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Industrial Subject Sessions

PROGRAMS FOR TRAINING SUPERVISORS

By JIM L. WINDLE
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The purpose of this presentation is to provide information on various types of safety training programs for supervisors. This information was obtained by means of a survey, which involved the design and use of a very simple one-page questionnaire. The questionnaire was kept simple, short, and direct in order to keep duplication and mailing costs at a minimum and, hopefully, to increase the likelihood of return.

The questionnaire was sent to organizations which were grouped in six categories: companies, colleges and universities, professional societies and associations, consulting firms, government agencies, and publishers. Most of the companies were selected at random from those listed in the *1973 College Placement Annual.* The companies selected were those that employ 5,000 employees or more and appeared most likely to have supervisory safety training. For example, retail stores, financial consultants, insurance brokers, etc., were not included.

The colleges and universities were identified from the National Safety Council's publication, *College and University Safety Courses.* The colleges and universities which offer one or more courses in occupational or industrial safety were sent a questionnaire.

The professional societies and associations were identified from textbooks and related sources which contain lists of such organizations. The societies and associations selected to be included in the survey were those that provide services either directly or indirectly related to occupational safety and health.

State and federal government agencies included in the survey were selected from those responsible for occupational safety and health.

The publishers were selected from those which publish materials dealing with (or related to) occupational safety and health.

A serious defect of the mail questionnaire is lack of response. Response to mail questionnaires is generally poor. Returns of less than 40 to 50 per cent are common, and higher percentages are rare. In anticipation of a possible low response, a large number of organizations (486) were selected. It should be recognized that this number is not all inclusive. By design, some organizations were not included, but no deliberate attempt was made to include or exclude organizations on any basis other than the pre-established selection criteria.

The response expectation turned out to be correct after 185 (or 38 per cent) of the organizations were accounted for; 43 questionnaires were returned by the post office indicating that the organization had moved and did not leave a forwarding address; 70 respondents reported that they did not have a supervisory safety training program or related instructional materials; and 72 respondents returned usable questionnaires. No attempt was made to follow-up on nonrespondents. The reasons for this included the limited time available, the limited funds available, and the type of research involved. Since this was not a piece of scientific research from which generalizations were to be drawn, the per cent response had no serious effect on the results (other than to limit the quantity of information obtained).

The information obtained was then tabulated and reported in the form of a resource guide. The complete report of the survey contains more extensive information than could be provided in this brief summary of the resource guide.

Now, let's examine some of the information obtained from the questions, "Does your organization provide safety training for su-

pervisors?" and, "Is your training available to supervisors who are not employed by or members of your organization?"

Of the 54 organizations which said they did provide safety training for supervisors, 43 said that their training was available to supervisors who were not employed by or members of their organization. These organizations consisted of 10 companies, 13 colleges and universities, 11 professional societies and associations, two consulting companies, seven government agencies, and one publisher.

The 10 companies that had training programs available for supervisors (i.e., not employed by them) provided the programs in the form of in-house programs (3), correspondence courses (1), packaged programs (6), and workshops or seminars (2). Several companies that had programs for training supervisors but did not provide them to outside organizations indicated that they used the National Safety Council's Key Man Development Course.

Two of the most comprehensive programs available to "outside" organizations are provided by Du Pont and Kemper Insurance. The Du Pont program consists of a 16-hour programmed instruction course entitled "Safety Training Observation Program" (STOP). It is designed to train supervisors at all levels in the techniques, checks, and actions of a skilled safety observer. This unique training system is based on the principle that safety performance (like production performance) is the direct responsibility of line organization. It focuses on techniques to prevent unsafe acts of people, because over 90 per cent of the injuries are caused by unsafe acts.

The course consists of eight two-hour lessons on such broad topics as personal protective equipment, positions of people, actions of people, tools, equipment, procedures, and orderliness. Actually, these seven subjects, along with an introductory unit describing the background and reasons for the course, comprise the eight basic sequential training units.

Each training unit contains self-study and testing material using programmed instruction techniques to teach the fundamentals, safety observation cards for on-the-job application of the fundamentals taught, and guides for follow-up group discussions.

The S-T-O-P program is designed to enhance supervisory efforts in observing, correcting, and preventing recurrence. Any measurable improvement in these activities can be reported as progress and will inevitably result in better performance.

The second comprehensive program available to outside organizations is provided by Kemper Insurance. Their program is based on the fact that although most plant managers recognize the importance of their supervisors in safety work, many assume that supervisors know more about accident prevention than they really do. Recognizing this, Kemper Insurance conceived and tested a new approach to plant safety. This program is known as "Operation Super Safe."

The important element in this program is the supervisor himself. The program equips supervisors to become group leaders. It helps them develop a safety-conscious attitude and, at the same time, develops their ability to pass on this attitude to those working under them. This is accomplished by combining study of the fundamentals of accident prevention with the group discussion method. This combination stimulates supervisors to think.

The program is designed to accomplish four basic objectives:

1. To give the supervisor a better knowledge of the techniques of accident prevention.
2. To inspire the supervisor to make accident prevention an integral part of his job.
3. To instruct the supervisor on specific things he must do if accidents are to be prevented.
4. To give the supervisor a source of ideas for discussion at safety meetings and when he is talking to individual workers.

Operation Super Safe not only provides additional tools to do a more effective accident prevention job, it also enables supervisors to tie safety and production together. In addition, it helps supervisors recognize their safety responsibilities as related to the following important areas: maintaining production schedules, operating within the budget, training and supervising personnel, assisting in investigations and reporting accidents, establishing job procedures, assigning jobs, and maintaining equipment. With the achievement of safety in these seven areas, four additional benefits accrue: reduced lost production time, decreased departmental costs, improved working conditions, and improved employee morale.

