroom.

Here are some rules for pupils:

1—Take care to avoid hitting others with a thrown ball.

2—Do not jump in stocking feet.

3—Drop the baseball bat, do not throw it, after hitting the ball.

4—Stick to safety rules in retrieving a ball thrown or kicked into the street.

5—Descend a rope lured under hand to avoid friction burns. Do not slide down.

6—Stop and look in games involving running, especially where the ground is uneven or where large numbers are playing.

MR. CARR: (Mrg. Pleasantville Safety Council) I have just returned from Chicago, where I attended the National Safety Congress, and I want to thank you and the other members of the committee for appointing me on your committee. I find that many safety council managers do not have the privilege of serving on their school committees.

I think it might be well, in that connection, to review some of the functions of the Pleasantville Safety Council. This committee in-

itself is tangible evidence of the interest of our school officials in the local council and in a city-wide organization for accident control and prevention.

As you know, the Council's primary job is to encourage interest in promoting accident control and prevention in the school, the home, or on the highway. We believe sincerely in teaching accident prevention in the schools, because there is no purpose in teaching the ABC's and how to add, subtract and multiply if the child is going out to be killed on the street in a traffic accident, or killed in the home as the result of a fall or something of that kind.

Our services are strictly voluntary. We have no legal standing in the school administration. We are happy that you are accepting us.

In that connection, regarding the services that the Safety Council offers the school, such as the distribution of films, audio-visual education aids, the safety lesson units, and so on, I would like to remind Father Quigley of the standing offer of the Safety Council to packet these materials once a month, send them to the schools monthly in a packet to a designated teacher to be reviewed by that teacher and distributed to the various classrooms where they may be most effectively used.

In addition to materials, we also have the assistance of trained safety engineers who are available to schools for technical services.

I would like to recommend that the junior safety councils of the schools be included on this committee and be used to make inspections, not with any idea of having them go out and tear down any school building because it may be unsafe, but to find, recognize and report the physical hazards which exist in the buildings. In many cases, the pupils themselves can do something about correcting the hazards. If the hazards cannot be corrected immediately, we can find out where they exist and try to avoid them.

If that recommendation is accepted—that the junior safety councils become a part of this committee—I would like to recommend further that the junior safety council in Pleasantville's elementary schools, as a part of their function, take on the operation of school safety patrols both at street crossings and in the buildings.

Working in connection with the Plant Inspection committee, a group of technical men from the Safety Council has just made a thorough inspection of all the school plants

in Pleasantville. This report is confidential, and is an information report, as he used strictly for the benefit and the guidance of the committee.

We found that the high school buildings, with one exception, are in excellent condition. We recommend that the stairways in the high school buildings be fireproofed and enclosed. We commend very highly the driver training program in the schools. We would like to see this program expanded to such an extent that adults may avail themselves of refresher courses or, perhaps, the first organized driver training they may ever have had.

In the elementary schools we especially recommend that hall patrols be organized to assist in the movement of pupils.

We further ask this committee's consideration of extending the organized safety movement into the first, second and third grades of the schools, because in those grades our children are most impressionable. They are forming habits which may become killing habits.

Safety education is something like character education—we learn by example. I have a neighbor who is a good neighbor, a good father and a good citizen. Many of you know him. He is very fond of children, but he is a bad driver. He learned to drive back in the horse-and-buggy days. We were riding with his two children in the back of his car one night. When we came off the side of the hill onto one of our tortuous, winding streets, he drove through a stop sign without stopping, and I called his attention to it. He said, "Oh, stop signs are for milk truck drivers." It got a big laugh out of the kids. But he is teaching my child bad driving habits.

I heartily agree with the recommendation of this committee that the Safety Council do something about adult education. I would like to remind this committee that we, as adults, are pretty well set in our ways, and that one of the surest ways of reaching a mother or a father with a safety lesson is through the school child. In other words, let's teach safety in the schools, with the idea that the child will take it home to mother and father.

Further, I would like to ask that this committee appoint one teacher in each school to be responsible for integrating safety education in that school.

CHAIRMAN WULFF: The Chair would

like to remark that, as far as asking that a teacher be appointed, we believe that is the function of the Board of Education and the superintendent and it is not our desire to dictate to them. We will be glad to pass your recommendation on to the superintendent of the Pleasantville schools. Will that meet with your approval?

MR. CARR: Yes.

CHAIRMAN WULFF: At this time I would like to remark on safety at the secondary level.

Your Chairman has had an opportunity recently of meeting with some industrialists who are very much interested in the safety movement. One of the industrialists said that industry spends hundreds of thousands of dollars yearly to train their men in safety supervision. Practically every plant in the United States has a safety director. He asked me why we, who are interested in the schools, do not teach more safety at the secondary level. We do quite well at the elementary level, but fail at the higher level.

I assured this man that we were doing everything we could to promote safety at the secondary level. Many of our students feel that safety teaching is *stuffy*, and we meet with much resistance.

We are trying to eliminate this attitude by pointing out that industry spends large sums annually to make industry safer. And we urge student participation in safety activities and programs at the secondary level.

We are all working on secondary education programs.

If there is no further business nor questions, the Chair will entertain a motion to adjourn.

MR. CARR: I move we adjourn.

MR. McFARLIN: Second the motion.

CHAIRMAN WULFF: We stand adjourned.

So much for Pleasantville. We will now assume our real roles. At this time, the audience is invited to participate.

MR. ADAMS (Oakland, California): Who should be on a school safety committee of a local safety council?

CHAIRMAN WULFF: The superintendent of schools, or someone appointed by the superintendent of schools; and that member of the police department who is in charge of the guards. We also have a representative from the public schools, one from the Catholic schools, the superintendent of schools in suburban areas, a representative from the Lutheran schools, one from the private

schools, a member of the Parent-Teacher Association, and we also ask a representative of the Federation of Women's Clubs to sit in. You might find that there are certain other people you would rather have.

Fundamentally, the committee should consist of persons who are connected with the schools and the police department, and who will work together.

MR. ADAMS: Who should be the chairman of that committee?

CHAIRMAN WULFF: He should be elected.

MR. GILLILAND (Oklahoma City, Okla.): Is it not advisable to invite some senior high school students to serve on that committee?

CHAIRMAN WULFF: Each school has its own safety council. This older group consists of the people who are running the schools.

We ask the young people in for conferences from time to time, but they were not official delegates from the schools. The schools are represented by the superintendent.

MR. GILLILAND: You would have some advantage in bringing in students. They might give a different viewpoint. After all, they are the ones you are working for.

CHAIRMAN WULFF: I don't believe I have made my statement clear. In every school—and I am speaking about a big city because I am not familiar with operations in small cities—we have a safety patrol and a safety council. We have a safety curriculum center. These people formulate recommendations. Mr. McFarlin meets with these people. He goes out to the safety curriculum center. We have a principal in charge there. The curriculum for the safety work is made up at that school. The local safety council cooperates.

The parochial schools have a superintendent of Catholic schools. There is also a superintendent of Lutheran schools and private schools. They get together on a program. When all the suggestions of the student councils and the student body are completed, the safety supervisor, acting as representative, brings these to us.

MISS WYMAN: May I tell you of our organization in Louisville? The vice president on the board of the local safety council is the chairman of the school safety committee. On that committee are the supervisor of safety education from Jefferson County schools; I am also on the committee; and someone represents the parochial schools. There is a

representative from the Parent-Teacher Association; a man from the police department, and a man from the fire department. Of course, the manager of the safety council is also a member of that committee.

We do not meet very frequently. If necessary, students attend the meetings. They do not come regularly because we would have

to have a very large committee to include all of them.

At the meetings we take up general matters.

CHAIRMAN WULFF: Thank you. If there are no further questions, the meeting is adjourned.

*Transactions*

35TH NATIONAL SAFETY CONGRESS



VOLUME XXIX

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## Foreword

THE Transactions of the 35th National Safety Congress and Exposition of the National Safety Council are published in 29 volumes. Volume I includes the Annual Meeting, Banquet, Women's Activities, Index to all volumes and List of Exhibitors. Volume II contains the ASSE Session and the Industrial Subject Sessions. Volume XXIX contains the Early Morning Sessions, "Psychology You Can Use." Each of the other volumes is devoted to the sessions of a single section or division of the Council.

The transactions are a record of the proceedings of the Congress, condensed and edited for reference purposes. The complete original manuscripts, many of which contain charts and illustrations which could not be reproduced here, are available in the files of the National Safety Council.

The National Safety Council seeks to eliminate from discussion matters not pertinent to the aims of the Council. However, it cannot accept responsibility for the views expressed at the Congress or in this record.

It is expected that the new format of these Transactions will permit wider and more effective use of the material relating to various fields of safety. At the same time, the whole set provides a complete and indexed reference work on all phases of accident prevention.

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# Psychology You Can Use

(EARLY MORNING SESSIONS)

Lecturer: J. L. ROSENSTEIN

Consulting Psychologist and Associate Professor, College of Commerce,  
Loyola University

## LECTURE I

I want to talk to you about people. I am not going to tell you what to do. I am going to rather, use Dr. Rogers' technique which he calls "non-directive counselling," or "non-directive teaching." I am going to give you things to think with, things you can carry away and play with and expand on and perhaps use permanently—not just once.

Some few months ago, those of you who are from Milwaukee and around this part of the country will remember that a serious and vicious strike which ran almost exactly a whole year was settled at the Allis-Chalmers plant. I am sure a great many of you remember that. It was settled, and that's about all. A few days after the strike was settled, I assume it was the company who put out a newspaper story which said something to this effect that "As a result of the strike, approximately \$80,000,000 in production was lost." Eighty million dollars in production, and along with that, approximately \$80,000,000 in wages! Now, that is a lot of money to me! Numbers like that bother me.

Recognizing that this is not a standard to go by, but accepting it merely as an example to think with, we recognize that if this were true throughout business and industry around the country, a worker who earns \$10 produces \$40 worth of goods—you remember \$80,000,000 worth of wages and approximately \$80,000,000 worth of goods—a worker who earns \$4,500 in any one year for himself, will have produced \$10,000 worth of goods for his employer! Now, we don't want workers to hang around for three months or six months and then quit us, do we? We like to do things, and we hope to work out such things that will keep them for at least ten years. We think of a machine in terms of ten years maybe. We amortize it over ten years, and we hope we will get the workers

who will stay with us ten years instead of ten days or ten weeks. This same man earning \$4,500 for himself and producing \$10,000 for his employer in one year will, at the end of ten years have produced \$100,000 worth of goods.

I have talked to accountants, and when I talk to these accountants, I say, "How much out of \$100,000 worth of production should be considered gross profit? Not net, but gross profit? They say, "Oh, maybe around 40 per cent." I don't know whether that figure is true. I am accepting their word for it. This \$4,500 a year worker, producing \$10,000 worth of goods per year, produces in ten years \$100,000 worth of goods and will in ten years earn for the company, \$45,000 gross. As a capitalist or as a businessman, how much money do you have to invest and how wonderful an investment would you think it would be if you had a big chunk of money, how much would you have to invest to get a return of \$45,000 gross in ten years? Wouldn't you think that was a pretty good investment? That is not the net because you would have to spend money investing that investment. Before you put your money in, you would spend a lot of money trying to find out whether the \$100,000 of yours was going to be thrown down in a sinkhole. During the ten years, you would spend additional money keeping a check on your investment, making certain that money was not being thrown away, but the investment was being carefully watched and nursed. You would want to make sure to get the most out of your investment that you could. You would want to make sure you are going to get \$45,000 gross profit in ten years. I am now talking about a \$4,500 a year man.

If you would be willing to spend that much

money and invest that much money to get \$45,000 gross profit in ten years when you are talking about dollars, are you spending that much money on every single \$4,500 a year man that you have in your organization, to discover, to maintain, to direct him, to make certain that in ten years he will produce all he is capable of producing? Play with that idea for a while.

Just a few days ago—there was a machine tool show in Chicago, and next week there is a metal show. They had one gear shaper; it must have cost \$20,000 or \$25,000. Some few months ago when I was up in Madison talking before the Madison Executive Club, one of the men was extremely excited about what they were doing. He wanted to show off, and he was telling me about the \$27,000 lathe they had. That's a lot of money to me, too. I have a hunch damn in my basement which I haven't used since I moved to Chicago five years ago, but I think I paid \$43 for it with some goggles, and so \$27,000 for a lathe sounded like it ought to be priceless. When he talked to me about the lathe, his eyes glimmered, and he took me over to their plant and told me about the experts who work on the lathes. I talked to him at length, and, by the time my phone was ready to leave, I learned that nobody was ever permitted to work with that lathe unless he knew what it was all about because the maintenance of that lathe was very important in order to get your money's worth out of it. After he kept on talking and I kept on needing him about maintenance, I said, "Well, that's just fine. Maintenance is wonderful. Do you have a man maintenance in your plant?" I think he thought I was crazy.