The program provides a procedure manual which contains materials for monthly conference-type safety meetings. Each month a different supervisor is assigned the responsibility for conducting one of the meetings. Two weeks before his appearance as discussion leader, he is given the safety text which he can use in stimulating group discussion. Working from this base, it is possible for the leader to interject thoughts and special points that relate specifically to the problems of his company. Furthermore, this type of meeting presents a good soundingboard for observing supervisor reaction. Any point of resistance which arises can be determined readily, and the leader can take steps to reach agreement.

Help in setting up these meetings and (if necessary) help in conducting them is available from Kemper Insurance. Materials available for these meetings cover such subjects as training the new worker, falls, falling objects, accident costs, accident causes, fire prevention, accident statistics, off-the-job safety, guarding machinery, housekeeping, hand tools, unsafe conditions, lifting, what to do after an accident, electrical hazards, safety shoes, artificial respiration, and handling materials.

Let's now look at the colleges and universities that have some form of training available for supervisors. Eleven of the 13 colleges and universities that responded indicated that they provide regular credit courses in industrial or occupational safety. Indiana University, Purdue University at Indianapolis and at Columbus, Indiana, provide packaged programs, in-house programs, and regularly scheduled courses. The Department of Supervision at Purdue's West Lafayette, Indiana, campus provided in-house programs and regularly scheduled courses.

Other universities providing regularly scheduled courses, in-house programs, and/or workshops and seminars include Louisiana State University, University of New Mexico, University of Wisconsin, and West Virginia University. Louisiana State also provides correspondence courses. Such colleges and universities as New York University, Orange Coast Evening College, and Louisiana State provide short seminars, workshops, and conferences.

There are 11 professional societies and associations which have training programs for supervisors who may or may not be members. These include packaged and in-house programs, workshops or seminars, and correspondence courses. Examples of some of the programs provided include an extensive safety training correspondence course for construction supervisors administered by the Associated General Contractors of America. Another example is the supervisory training courses provided by the Greater New York Safety Council.

As mentioned earlier, one supervisory training program that was frequently being used by companies in the survey was the National Safety Council's Key Man Development Course. This program is perhaps more comprehensive than any other supervisory training program provided by a professional association or society.

The course is based on the premise that an effective company-wide safety program relies on an inner core of support from supervisors who work directly with employees. Such supervisors are instrumental in training, orienting, and leading other employees. Therefore, they are in a position to assert a lot of influence on attitudes, work habits, and general employee morale.

The Key Man Development Course seeks to develop a company's human assets. The course sets up a positive chain-reaction for in-plant safety by teaching supervisors sound safety practices, effective communication, principles of loss control, and recognition of hazardous conditions. Key supervisors transmit their knowledge and awareness down the line—and accident prevention thereby becomes an integral part of production on all levels. As noted earlier, fewer accidents mean higher rates of production, bigger profits, few people injured, less material damaged, and a safe overall work environment.

The Key Man Development Course prepares supervisors to implement the requirements of OSHA. It also reinforces the spirit of safety as a joint team effort between management and labor.

The course consists of 12 classroom hours of formal study. The educational materials include the course textbook (*Supervisor's Safety Manual*). This textbook consists of 12 chapters, and each serves as a major course topic. These include safety and the supervisor, know your accident problems, the human element, maintaining interest in safety, instructing for safety, employee health and industrial hygiene, personal protective equipment, industrial housekeeping, materials handling and storage, guarding machines and mechanisms, hand and portable power tools, and fire prevention and control. In addition, nine slide presentations containing numerous practical demonstrations of safety equipment are introduced at intervals throughout the course. These visual aids highlight basic topics, underscoring the "how-to" aspects of on-the-job safety instruction. Each of the nine slide presentations consists of 30 slides directed toward a specific area of safety concern. These areas include employee health, guard your hands, guard your sight, hand tools, how to fight fire, keep it clean for safety's sake, manual lifting and handling, safety and the supervisor, and safety attitudes.

Also, supervisors taking the course receive a variety of pertinent materials to aid them in performing their safety function and in reaching their subordinates. These materials include the Supervisor's Accident Report Form, Rules for Safety booklet, Selling Safety (series of 5 booklets), You and the Safety Committee booklet, and Industrial Data Sheets and Index.

Upon completion of the course, supervisors are given a comprehensive examination and are awarded a wallet card and a Key Man certificate.

Your supervisors can enroll in the Key Man Development Course through their state or local Safety Council, or the course can be conducted within your own organization. If you wish to have the course conducted within your organization, you will need your own local safety expert as the course instructor. You will also need the student's educational materials previously described, plus the instructor's materials. These materials include a copy of the course textbook and the Instructor's Manual. The manual outlines in detail how to organize the class and prepare for each session of the 12-hour course. It is coordinated exactly with the textbook and gives a lesson plan for every chapter, including the following: discussion topics, statement of objectives, summary of key points, and procedures (i.e., what to say and what to do). In addition, the instructor's materials include the nine slide presentations with scripts providing appropriate commentary. The slide presentations are also available with optional pre-recorded tape cassette commentary.

The National Safety Council also has available two correspondence (or home study) programs. One program is called "Supervising for Safety," and it covers 12 subject-matter areas: safety and the foremen, know your accident problems, the human element, maintaining interest in safety, instructing for safety, employee health and industrial hygiene, personal protective equipment and safe dress, industrial housekeeping, materials handling and storage, guarding machines and mechanisms, hand and portable power tools, and fire prevention and control.

The second home study program provided by the National Safety Council is called "Supervisor's Guide To Human Relations." It deals exclusively with the human engineering aspects of safety supervision, and covers 10 subject-matter areas: dissatisfaction—its causes and correction, personality factors in safety, good safety attitudes and how to develop them, motivation for safe behavior on the job, influence of tension and stress, communications in safety, and fitness to lead.

Of the consulting companies that have programs available, Advanced Management Research had the only packaged program. Their program, entitled "Accident Control Through Supervision," covers eight topics in a student-programmed instruction manual. These topics include production with safety, personal protective equipment, falls and bodily injury, housekeeping and preventive

maintenance, fire prevention, the environmental trap, behavior and safety, and safe operating procedures through education and training. A leader's guide is provided which relates to and expands on the material in the programmed instruction manual and the audio-visual presentations.

Each of the eight lesson plans contains a script of the film or slide presentation, overhead visuals, and a unit test. Nine full-color slide presentations (containing 290 slides) are included. Each presentation is accompanied by scripts. The scripts are also recorded on audio tape cassettes. The program also includes a film entitled "Don't Push Your Luck."

One of the various state and federal government agencies which provide safety training programs for supervisors is the Industrial Commission of Ohio. Their program (Supervisor's Safety Training Course) is administered by the Division of Safety and Hygiene. In a two-year period, over 1,000 employers used the programs, and about 28,000 supervisors were trained. These supervisors then trained 292,000 employees in safety.

The course consists of 12 two-hour sessions presented in a discussion and role-playing manner. In addition, demonstrations, quizzes, and safety films are used. The 12 sessions cover such topics as: the workmen's compensation aspect of accident prevention; the legal and moral responsibilities of the employer, the supervisor, and the employee; accident causes and controls; inspections; housekeeping; pinch points and guarding; powered hand tools, cranes, and portable and mobile equipment; methods of controlling accidents and injuries; personal protective equipment; safety rules and regulations; and communicating accident problem-solving information to employees. Individuals who satisfactorily complete the course receive a certificate.

The federal agency which provides the most extensive array of safety training programs is, of course, the Occupational Safety and Health Administration. These programs may be used for supervisory training purposes and include the following:

1. Employer-Employee Rights and Responsibilities Under The Williams-Steiger Occupational Safety and Health Act. This program consists of a comprehensive package of instructional materials designed to bring about an understanding of OSHA and the rights and responsibilities of both employer and employee. The program includes an instructor's guide and a set of 189 color slides.

2. Fundamentals In Occupational Safety and Health. This is an extensive home-study course prepared in cooperation with the National Institute for Occupational Safety and Health. The course stresses sources of occupational safety and health hazards, their recognition, and their elimination or control.

3. A Guide to Voluntary Compliance. This is a course in voluntary compliance procedures. It provides guidelines for developing systematic self-inspection procedures to help employers correct workplace deficiencies. The course includes a student manual, instructor's guide, and a set of 174 color slides.

4. Construction Safety and Health Training. This 40-hour course is conducted at the OSHA Training Institute and is designed to assist employers to train and educate their employees in safe work practices on construction jobs. It covers all phases of construction safety and health and provides a set of five manuals and 466 color slides.

5. Principles and Practices in Occupational Safety and Health. This is a programmed instruction course. It covers such aspects of the Act as record-keeping, compliance with standards, first-aid and medical care, accident investigation and analysis, personal protective equipment, training, and communication. The course is designed to require approximately 30 hours of work and is aimed primarily at first-line supervisors.

Almost every organization listed has aids and materials available. These include films, tape cassettes, slides, programmed instruction manuals, overhead visuals, books (both reference and textbooks), course outlines, video tapes, handouts, pamphlets, booklets, demonstration aids, lesson plans, flip charts, tests, reports, and film strips. These types of aids and materials can be obtained free from 33 of the organizations listed, or they can be purchased from 31 of the organizations. In some cases, some organizations have both

free aids and materials and those which may be purchased.

In conclusion, you can readily see how the resource guide can be used to build a supervisory training program tailored to fit your own needs. You can take advantage of specific packaged programs, in-house programs, workshops and seminars, correspondence courses, and regularly scheduled courses, or any combination of these. In addition, you can take advantage of the many aids and materials which are available from the various organizations listed.

TELEVISION FOR TRAINING

By LYNN YEAZEL
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Television is television—right? The answer to this question depends on your viewpoint. When upper levels of management view a corporate TV facility in lesser or greater terms than reality, troubles can begin.

You as a TV center manager or supervisor know what your equipment is capable of doing. The division vice president may know your facility exists and naturally assumes the type of production quality he sees on the air is the same as you can produce. Regardless of what we think of commercial television program quality, the production quality is the finest in the world.

Be sure when you're planning, programming or expanding a teleproduction facility within a company that your management understands what they will get for the investment. Speaking of investment, there are four major factors to consider when organizing an in-house facility and they will affect the investment. They are: *People*; *Hardware*; *Software* and *Facilities*.

People to produce, direct, write, and maintain the equipment are available in the open job market. They may be the products of a major university degree program, technical or trade school, or from commercial television stations or networks.

The obvious selection job would be to hire these people already trained. But for budgetary or staffing reasons you may decide to train staff members. There are numerous short-course or seminar style training programs available. You may also decide to hire one or two professionals and train some of your existing staff as a middle ground approach. Buy the talents and services you need from outside suppliers until you need or can train to that level of in-house proficiency. This is definitely the case for engineering skills.

Hardware can be grouped as follows:

- Package = Camera, recorder, microphone, monitor
- System = Two cameras, switcher, recorder, audio mixer, microphones, monitors
- Studio = Two or more cameras, switcher, two or more recorders with editing, film chain, audio system

Such groupings represent the following *average* investment:

	MONOCHROME	*COLOR*
Package	$2.2K	$4.3K
System	$7.5K	$35.0K
Studio	$66.0K	$140.0K

Software

–Outside writers or technical consultants may be hired on a "per job" basis.