Let's not talk about \$27,000, but about a \$4,500 machine amortized over ten years, \$450 a year. It may be a very, very fine machine, and you add \$50 a year for maintenance. That is \$500 a year. You don't get production out of a machine! You get production out of man-machine cooperation. Do you spend \$500 per year on every man who is working on a \$4,500 machine tool? Did you ever buy a \$4,500 machine without checking it and investigating it, or without having some engineers spend a little time either at the factory or when it is delivered, getting it set up just right so that it does its job and seeing to it someone is acquainted with every part and every aspect of it so that you know all its weaknesses, all its limita-

tions, all its attributes and all its qualities; everything you can get out of it?

Do you know anything about the qualities and the attributes and the limitations of the man who is going to be working on that machine to get production out?

In my classes in psychology at the university, I have difficulty telling these smart people who come there. They come there with a psychological approach toward the worker. They have a psychological approach to the worker. They want to treat them like human-to-produce people who have hopes and needs and fears and ambitions and hopes and aspirations, and I think that is wonderful. But, I say, look, everything that has gone wrong with labor-management relations has been based on that principle of trying to deal with people as people with feelings and fears and needs, and we have made hobbits of it. Let's forget that! Let's treat them as economic factors. Let's be selfish, hard-headed business people. Let us say, "I am in this game for the profit and the money that is in it. How much can I get out of this worker?" And then, what will happen? We will maybe treat a human being as well as we treat a machine—maybe. If the machine doesn't function properly, if the machine doesn't produce, if we go outside its limitations, we know something is wrong. We don't get a mallet or a hammer and slap that machine. We don't pick it up and throw it down. We don't penalize it. We don't say, "You are going to be laid off for three days and you aren't going to get any oil because you haven't produced properly."

We do that to the worker. We scribble all kinds of evil things to every one of his performances which doesn't match up to what we think should come from him. How silly and how stupid! Why not treat him like a machine, and you will treat him right.

Did you ever permit a man to work on a machine unless he proved that he knew something about that machine, its qualities, its properties, its limitations and attributes? Did you ever permit a clerk to work with figures unless he had proven to you he could work with figures? Did you ever let a salesman go out and sell your products unless he had proven to you that he knew how to sell and deal with people and how to direct their thinking and actions? Did you ever permit a man to drive one of your good trucks unless he had proven to you that he was a good



truck driver? Not a chance in the world! But what about these men who are controlling and directing the actions and the destinies and the lives of the people working in your shop.

Did you ever know a foreman who had to prove to management that he knew how to handle men? Did you ever know a supervisor or an executive that had to prove that to top management first? I have never seen one. All foremen have to do is prove that they are outstanding technicians, that they are good, honest, hard-working, loyal people, and they become foremen when the opportunity arises. The same thing holds true at every level of supervision.

In the publications and the articles, we see and hear bigshot management say, "O, give us men who understand men! Who can lead men!" But never do they demand that they prove anything beyond technical skill before these men are employed and placed on the job. Most supervisors know how to control the technical aspects, but they do not know anything about the individual qualities and properties of people, of human nature. What kind of supervision do you think they are getting? You as safety people have to deal with these people under that kind of direction and supervision. The result as I see it is something far from acceptable.

A symptom is a sign of something else. According to the dictionary, it is a symbol of something else. A headache is a simple symptom. A headache means there is something wrong, not necessarily in the head. It may mean that you have strained your eyes. It may mean you have a digestive upset. You can treat the symptom by taking aspirin, and you can relieve the pain and eliminate the symptom, but you will not cure the digestive upset by aspirin, nor cure the strained eyes.

An accident is a symptom. Love, hatred, fear, antagonism, admiration, cooperation, lack of cooperation, are all symptoms. Those of you who are working with accidents are wasting your time, apparently. You are working with symptoms, not the disease. I think you know more about accidents than anybody could be expected to know, but have you ever seen an accident without a person involved? Have you ever studied people? Isn't it curious that you study every single thing about all kinds of accidents, but never do you study the people, the one thing that

is in every accident! What right do you have to be safety people unless you make it your business to study people, the one, single individual factor that is never missing from any accident that has ever occurred?

Furthermore, I think your point of view toward accidents is warped and twisted. It's not your fault, it's the peculiarity of your logic. I say there is only an accident when nobody is hurt, because to me an accident is like a machine. A machine consists of parts that are put together, and when they are put together properly and put into action, they will produce the only thing which that machine was built to produce. The same thing holds true with an accident. An accident consists of a number of conditions which come together. When these conditions come together, it will be an accident, and if nobody is hurt, according to your way of thinking, it is not an accident; according to my way of thinking, it is only an accident when no one is hurt.

I think you teach safety poorly too. You have tried to use every conceivable approach to the intelligence and the understanding and the reasoning of the worker. But I say, "Look, if I want to know something about accidents and safety and prevention of being killed or hurt, let me go to the professionals, the outstanding professionals I know who constantly put themselves in jeopardy as part of their jobs, like circus acrobats working up high with or without a net. Now what do these acrobats do? Do they depend on reasoning and understanding and logic and a willingness and a desire to be safe, to keep from getting hurt? They spend their time in winter quarters going over the same thing again, and again, and again, until they are not conscious of doing anything, until they are machines, until they are perfect in a habit pattern and the habit is a perfect performance, no consciousness, no awareness, no nothing—just get them started and they perform."

Recognizing that something might go wrong, a hand might perspire despite the powder or the resin, they might slip, they rehearse how to get killed, how to fall into the net without a scratch. Are you teaching men safety on the basis of understanding and reasoning or habit so that if anything untoward happens they perform like a machine, mechanically and perfectly, so that they will not be hurt? Do you actually have daily rehearsals of what to do in an accident?

Maybe the man will say, "That's silly. If my machine does this, I do this." If he doesn't lose an arm, it won't be silly. Habit is the perfect performance. Don't teach them by common sense, don't teach them by reasoning. Teach them by repetition over and over and over again the actual way to perfection, a habit performance. People are not logical animals; they are psychological animals. If reasoning and thinking comes in, they don't reason with their hands; they reason with what's in their heart: not what's between their ears.

They never react to things or conditions. They react to what these things and conditions mean to them. That is why smokers who go down into the coal mines smoke cigarettes and snatches. If you try to stop it, you have a strike on your hands. They are not reasoning with their heads. There is a symbolism attached to this, a symbolism that they think with.

You have in the labor unions the fact they are always fighting one of the three major things: wages, hours, and working conditions. Working conditions are terrible. Working conditions are always bad. The best they are is indifferent; they are never good according to the union. For that reason, morale is low and people won't cooperate. That's a lot of malarky! You know that. The telephone lineman and the man who works for the Commonwealth Edison works in rain and snow and sleet and hail and hot summer and cold winter, and that is when he does most of his work, when the weather is bad and his working conditions are terrible, but morale seems to be fairly high with these people. It isn't the working conditions at all. It is the symbolic meaning of these conditions to the worker.

I want to ask one of you a simple question. If you were earning today as a worker \$47 a week, would you think that is a fairly decent wage?

MR. EBER: (Kohler Co.): That would be about the minimum.

DR. ROSENSTEIN: If you were earning \$50, would you think that was a fair wage?

MR. EBER: Fair.

DR. ROSENSTEIN: All right. We have arrived at a fair wage, \$50. Now, suppose you had been with a company two years or a year and a half and had gotten to the place where you were earning \$50 a week and you thought it was a fair wage. One day around

the 15th or the 1st of the month you found in your envelope, a little red slip, bright red, and a check, and the slip would say: "Dear Mr. Eber: Because of your cooperation and the loyalty of our employees, we have earned so much money that from now on, your pay will be \$150 per week." How would you feel about it?

MR. EBER: I would be walking on air.

DR. ROSENSTEIN: I think you probably would, and so would I. Now then, suppose about five days after you got this check, this is next Thursday, you are up in the cafeteria sitting with three of the other boys and you say, "Brother, isn't this really hot? Imagine, \$150 a week!" and one of the fellows turns to you, "What do you mean, \$150?"

"Why, didn't you get a raise?"

"Yes, I got a raise."

"Well, what did you get?"

"I got \$157.50."

Tell me about that, Mr. Eber, how would you feel? How would you react now? We have left you walking on air.

MR. EBER: The bubble would be busted.

DR. ROSENSTEIN: What would you do about it?

MR. EBER: It would break your morale quite a bit.

DR. ROSENSTEIN: It would hurt your morale. That's right. What you have told me, Mr. Eber, indicates that you are a normal, human being.

Apparently it isn't the \$150. Apparently there is something comparative and something relative as those working around the job evaluate it. It isn't how much I got, it is what it means to me in the heart. This man gets \$157.50, I get \$150, both of us knowing we haven't earned it, but I know I have been taken advantage of. Something has been done by the company. That's the kind of normal human being you are dealing with, because he works in terms of things, in terms of symbols.

The boss is a symbol—a sinister one. You try to deal with reasoning and logic and you can't get over the story you are trying to teach, because you are reasoning with an emotion. Good psychologists know that. You never reason with emotions and a symbol is an emotion. Labor leaders and labor agitators, teach that management is the villain, who will try to take advantage of you, and that is the symbol of capital. That is the

symbol of management, that is the symbol of ownership in the eyes of the worker.

Management doesn't do a thing about it. Management doesn't spend one half as much time selling its most important public in the shop as it does in selling people on the outside. One of the things that it hasn't sold or taught its worker is the meaning of profit. If you want to know anything about profit and making profits, you don't go to the do-gooders, or the thou-shallers, or the palpit therapists, and you don't wait for Sunday school teachers. He says, "I apologize for agreeing with them, but that is the most important and basic principle of profit." People will do business with you so long as they know you are in business to give them service. If somebody else gives them more service, they will turn to them. Profit and a growing profit is the end product of service rendered to somebody else. It is not at the beginning of the line; it is at the end of the line. Service comes first. Have you taught your workers that they are entitled to a profit, maybe a greater profit than they are getting now? Have you ever tried to teach them that basic principle of business profit, as applied to their own business and working lives? If not, I don't think you are doing your job well.

Today we know better. It isn't a question of making profit. We want to make more and more profit. How do we grow? We grow only in one way, by getting customers to buy more and more goods, by getting new customers to come in. How do we get that?

## LECTURE II

Today I want to discuss with you what you might mean by personality.

I think it is important. Everybody talks about it. If I were to ask ten or a dozen or fifty of you what you meant by personality, the chances are I would get ten or a dozen or fifty definitions—none out of textbooks, some of them your own ideas.

You would say something like this: It is the way a person does things; it is his manner, his smile; he represents culture or charm, or maybe intelligence; or you say "He has a manly handshake," or "a handshake like a handful of wet liver." You are talking about some kind of a person in some kind of action. Now when this meaning is over you might say, "That guy didn't say a word that meant anything, but he had a terrific personality." Some may go away and say, "Every time he opened his face, he had something to say, but a personality? Good I couldn't stand him for five minutes—except that I paid already, and I might as

well sit through the meeting." People don't care whether we make a profit. They don't care whether we stay in business. They are interested only in, when they give us hard earned money, what are they going to get for it? There is the principle then. People are not interested in you. They are interested when they do business with you and how you are going to serve them. Profit is the end product of service rendered to others. There is your basic principle of profit.

You say to him, "Mr. Hard-headed Businessman, that's the stuff you get from Sunday school teachers." He says, "I apologize for agreeing with them, but that is the most important and basic principle of profit." People will do business with you so long as they know you are in business to give them service. If somebody else gives them more service, they will turn to them. Profit and a growing profit is the end product of service rendered to somebody else. It is not at the beginning of the line; it is at the end of the line. Service comes first. Have you taught your workers that they are entitled to a profit, maybe a greater profit than they are getting now? Have you ever tried to teach them that basic principle of business profit, as applied to their own business and working lives? If not, I don't think you are doing your job well.

well sit through the meeting."

There may be with the same individual, the same performance, but a difference of opinion as to whether he has a good personality or a poor one. You and your wife may have seen a lovely couple arm in arm staring at each other's teeth oblivious to the rest of the world, completely entranced, the knowing he is the most wonderful personality in the world, and your wife turns to you and says, "I wonder what she ever saw in him!"

Apparently this business of personality is something that we should try to put a finger on. If you will examine very carefully what you mean by personality and what I mean by personality, you will find that my personality has very little to do with me and what I do and how I go about doing things. You will discover that my personality is based on your personal prejudices collected over a period of us, 30 or 40 or more years

of what you think is good or bad or fine or boorish or uncleaned or cultured or general, reprehensible—that's my personality.