–Some talented writer in your company communications or public relations department may give assistance to the video effort.

–The professional producer/director you might have hired to begin the operation can serve as coordinator of outside writing inputs. He can rewrite the professional writer's script or your internal writer's assistance to fit the television format.

Facilities (Guidelines)

–Converted classroom

–AC power capability should be more than adequate and allow for some growth

–Sufficient air conditioning—New equipment requires far less light than the "old days" of closed-circuit television but the comfort of the floor crew is important as is the quality of the talent's presentation, so the cooler the better. You can always turn too much cool air off but try and cool a hot studio with insufficient cooling units.

–Relative noise control—avoid areas adjacent to elevators, corridors, power transformers, and rooms facing busy streets.

–*Always* go for usable rather than sophisticated space. Avoid rooms with center support poles, etc. Acquire all the space you can get regardless of its condition, a little paint

and cork board will go a long way toward livening up that space at a later date.

A final consideration may sound ridiculous at the planning stages of a facility but give some thought to the philosophy of the facility. While at first you'll worry about being busy enough, the day will come when you have to decide:

1. Who you work for? Department, division, or entire company and how do you appropriately charge for your services.
2. Will you be TV only or multimedia? Since many other audio-visual skills are part of a teleproduction center (slides, audio, 16MM film, art), these skills can also be applied to the production of slide/tape, filmstrips, movies, audio training tapes, and publication production.

The Qualitative Decision

While money does not translate directly into production excellence, it certainly is a factor. Some extremely clever and effective black and white tapes produced on low cost equipment have saved many companies a considerable amount of their training and communications budget. Whether black and white or color, the quality of the sound and picture should be shown to top management before production plans or construction of a facility is done. Again, I stress that this is a qualitative decision and definitely arbitrary. For slightly reduced picture quality, a program whose cost per viewer is very low can be an excellent investment.

Cost per viewer depends upon:

1. Complexity of the production
2. Message permanence
3. Number of individual copies needed

A typical master videotape is the result of the following activities: *Script, Schedule, Editing, Props, Coordination, Art and Supplies, Production, Narration, Post Production*—for a total of approximately 55 man hours.

Arbitrarily, we'll assume the cost of salary, benefits, heat, lights, insurance, etc. results in a cost of $20 per manhour. Therefore the typical master videotape would cost $1100 ($20 x 55 manhours.)

The next factor in cost per viewer calculation is the duplication cost which depends on the number of copies and whether recycled tapes or new tapes are used. The following figures represent an average total cost:

(200 Copies)

	New	*Pool* (Recycled)
Master	$1100	$1100
Copies	$3300	$ 850
Postage	$ 200	$ 200
	$4630	$2150

Assuming the following audience:
20 people per location
20 x 200 copies = 4000 total audience

Cost per viewer (200 Copies)

New	*Pool*
$1.16	$0.54

This example assumes air mail postage of approximately $1 per tape and simultaneous viewing as each location has its own copy. If we carry the example one step further and reduce the number of copies to 100 thus eliminating simultaneous viewing the costs are:

Cost per viewer (100 Copies)

New	*Pool*
$0.73	$0.41

Carrying the example one final step and reducing the copy quantity to 25, the costs are:

Cost per viewer (25 Copies)

New	*Pool*
$0.41	$0.33

Back to the qualitative decision, you can have high, medium, and low cost per viewer, depending on the type of production. For the day-to-day simple productions keep that cost per viewer low, do it in-house to the best of your capabilities. When you need that once or twice a year new product introduction or national sales meeting, pull out all the stops, buy outside writing, production, art, and talent and put together the extravaganza with all the bells and whistles.

PROFESSIONS AND THE "REAL PRO"

By JOHN GAUSCH
Consultant, John Gausch & Associates, Greenwich, Conn.

Just one year ago I was spending time in the warm sun of Arizona as leader of a workshop session. It was a pleasant experience working with a group of enthusiastic loss control representatives of the Arizona State Compensation Fund. You might recall the directors of the fund recently voted to return $4 million in dividends to their clients. Policyholders' dividends will be based on the size of premium payments and loss experience. Poor safety performance will reduce a policyholder's share of the dividends. This gives me the impression that they must know what they're doing, and I'd certainly listen to any opinions offered.

One opinion was put forth by a member of the workshop group over dinner. He said, "I was talking with one of the fellows about you, and we were trying to characterize what you are." Expecting almost anything, I asked, "Well, what did you decide I am?" "You are a real pro," he replied.

I get very vocal when I am negatively criticized, but usually I am speechless when complimented. I didn't really know what to say in return. I don't think that I could be so egotistical that I would want you to believe that I deserve such a compliment. I have thought about it since then. I tried to reflect on why I would be delighted to merit such a characterization and how I might get there. What are the subtleties of the statement "real pro"? Further, what is a profession? Why are some occupations labeled professions and others not? It is to these two subjects that I will address my remarks—the profession and the subtleties of a "real pro."

Briefly we might consider the safety specialist of the past. A long dissertation would probably be unnecessary. Many of you know only too well the activities and frustrations of safety work in the past. For years, as a safety engineer I was introduced to foreign dignitaries as the "Manager of Safety Glasses and Hardtoe Shoes." When conducting projects involving training or promotion, it was "Safety Sam, the Circus Pitchman." On tours of inspection it was probably "Fred, the Super Sleuth." Many of our activities are still the same. As a matter of fact, there is a vast increase in the area of super sleuth.