I don't have any personality of my own. All I have are performances, and the way I perform and my personality so far as you are concerned will consist of whether or not my performances are in line with what you like or what you dislike. Your personality and the personalities of the men in your management are based on the prejudices, the dislikes accumulated for us, 30 or 40 years, of the men who work for you. Therefore, when you say to me, "Can my personality be improved? I will say "Sure." If you come to my office and say, "I want to do something about my personality. I want to improve my personality," my first question would be, "For whom?"

My personality is different here than it is when I am sitting around home on a Sunday in my robe reading the Sunday papers. My personality on Saturday night when I am out with the boys is different than it is on a Sunday morning when I teach a Sunday school class. My personality is different when I am away on a trip with my wife to New York than it is when I am attending a meeting of the faculty of the university. What am I doing? I am doing the very thing that every salesman knows must be done. The salesman walks into one store, takes his hat off, fixes his tie, throws his cigarette away, throws away the chewing gum, goes into the office and says, "Good morning, Mr. Smith. How is Mrs. Smith? She was quite ill when I was here last time. I hope I may bring in my line, and I hope you will have time to look at it." He walks down the street, puts his hat on the side of his head, sticks a cigarette in his knee, walks in and says, "Hi, Funk! Did I tell you the story I picked up in St. Louis?" He knows that if he were to switch personalities, he might be thrown out of both places.

Apparently he has learned that his personality, his acceptability as an individual, is not based on his inner personal qualities, but his personality is dependent on the likes and dislikes and the prejudices and the antipathies of the people with whom he deals, and he therefore must have multiple personalities.

You must remember that any program that you ever expect to put over to your men will only go so far, will only be accepted

in so far as you and your performances coincide with their prejudices of what is good and worth while. The salesman or the sales manager has learned that two men call on the same customer and one can sell him and one cannot sell him. Is he selling anything different? Yes, personality fitted to the prejudices of the individual.

Every plan, then, must be built so far not only a logic which includes facts, but a logic which includes the prejudices of your people. Why? Because elementary psychology teaches that there are three basic reactions that human beings are supposed to be born with: Fear, rage, and love.

I want to speak about fear. What are the conditions under which fear arises? What do we fear? What are we apprehensive about? Well, we fear that which we do not understand. We fear things that we don't know. If we understand, we can control or devise a means of controlling; if we don't understand, we can't control. As John J. R. Morgan, the famous psychologist who died a year ago at Northwestern, said, "Men used to be afraid of thunder and lightning, until they learned to understand what it was. Men were afraid of the various plagues because they didn't understand them." Now, we don't like them. We are afraid that they might come, but we know; we are not afraid of them as such. We are suspicious of, we mistrust, we are antagonistic to things we don't understand. We are suspicious and mistrust the motives of people we don't know well. We trust people we know and we will go very far in trusting people whom we know, and whom we like. We mistrust people whom we don't know. We want to be sure of their motives first. What are you doing? What is your management doing to get the people to know them and get acquainted with them? You know people and you may say to your friend who doesn't know some individual, "I know he is like that," or "I know she is like that. But when you get to know him, he's a peach. I know she is peculiar, but when you get to know her, she is just swell." Why not get to the place where the worst they can say of you is that you are peculiar. If they know you, that is the very worst they will ever say. If they don't know you, they will mistrust you.

What is your management doing so the workers will get to know you and get to know and understand your motives and what

you are really trying to do? Labor leaders are not aloof. Labor organizers are not aloof. "Commies" are not aloof. Supervisors and management are aloof. They are afraid that their dignity might not be able to withstand getting acquainted and friendly with the workers.

Don't you think that what you have to sell can stand as close inspection as what labor leaders or organizers or "commies" maybe have to sell? Let's spend a moment with the salesman. Salesmen know the answers.

The salesman knows that there are several parts to a sale. He knows that sometimes a sale is made long before he ever gets to a customer. He calls that the pre-approach, the preparation, the getting the thing ready so that there will be receptivity to a program. It doesn't make any difference how good his product is; he knows that he must have his pre-approach before he ever approaches and before he tries to sell and before he tries to close and before he gets away. Are you using a pre-approach? Or do you start right in and sell safety? Why not go to your sales department and ask them to tell you the story of the pre-approach and how safety can be pre-approached. I think it takes salesmanship of the highest order, especially today, to put over the very finest of programs such as yours. Why? Let's take a look at your customers, the people to whom you are trying to sell safety.

Do you know that about 30 per cent to 40 per cent of the men who were discharged from the services for medical reasons were discharged because they were emotionally unfit? They had passed the physical examination, the mental examination, and some other examinations, were already in service, and then were discharged because they were emotionally unfit? They all came back, and most of them went to work. They are working in your plants, in your stores, in your factories. The unstable, the neurotic, the potential psychopaths, they are some of the people whom you are selling.

Do you have a psychiatrist around who can teach you and show you how to deal with them?

Here is a second picture of this group to whom you are selling your customers. Back in 1938, Mr. Roper, of the famous Fortune polls made a study in which he asked people a question from the day laborer level to the top executive and profession: If you were 18 years of age again and had it to do all over

again, would you choose the same kind of work? Are you satisfied and happy with your work? Fifty-five per cent of the people said, "No," from the day laborer level to the top executive level. At the upper level the percentage was lower than that, but the over-all picture was 55 per cent. They would never go into the same kind of work. That sounded pretty bad. In 1948 Drs. Patterson and Stone at the University of Minnesota made a similar study. Don't forget, in 1948 people were making a lot of money. It wasn't a matter of wages. The over-all picture was that 58 per cent said they were dissatisfied with their jobs and with their work, and they would choose other work.

He also inquired, "What would you turn to? What would you rather do? What kind of a career or job?" Out of that 58 per cent, 88 per cent of them working for other people in factories were dissatisfied, from the day laborer to the top executive level. Fifty-eight per cent of your customers dislike their work and dislike their jobs and feel that they are at a dead end, that they are failures, that they have gotten into the wrong kind of career or the wrong kind of job or wrong kind of trade. Do you have a psychologist that can help you with that problem?

Well, don't you think that you need some help, more than a knowledge of safety to deal with that kind of a group? If you think that you might learn something from the Western Electric program on counselling and dealing with these people? Don't you think that they have problems of turnover just like other companies, and don't you think they have been able to reduce turnover, reduce absenteeism, and unions haven't had much luck with them either because they have turned their attention to the human side, to the psychological side, to the emotional side of the workers' adjustments and instabilities and emotions?

Why not learn from good, successful practice?