New impetus and the complexity of problems have greatly improved our visibility. The specialist finds himself in the delightful position of increasing opportunities. Sadly, however, he is experiencing the confusion and frustration always associated with increased responsibility and changing job scope. Everyone probably desires to be a professional. Now there is almost a demand to establish a profession for "real pro's."

A well-conceived and administered program of certification has been established. Increasing numbers of persons are cardholding certified safety professionals. For many, this might be viewed as the ultimate goal and the final achievement. Such people will now distribute glasses and shoes, play pitchman, and inspect plants. Hopefully, some of us will see it as an opportunity, a foot in the door to show that a solid profession can be established and genuine professional responsibility can be demonstrated.

We have a good basic organization and the opportunity. What guidelines can be added for directing our effort toward a solid profession? Many associations and organizations have faced this problem. They establish some basic parameters of a profession. Do they apply to our safety profession?

A true profession: (1) requires a large body of specialized knowledge; (2) sets its own codes and standards; (3) possesses special techniques which can be communicated; (4) has a close knit organization; (5) requires comprehensive individual preparation; (6) demands continuous personal growth; (7) offers a permanent career. If we view each of

these separately, we can begin to educate our efforts and recognize opportunities to strengthen the safety profession.

1. Requires a large body of specialized knowledge. With the changing job scope and tendencies toward a total safety concept, no problems will be encountered in finding a large body of specialized knowledge. Although there is a need for more safety textbooks, the existing standards, practices, and codes fill a bookshelf comparable to a law library.

2. Sets its own codes and standards. A certain way to keep safety from the roles of strong professions would be to sit back and wait for legislative bodies to develop and refine all the codes. In the short time since the Occupational Safety and Health Act was passed, only a handful of codes have been finalized and less than a dozen criteria documents have been developed by the National Institute of Occupational Safety and Health. In a series of reorganizations and budget cutbacks, NIOSH has been reduced to a weak organization. Their most important function of research is given inadequate support. Voluntary involvement in code and standards development must be strongly pursued as an element of the safety profession.

3. Possesses specialized techniques which can be communicated. A physician has his diagnostic and operative procedures, an attorney his case preparation. Even an industrial hygienist has his labor atory analysis. The safety engineer has a common method for calculating accident frequency and severity, which is about the only thing he can carry over and use from a job in the mines to a job in a department store. This is not enough; our profession needs something more! A system safety approach can provide a specialized and communicable technique.

4. Has a close knit organization. Desire to be a cardholder is strong, but contribution is weak. It is demonstrated that it is difficult, if not impossible, to get ten per cent of the membership to attend an annual technical session. Safety professionals must work more actively for their professional organization.

5. Requires comprehensive individual preparation. A real plus for the CSP program is that the future was not compromised by the lowering of criteria for certification. Individual preparation is required.

6. Demands continuous personal growth. It is hard for a specialist with responsibility for the safety of only workers to realize a strong demand for personal growth. If we consider that the profession involves elements of fire protection, industrial hygiene, product assurance, and even the environmental problems of the nation, then the demand is obvious. If we further agree that the total safety concept requires persons capable of managing, we see a continuous and unlimited growth requirement.

7. Offers a permanent career. While it is argumentative, it is to me apparent that safety or any other specialty area offers a permanent career to anyone with enthusiasm. Professionalism will make it even better.

What kind of person will it take to be a professional in a profession like this? He will have met the requirements as outlined by his organization and certification programs. He will get his "cards." He will constantly evaluate himself in light of established codes of ethics. He will be self-motivated to prepare, expand, and contribute to his profession.

If he aspires to be a "real pro," he will have some special characteristics: (1) He will not sacrifice his personal self-respect; (2) he will not relinquish the standards that have been established by his professional organization; (3) he will recognize a responsibility far greater than his own well-being or even the well-being of his employer; (4) his first loyalty will be to the profession and second to his employer.

We can review these to clarify their implications.

1. He will not sacrifice his personal self-respect. In the course of duty, many safety engineers must make a choice: either insist that protection is provided, or withdraw to avoid antagonizing their boss. Withdrawal is common. It usually results in heavy documentation of position by filing memos. Ultimately, there is a serious sacrifice of self-respect.

2. He will not relinquish the standards that have been established by his professional organization. When the standard does not appear realistic, the "real pro" will actively

contribute to improving it. He will not simply avoid complying with it.

3. He will recognize a responsibility far greater than his own well-being or even the well-being of his employer. Many times a safety engineer becomes involved in choices which affect the public. Consider a waste disposal problem which ends in a decision to sell all waste chemical solvents to a pick-up service. The "real pro" will want to know exactly what the contractor is doing with the hazardous material he is collecting.

4. His first loyalty will be to the profession and the second to his employer. True professional responsibility requires a certain amount of whistle blowing. The "real pro" will not let his employer contaminate the environment, expose employees to health hazards, or sell dangerous products to the consumer. If he cannot stop his employer with reason, he will ultimately blow the whistle.

Some safety specialists with maximum job security, high immediate income, and a comprehensive retirement program will not be enthusiastic about developing the profession or becoming a "real pro." They will not be fired up with any new motivation to change things. Others cannot see a need. Specialists in organizational research have strong opinions regarding the changing complexity of business and the needs of management in the future.

"Not too long ago, you put a good superintendent in charge of a distant plant and let him run the show . . . . Today the business is too big, too complex, too competitive. It takes constant shuttling by the specialists—safety men, labor relations experts, purchasing agents, tax experts, attorneys, technicians—to keep things going."[1] We are beginning to see this come true in the field of total safety. Legislation has increased the need to stay informed of codes and standards to a point where the plant manager feels he needs help.

The modern manager needs a new approach to his job for these reasons:

1. He must learn to view management in a way that takes into account the high influx of new knowledge that has come into being. This suggests a system approach.

2. He has to have a frame of reference that allows him to relate one specialty with another in his work. This indicates a need to move more towards a total safety concept.

3. He must look beyond his everyday routine operations and be able to relate his company to the complex environment surrounding it. This imposes a greater responsibility than you and I or the company or organization for which we work.

Today, we are witnessing the emergence of the professional manager who attends courses, seminars and conferences with other managers (Implies a demand for continous personal growth) and writes papers, gives lectures (suggests a contribution to the "close knit organization").

Business specialists expect to see all types of managers change their *loyalties*. The future of business is characterized by transience—corporate loyalty will give way to professional loyalty. The rapid growth of professional positions and roles will make it imperative for business to accept and encourage multiple loyalties. "Loyalty to and interest in a profession for its own sake, within reason, is an avenue that generally leads to individual growth of far greater value to an organization than strictly corporate loyalty can hope to develop."[2]

We could go o.i with quote after quote to substantiate the opinions expressed here. No one really knows exactly what the future holds. For safety professionals, it will be greatly dependent on what is done with this current opportunity. If the opinions of management experts are at all in the ballpark, we will improve our profession and the quality of its members or be eliminated from the functions of higher management.

Some sample guidelines are offered for professions and professionals. Perhaps if we strive to meet them and the established responsibilities of our organizations, safety will ultimately rank with medicine and law.

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TOTAL LOSS CONTROL

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The innate aspect of most present day safety programs is that their existence admits unsafe conditions. Total loss control takes you beyond and into the control of all factors that downgrade a system.

Unfortunately, many creative ideas come only after the need or problem has reached the crisis stage. Some years ago, a number of professionals associated with the safety movement faced the fact that a major problem existed. A review of accident statistics and costs on the North American continent, as well as other industrial countries, indicated that while great progress was made during the first half-century of safety programming, we were now facing a period of increasing frequency and dollar cost of injuries to personnel. It appeared that a plateau was reached in the 1950's, when world-wide statistics remained relatively static. This situation in itself gave rise to some concern, but more important was the fact that after 1960 these injury rates started to climb.

In seeking an answer for this decline in safety performance, the question was asked, "Could it be that current program techniques implemented over the years, while good, are not good enough for today's needs?"

This resulted in the concept of total loss control.

What is total loss control? It is an evolution from injury prevention to the control of all losses by the application of sound management principles. This evolution includes injury prevention, damage control, total loss control.

While we use the terms "safety programs" and "accident prevention," most companies are concerned only with injury prevention, and most current statistics bear this out. Safety performance is measured by frequency and severity of personal injuries.

Injury prevention is a program to reduce or eliminate injuries to personnel and reduce workmen's compensation costs. By placing emphasis on injury prevention to the exclusion of other incidents which downgrade the system and have identical cause factors, we are overlooking or ignoring a much greater number of incidents which are far more costly.

Damage control is a program for the prevention or personal injury and/or damage to facilities, equipment, or material. Millions of dollars are lost to industry every year as a result of damage to facilities, equipment and material. The majority of such incidents are preventable, and many of them have the potential for personal injury.

Total loss control is a program to reduce or eliminate downgrading incidents which cause injury to personnel, damage to property, fire or explosion, security losses, hazards to health, pollution, and product liability claims. The total loss control concept expresses the philosophy that business interruption results when any work activity is carried out in any way that the ability of the organization to provide goods or services at planned costs is adversely affected. This definition is very broad. For practical purposes, each company must define what constitutes business interruption in that firm.

Total loss control includes occupational injury and disease, fire or explosion, pollution, product loss or damage, equipment or vehicle damage, security violations, and product liability as high cost examples. These cause the major interference with expected productivity and result from mistake or error in action or judgment.

Management must identify and appreciate the basic problem to avoid the human and dollar waste that arises from the wide spectrum of downgrading incidents occurring in industry. Stating the problem is easy. Determining how to overcome the unnecessary waste is the difficult and challenging objective. If a manager is to successfully meet the new challenge, a new approach and a new attitude is required. Success in this, in turn, lies in a new capacity to more effectively use the abilities and capabilities of people. He will have to, in effect, saturate his organization with a recognition of the reasons and the pressing need for improvement in loss and environmental controls.

Every executive, in fact every member of line management, should with honest introspection answer the question: "Do I really know the extent of waste from downgrading incidents in my area of authority?"

To obtain an answer to this important question requires that a loss analysis chart be completed. This is a two-part report itemizing insured and uninsured costs. Completion of a loss analysis chart will give a reasonably accurate estimate as to how serious the problem is and the main issues requiring attention.

Part 1 of the loss analysis chart is concerned with insured costs: workmen's compensation, fire insurance premiums, vehicle insurance, and other liability premiums.

Management generally has accepted workmen's compensation and other insurance premiums covering fire and liability hazards as a standard cost of doing business. No consideration is given to the many uninsured costs arising from downgrading incidents. These are the costs affecting a company's profit picture.

Part 2 of the loss analysis chart is concerned with these uninsured costs: injury, property damage, fire and explosion, theft, pilferage, vandalism, espionage, health and hygiene hazards, pollution, noise, and product liability.

A recent survey made in a medium sized plant in Ontario produced a ratio of uninsured to insured costs of 16:1; i.e., for each dollar paid for insured costs, management was losing 16 dollars as a result of downgrading incidents causing loss of profit for which no coverage was carried on the books in the form of insurance.

The development of costs for Part 2 of the loss analysis chart will not be easy, nor will it be done in an hour or two. It will require some digging and some penetrating questions to give validity to the costs.

1. Injury. There are numerous costs associated with personal injury which are not covered by insurance and must, therefore, be borne by the company. While most of us are aware of additional cost, how many companies have conducted studies to determine such costs?