During the war, we knew that it was difficult to get a good worker. Anybody that could stand up, was warm or slightly warm, was a good worker. If he leaned against the machine, that was all right too. It was my job first, as head of the Incentive Division of the War Labor Board here in Chicago, then later as administrative officer for the team of personnel. You wanted approval to War Labor Board, to worry about the prob-

lems' wages, and we had to have somebody write the approval. We couldn't get typists or stenographers, and we couldn't pay them as much as you were paying them. As in every business, we had to establish a policy and my first meeting with all the employees took about four or five minutes. I said, "Look, boys and girls, I can get all the heavy help I need. I can get all the peer help I need. I can get all the help that will lay down on the job. All I have to do is walk out on the street and pick them up. What is hard to get is good help. Now, if you intend to do a good job, you stay here; if you intend to be no good, I will throw you out and take a chance on somebody else being better, because people who are no good, I can always replace with assurance that I can get them at least as no good as what I have." Some of you are baffled by the thought that turnover is something to be afraid of. Turnover in poor labor is something to be proud of. You can always replace them with people equally as poor, and you might get somebody better.

I have a stack of questions, about 600 or 700. I got these questions from my students. They are all juniors and seniors at the college level. They were at the upper level before they came to my classes, and I said to them, "For every single day that we come to class, whether we are completing a chapter or a part of a chapter, you must turn in two questions based on the five pages or ten pages which have been assigned to you. I accumulated these questions, and as a result of scanning them, I suddenly got a picture. The average man and woman who is a senior in college is going to graduate with antagonism, an anti-management point of view. Not necessarily pro-labor, but anti-management, because the questions are something like this "Well, why don't they . . ." or "Why is it that management does . . ." or "Why isn't it true that management is willing to do", and so on. I insisted they were not to put their names down but the kind of work or business their fathers were engaged in and approximate income. I thought maybe if they came from workers' homes they had gotten this kind of an attitude from home. I discovered that by and large those people who are in my courses on personnel and business organization are thinking of leaving school and going to work for their dads or with relatives, because they are not

all at low income or labor-worker level. Most of their parents are either at the executive level or are in business for themselves.

Where do they get that attitude? They pick it up in the newspapers, on the street. What are you doing about it? Anything? No. One must not become inattentive. One might lose one's stuffed shirt!

And again I say to you the "commie" hasn't got a stuffed shirt. He has a fancy story to tell. I don't think it's as good as yours. Why don't you tell yours?

The schools don't teach them ethics, the responsibility of one man to another. They don't teach them about the basic problems of living. Every one of us who gets out of school is going to get married and hopes to have a home and family and children. They teach the boy how to make a necktie holder and teach the girl how to sweep under the carpet and hang curtains, but they don't teach her how to be a good mother or good wife, or him a good father and husband. They come out of school and are thrown out on the street. You get them, and you know as well as I do that 75 per cent to 85 per cent of the adjustment problems you have on the shop floor are brought in from the outside. What are you doing about leisure? You know leisure is a menace as well as a blessing. Nobody ever gets in trouble in the eight hours he is on the job. You get into trouble after the meetings are over. Are you teaching them anything about their leisure time, their uncontrolled activity when they are on their own?

We have these beautiful gymnasiums. Sure, we talk about physical health, and we try to teach them that and that is a wonderful thing, but we don't do anything about mental health. It is not important enough. There is no grade school, there is no high school, and very few colleges which have programs in which they deal with the mental health of the individual student. We have no places where they have programs of vocational guidance, where they try to study the child or the boy or the girl, or the man or young woman and study jobs and try to fit jobs and men. That is why these kids come out and come to your offices and say, "I want a job."

"What kind?"

"I'll do anything. All I want is a chance to show I've got something."

Don't you think it is important? I do. Do you think it affects your job? I do. Do you

think frustrated, unstable, maladjusted people affect your record? I do.

Remember these unstable people, these frustrated people, these people who are highly suggestible, because they are hungry and groping for an answer to their problems

are easily led by those people who can mislead them and are misleading them. How about getting into the game? How about getting your own sales department and yourself cooperating to put over the program that will fit these people?

### LECTURE III

Approximately one out of 20 people, 5 per cent of our population, belong in institutions for mental disorders but are not there. Some of them are working for you. More than half the hospital beds in the country are occupied by mental patients. Do you think TB is serious? There are at least nine beds filled by people who are mentally ill as compared with every one filled by a tubercular patient. At least 50 per cent of the patients who come to doctors are suffering from mental or emotional illness, even though they complain of physical aches and pains. You go to your doctor once a year; you go to your dentist twice a year; you watch your diet; you take exercise for health's sake, and you scrub your teeth, and you watch your eyes, and you take care of your ears and watch your hands, and make sure you don't take things in that are going to make you ill. What kind of mental exercise do you take? Do you see a psychiatrist once a year? When did you scrub your mental teeth last? What kind of a mental diet are you on? Do those questions sound silly to you? Maybe mental health isn't as important to you, not any more important to you than safety was before 1912 when the Safety Council began to do its work.

We are almost oblivious to the fact that there is such a thing as mental health and mental ill health, until we run into it in our own families, and there we don't talk about it. Everybody has an uncle or cousin who is a little bit peculiar or eccentric—never ourselves!

We know ladies are wonderful. They have a directness about them that is frightening to men. You can pass the stores and see all kinds of gadgets in the windows for the purpose of making them lovelier than they really are. My wife and my daughter get into conversations about these flexible arrangements which are supposed to mold fat which accumulates from sedentary physical occupations, into more esthetic forms. But there is no such thing as a "mental girdle" which

will take care of the mental fat which accumulates between the ears as a result of sedentary mental occupations. Even the ladies haven't found that one!

What kind of exercise are you taking? What are you doing about your own mental health? You don't expect to obtain perfect or good physical health forever without doing something about it. Why do you think you will not deteriorate in mental health unless you do something about it? You have a family doctor. You have a family dentist. Do you have a family psychiatrist? When is so peculiar about going to a family psychiatrist if you feel mentally distressed and disturbed? "Oh," you say, "it is a minor thing. Surely I can take a mental aspirin. Maybe there is a mental sodium bicarbonate."

In some plants they have set up programs for this purpose. I mentioned one, Western Electric. There are many others who are using counselors to whom the worker may turn when he has something on his chest. He is permitted to blow it off. He is permitted to weep on somebody's shoulder and give no opportunity to work out his own problems. Every one of us needs someone to turn to. Do something about your own mental health. Do not chiding about your own thinking concerning human nature.