2. Property damage. Very few managements are aware of the magnitude of losses resulting from preventable damage to facilities, equipment, and materials. The dollars spent for repair or replacement of such damage and the cost of rectification, rework, or scrap means less profit to your organization and indicates that downgrading incidents resulting from mistakes or errors of people are costly.

How costly? The best way to determine these costs for inclusion in the loss analysis chart is to discuss the situation with your maintenance and quality control managers. By reviewing last year's maintenance capital and expense costs, your maintenance manager can give you a good indication of how much of his budget was spent to repair or replace facilities and equipment damaged as a result of "accident."

In the same manner, the quality control manager can provide information as to how much of the rectification, rework, or scrap charges resulted from "accidental" damage to materials in process. While these amounts will not be accurate to the last dollar, they will certainly be valid enough as an indicator of the extent of loss from property damage. No area of loss or potential loss should be overlooked. Many senior executives have told me that they considered security or pollution losses to be negligible, yet subsequent surveys brought to light substantial losses of which they were not aware.

For example, a company president was concerned because his compensation assessment had been doubled. I suggested this penalty charge might be symptomatic of other problem areas in the company and suggested

that a survey be made. He agreed, and two weeks later I walked into his office and placed an iceberg analogy chart on his desk. His immediate response was, "I don't believe it," and I then presented the loss analysis chart:

Insured Costs	
W.C.B. Assessment	$ 42,000
Penalty	42,000
	$ 84,000
Insurances	63,450
Total Insured Costs	$ 147,450
Uninsured Costs	
Injury	$ 7,654
Property Damage	613,566
Fire	43,125
Lack of Security	125,000
Health, Hygiene	62,125
Pollution, Noise	7,465
Product Defect	105,285
	$ 964,720

The comptroller of the company had reviewed these costs and validated them as legitimate costs.

Now we had an excited president. He had been concerned about a $42,000 penalty charge by the compensation board, unaware that almost one million dollars a year was being lost as a result of downgrading incidents. His reaction: "Let's get a total loss control program started now."

It is my philosophy that a well-documented loss control cost analysis chart will not only open the door to the front office, but will obtain for you and your program active support and participation of executive management.

The total loss control concept was developed for the purpose of reducing or eliminating all incidents which downgrade the system, thereby improving effectiveness of operations and providing greater profitability.

The mode of approach requires a major change from looking at safety as a satellite function to one in which the common sources of business losses are better controlled by the application of accepted management principles: planning, organizing, directing, controlling. To do this effectively requires a knowledge and understanding of current position. The best way to do this is to profile the current program, which will permit management to honestly assess the program and its effectiveness.

Total loss control requires that we gather facts, evaluate facts, and develop solutions. There are three basic steps in profiling: (1) a determination is made of what is being done; (2) an evaluation is made of how well it is being done; and (3) action plans are prepared indicating what needs to be done. Profiling highlights problem areas, weaknesses, and deficiencies in current operating practices.

There are a number of profiles available today, some with complicated weighted averages for evaluation which can become somewhat confusing to the profiler. Our profile consists of 150 questions under 14 major headings. The evaluation is based on a simple five to one rating scale. We believe that it is necessary to make an in-depth analysis of current programming by evaluating its effectiveness, assessing weaknesses and deficiencies, and then assigning priorities and writing an action plan.

Having completed the profile, it becomes necessary to indicate what needs to be done to upgrade each section of the program to a satisfactory level. With knowledge known only to you and your colleagues concerning management attitudes, other program plans, worker attitudes, etc., a target date is placed on the action plan indicating date of implementation of that segment of the program. This date must be both realistic and challenging. Do not be over-optimistic and put down dates that common sense dictates cannot be met, but, on the other hand, do not be so cautious as to postpone action which should have immediate priority.

Now, perhaps for the first time, a document has been prepared showing the way to effective productivity with greater profitability by eliminating those incidents which downgrade the system. Important though this is, even more important is that we have a blueprint for the conservation of our human resources, or total safety. While this may sound simple, in actuality, it will take time and effort on your part. Following, briefly, are some of the requirements of an action

plan.

An action plan requires: a policy statement; objectives; program; budget; procedures; forecast; and strategy.

Policy

Policy should be: over the signature of senior executive; clear and concise; known to all; and rigidly enforced. The attitude of the plant supervisory force is a reflection of senior management's stated objectives. Therefore, if executive management issues a written company policy covering total loss control, it is far more likely that subordinates will constructively work toward the achievement of that policy.

A total loss control policy does not have to be a lengthy document. Following is an example:

> The management considers no phase of the operation more important than total loss control. It is the policy of this company, therefore, to promote and maintain a good environment to safeguard our employees, our facilities, and equipment. This will result in effective operation of the business.
>
> It is also of utmost importance that such a policy be known and understood by all employees and that it be rigidly adhered to at all times.

Objectives

Objectives can be short term or long term. Objectives should include immediate goals as well as long range objectives for, say, 12 months, three years, and five years.

The following are objectives worthy of consideration:

1. To develop interest on the part of managers and supervisors in the loss control concept.
2. To arouse recognition of personal responsibility for all incidents which downgrade the system.
3. To develop and make aware of underlying causes of such incidents.
4. To develop total costs of all downgrading incidents.
5. To indicate ways and develop techniques which will correct present loss producing situations and prevent other similar situations from arising.

Because we so often fail to meet our basic objectives, it becomes necessary to establish some priorities—setting up a correct sequence of events within a specified time limit.

Program

The program should establish priorities, set up proper timing, and assure challenging but realistic timing.