There are some things which people will do and some things which people will not do. If you expect anything different and are disappointed because you don't get the results, nothing is wrong with the people from whom you do or do not get it—there is something wrong with your thinking. Let's consider two or three or half a dozen of these things which we may expect from normal people every day.

First of all, people, including you, will not look beyond their own immediate, narrow, small interests. They live in a universe of their own. They don't care about anything much that happens outside that little universe. They are not interested in you any more than you really pay down deep inside

of you are interested in anybody else. You are interested in yourself and your wife and your children and your home and perhaps one or two other people vitally, the rest of them you are interested in just because you happen to be a nice person and don't want anything untoward to happen to them. But if anything did happen, you would be unhappy very, very temporarily. You would not be thrown out of stride for very long. That's human nature. That is the way people are with whom you live. That is the way the people with whom you live, find you.

Second, people will resent change. Not because the new things are not better, but because even though they are insecure in present conditions and even though they may be uncomfortable under present conditions. They will still resent change because they have become secure in their insecurity, secure in their discomfort. They understand their present insecurity and discomfort. They are not afraid of it. They have adjusted themselves to it, and any change will mean a new kind of adjustment, and they don't know whether they are going to be able to adjust. Some of you know people who have refused better jobs or promotions. You thought they were crazy because they wouldn't take the promotion and the opportunity. They didn't take them because they were afraid. They know that for the rest of their lives their ego is taken care of. The company probably had said to him, "You are a good man, and we want you on a better job." For the rest of his life, he can say, "The pretty good stuff. I turned the opportunity down." He turned it down because human nature is such that people lack initiative. They will not do anything, and they will not take the initiative for doing anything unless they are proud of it. People are afraid of not making good, because, from the time they were born, they were taught by the process of every day conditioning that if you do something wrong, punishment is in line with it. Punishment and pain and suffering always go with making a mistake. Isn't that the way you teach your children? Isn't that the way you were taught, and so we are afraid to do things because we might not do it well. We might make a mistake. We might fail and we don't want to fail. This may be unconscious reasoning, or it may be a rationalization we are not aware

of. "I don't want to fail. If I don't try, I can't fail, and if I don't try and don't fail, I can always say, 'I could have done it if I had wanted to,'" and so you say, "If I only had the time, I could write as well as these people," and "If I had the time, I could talk as well as that guy on the platform," and "If I had the time, I could do this or do that."

We get a perfect example from women, and women are as brainy and can do as much as any man. Although male ego says they can't be good supervisors and "If we don't give them a chance, they can't prove we are wrong, so we won't let them be supervisors." During the war, they were supervisors and they did a mighty good job. We always forget "Mama" Glibreth who was able to raise several children and become the outstanding industrial engineer in the world.

We hear that old one about the Japs dying to save face—maybe we don't say it as well, but we mean it in the same degree. People will die to save face. So don't do anything that will cause people to lose face.

It is also human nature to forget great big favors and remember for a long time little hurts. That is what you may expect of people. It is human nature not to fight for things, if there is anything to fight against. Remember that in your teaching. It is human nature not to dare to be different from the crowd unless that difference will be considered a virtue. That is why those of us who try to be different or unconventional or radical attach all kinds of virtues to that difference and the principle of psychology is that the more different I am, the more noble I try to make my activity appear.

Since people think with what is on their chests rather than with their minds, since they are psychological rather than logical animals, and since people are hungry to be led, they will accept readily beliefs that are ready-made rather than thinking through things for themselves. That is why people are usually misled. How do these misleaders mislead them? First they begin to build confidence on something that has virtue and they lead them astray.

It is human nature not to have any goals; people usually just wander around, wander around, no steering wheel, no rudder, no nothing. Aren't you like that? How many of you have actually sat down once a month like any businessman does to examine his

business? How many businessmen do you think could stay in business if they did not, at least once a month or certainly once a year, take inventory or stock and see what they had on their shelves with which to do business? When was the last time you got yourself in your room, closed the door, pulled the shade down and took inventory of yourself? When was the last time you sat down, like any good businessman, and began doing some planning or making an appraisal of yourself like he does his company? When was the last time you made an appraisal of yourself and said, "Next year, I want to be at this place; five years from now at this place; ten years, if everything goes well, at this place. Here is where I expect to get and where I want to be next year, and here is what I ought to do to get where I want to be in five years or ten years." Isn't your life as important as selling neckties or making boiler plate or newspaper? Why don't you treat yourself as a business? You are the only business you have got. A real business would go bankrupt without that constant, thorough, inventory. Why not do it on a scientific basis, just as you do it for your company and for your management, or is a few dollars a week more important to you than your own life plan? Will you do it for a few dollars, but not do it for a purpose, for yourself?

Human nature is such that we all have weakness and we all have struggles, and, as a result, everyone of us has inferiority feelings of some kind in a greater or lesser degree. That means that everyone needs a buildup. We can be sympathetic with a person who is shy and timid and quiet and withdrawn. We want to help him. The person who is over-aggressive, we want to knock his ears down, but psychologists tell us that over-timidity and shyness and over-aggressiveness on the other hand, are both two facets, two pictures, two representations of exactly the same thing, a sense of inferiority. The person who is over-aggressive and the person who is shy both need buildup.

The other day, I used the term "symptom," and I want to take one in industry that you really ought to think about, and that is the symptom which is now kind of quieting down, but is merely kind of covered up. That is the unionization of foremen. You remember how much there was a year ago about that? Two years ago? It seems to me that industry is going through the same

stupid performance that it went through with its workers. Apparently we never learn. Maybe if we threw all the industrial lawyers out so that actions between management and labor would not be legal, but, would be personal and human, some of these problems would be solved. After I resigned as an administrative officer, I went into the arbitration work and I have never yet found one case in which a lawyer representing the company or the union should not have been thrown out and wherever I could get rid of them, I was able to settle the case without arbitration. I insisted where I could, "Come on, you can get together and work it out better than I can. You don't want a decision handed to you. Sit down and get together. Let's get rid of the lawyers." Wherever that happened, we settled cases immediately. I think all of those lawyers told management, "If you fight, you can beat these foremen." The Supreme Court said that foremen are not part of management. The National Labor Relations Board says that foremen don't have to be negotiated with, but that hasn't solved the problem. That is only taking care of the legal aspect. Let's see what this foreman symptom looks like.

Thirty or forty years ago I remember my dad worked in the needle trade. He came over from Russia. He started as a presser, and after a few years he was made a foreman. Now as a foreman, what did he do? He hired workers; he trained them; if there was any difficulty or any trouble, he sat down and talked with them; he was a counselor; if there was anything wrong with the man's work, he disciplined him; if there was a problem of money, he sat down and quarreled and argued and worked out piece rates with them that were fair and equitable according to some agreement; when the work was done, he had to OK the work; if there was any problem of work practices, he said, "Now this is unsafe. Watch your fingers," or "Watch how you do this." He was interpreting company policies or making them, because in those days the needle trade had very little policy. If there were grievances they came to him. He was a foreman. He was what you would call a general manager today maybe or a vice president or an assistant to the president. He was a good old fashioned foreman, an executive.

Now, my dad is not a foreman any longer. I have lost him, but a few years later, sup-

pose your dad had been a foreman, and he would come home, and Momma would say—she always knows when there is something wrong—"What's the matter, Poppa? What's wrong?"

"I don't know. The company is getting progressive and getting modern. We had a meeting of foremen, and they told us that from now on they are going to have an employment department which is going to do all the hiring. I don't do any more hiring."

A few weeks later something else is wrong, and Poppa says, "They got a training expert in now. He is going to do all the training. The trade school training and apprentice training will run on some other kind of basis. They got experts and big shots now."

Then later Poppa is told "The workers have problems. You are a foreman, and from now on you don't worry about these things. But if the worker looks as though there is something wrong, send him down to us. We have counselors and specialists now—later on Poppa is told. Don't you worry about wages. The company now is making contracts with the union. You don't have anything to worry about on that. All you worry about is that the worker doesn't get mad at you and squeals to the steward who takes it up—stain so you get a bawling out. Later Poppa is told that, as to the planning of the work, we have a production planning department. We have standards and methods and routines departments and that is not part of your job. You are a part of management. Don't worry about that now. We've got experts on that. Now as to inspection, we have a separate division called the inspection department and you don't have to OK work any more. On safety, we've got safety directors and safety engineers. You don't have to worry about that. On policy, we have a policy committee and on grievances we have grievance investigation committees, and you don't worry about that. The worker goes to the steward. We have a grievance committee and a procedure."

One of these day, Momma, who has one of those straight-forward, direct thinking minds, says "Well, Poppa, what is your job? Are you a foreman any more?" He said, "I don't know. I suppose I am just a high priced clerk who hands out work, that's all." And he starts to think. "They have taken this out of my job; they have taken that out of my job. They are stripping me of my job

and what do I have left? I am worried. I am beginning to feel insecure. Pretty soon they will get a gadget that will ship the work to the worker on a belt from the central office, and they won't need me any more at all. I am unhappy," and along comes someone who says, "Look, Joe, join up with us. They are doing it to all of us. Join up and your job will be safe."

Can you understand his fear and his apprehension and his insecurity as a result, a symptom of what the company has been doing to the foreman? Do you blame him for grabbing at a union when you think of it in terms such as I have presented it?

Suppose on the other hand, the management had gotten the foremen together and said, "Look, men, you have been doing a lot of things and that's fine. But we are not interested in what you can do, otherwise we'd have kept you on as machinists or tool and die men. We want you for what you know. We want you for your brains and abilities and special skills. You are a member of management and as quickly as possible—that is the pre-approach I mentioned—"as quickly as possible we are going to take the details away from you. We want you to be in an office and be able to wander around and use your brain. We want you to be an administrator, not a worker. We want you to be a part of the top staff with a little bit of line function. We want you to be a true executive and a true member of management and we are going to take these details away from you gradually, slowly, as soon as you can pass them over to somebody else." Do you think he would have felt insecure if he had been given such a buildup? Do you understand why foremen think the union is necessary? Is it their fault they feel insecure? Do you think they want to be insecure and therefore have to get together and say, "Brother, you are not going to knock me out of my job, just as you have been doing a little bit at a time."

I don't think I have exaggerated the thinking of this foreman, a good, hardworking, loyal, honest man, a workman who made a foreman because of that, who was suddenly seemingly stripped of his job. There is a change that needs to be explained to him in psychological terms.

Now, what about the worker? How does he think? There are two major charges by

workers which all surveys seem to bring out. Expressed in my own words they are that "Management doesn't care about me as a person, why should I care about the company? Management buys me and my services just as it would buy oil or a piece of metal or lumber or grease or a detergent. It buys me as a commodity. Is management expecting loyalty of me because management is giving me money? Well, management is just giving me money. I am giving management everything I have got; my own life is on my job. Is management giving me loyalty in return? Why should management demand loyalty or even expect it? Loyalty is an emotional thing; you can't buy it. It is something I give, something I feel. It is the kind of thing that makes me say, 'Gee, Bill, you look like you're stuck. I'll stay around. I'll call up the wife and tell her I am not coming home for dinner.' It is something that comes freely because I feel that way. Does management feel that way about me? Has management done one single thing except talk about it to prove to me that they might feel that way about me? They have a fair exchange. I give them so many hours of work, and they give me so many dollars. Now if that were out of the picture would I care about them? When there is a lay-off, there is a seasonal slack, and they don't care what happens to me, so why should I care about them when business is bad."

That is how the workers think. Maybe management ought to forget its lawyers and begin wondering and thinking how the worker thinks and let the sales department help them solve the problem. Maybe the psychiatrist and psychologist could help them solve an emotional problem.

Isn't it curious that management neglects the foreman? Management neglects the one man in management that I, the worker, have contacted regularly. It takes a great deal of pains putting out a magazine or house organ or publications, and it takes a great deal of pains with its little handbook giving company policies and so on—abstemiousness, lateness, vacation pay. And all those are gorgeous. It takes a great deal of pains with that and hires experts to do it. It takes a great deal of pains with posters and recreation and athletics, spends a great deal of money on these things, but it doesn't spend one half the time or the money or the effort to make this foreman a great big man in the eyes of the worker who looks on him as management. If he is a little man, then management is little, and if he is a big man then management must be big because he performs according to policy.

Is this worker's indictment wrong? I don't think so. Maybe you ought to take it home and give it to your management.

One of the major criticisms which I as a teacher have of industry's approach to the problem of working with men is the same criticism which I have of educational programs. Who are and where are your best teachers and your best minds? They are in the colleges and universities, in the educational field. That is where the leaders are, and you know where they ought to be. They ought to be down in the kindergartens and the first grades where the fundamentals are located. Where are the best brains of industry? Supposedly up the top in the hierarchy. You know where the best brains of industry ought to be? On the shop floor, the man who is dealing with fundamentals.

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