Before establishing priorities it is necessary to review what is being done. The program itself is so very important that before priorities are assigned, a hard look should be given to what we have been doing in our safety and accident prevention programs. Guarding, housekeeping, rules and regulations, contests, competitions, audio-visual aids, committees, and discipline are the standard items in most current safety programs, and they have been used to some degree since the turn of the century. Certainly, we have a more sophisticated approach today, but as I noted at the outset of this presentation, frequency rates and costs have been on the increase since 1960, indicating that what is being done is not good enough.

What, then, are the weaknesses in current programming? They are narrow base of action, etiological causes bypassed, patch prevention, universal antidotes, little applied research, and limited formal training.

Narrow Base of Action. We have permitted safety or injury prevention to remain a satellite function. It can, and often is, turned off and on as management sees fit or as pressures dictate. We realize now that the other downgrading incidents resulting in unnecessary loss are the same as those resulting in injury incidents. Therefore, the total loss control concept demands that the base be broadened so that the function of total safety becomes the reduction or elimination of "people errors."

Etiological Causes Bypassed. When something goes wrong, we invariably get into the act of blame-fixing. Having reviewed thousands of investigation reports, it is evident to me that the underlying or basic causes are not uncovered.

Patch Prevention. How many of us spend

our days putting out fires, handling emergency situations, attending meetings, solving union problems to the point we are left with no time to do forward planning? Far too many safety personnel are spending the majority of their time in post-accident activities instead of pure prevention. The total loss control concept, because it deals with preventive action rather than post-incident activities, provides the time necessary to do constructive planning.

Universal Antidotes. A major weakness in current programming is that all too often a shotgun approach is used, in the hope that some activity would bring about some improvement of performance. This has resulted in a lot of "wheelspinning." It is similar to giving an aspirin for a headache, instead of determining the cause of the headache and then working to eliminate the cause.

The total loss control concept eliminates this rather haphazard method inasmuch as problem areas are identified, needs are assessed, and specific action plans are developed and implemented.

Little Applied Research. There has been, and still is, very little research into all aspects of present activities in the field of accident prevention. This lack of research has hampered the development of effective programming.

Limited Formal Training. This has been a major weakness in the past, and to some degree it exists today. Too many safety personnel in the past have been appointed by default and did not have the necessary qualifications to be accepted by management as qualified professionals. Thanks to the ASSE for its efforts to upgrade the profession, and with increased educational and training programs and the certification program, we are beginning to see safety professionals taking their rightful place on the management team.

While much has been done for the advancement of the profession, we must not become complacent. The total loss control concept demands that all aspects of the program be administered by professionals who are truly members of the management team.

Budget

Budget will require adequate resources—material, human, and financial. Again looking to the past, in so many companies "safety" budgets have been in the form of handouts with not much thought of a return or of obtaining cost savings.

Total loss control requires consideration of an adequate budget, but every dollar requested must carry justification for its spending, and the benefits to be derived must be of a tangible nature. All programming activities should be based on the premise that monies spent on loss prevention must pay off in savings. Major outlays directed at loss prevention must be weighed against potential savings, just as a decision which parallels those made regarding current expenses and long range capitalization. Let me add the caution that poor measuring techniques discourage loss control measures.

Procedures

Procedures standardize methods for uniform instruction to eliminate unnecessary costs.

How do you write a procedure? The experts will probably disagree with the philosophy that the best procedure is short and to the point and in understandable language. My files hold procedures that run from 28 to 62 pages of typewritten material. The reader usually gets bogged down about page 3, and from then on is not getting the message. Have you ever been called to a meeting for the sole purpose of "interpreting" a new procedure? It happens all the time, and such procedures, while legally and technically well-written, are inadequate. When a man on the shop floor, who is perhaps lacking a great deal of academic education, fails to understand the requirements of such a procedure, these objectives are obviously deficient.

You must first decide what procedures are needed, state the purpose of the procedure, and then set out the requirements in understandable language.

Forecast

Forecast results: fewer injuries, less property damage, improved efficiency, and lower operating costs. A few minutes ago we talked about justification for budget requirements. If you have really done your homework by uncovering the problem areas, the unnecessary high costs of operating the business, and have prepared a constructive action plan for your company, you can be quite specific in forecasting results anticipated from the program. You are no longer hoping the disabling injury frequency will drop. Your program is now zeroing in on specifics, and if you have effective implementation, you can do some pretty accurate forecasting.

In summary, then, the major elements of a total loss control program are simple: identification of possible loss producing situations; measurement of such losses; selection of methods to minimize losses; and implementation of such methods within the capability of the organization. Implementation of the methods necessary for any organization depends entirely on the managerial capability within that organization to commit the necessary financial and human resources to the problem at hand.

The concept "total loss control" opens up a new vista in so-called safety programming. Viewing all incidents, including injury, from a cost point of view does not lower feelings for human values. Rather, it brings the importance of preventing the mistakes which lead to them into proper perspective from an operational and business point of view.

In positive language, freedom from loss in many organizations is directly proportionate to the desire of the top executive and his management team to demand excellence throughout the organization. The concept total loss control or total safety is committed to this end.

Will the program work? The answer is an emphatic "Yes," providing you remember that it takes people to make it successful.

Why do we insist on using the term "total loss control" and "total safety"? Because we fully realize that to be successful we must have a total program, total commitment, and total participation. This is not a loss control management concept but, rather, a people program. Unless the rank and file employees are included, unless they have some input and participation, the program will not be as successful as I am sure you would want it to be.

The gap between management and the work force must be bridged. Employees will support the program when they are convinced it is in their interest to do so. That is why we urge you to accept the concept of total safety.

TOTAL SAFETY FROM RISK MANAGER'S VIEWPOINT

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Too often, the word "safety" leads one to feel that we are concerned only with the safety of people, our most important assets, or the conservation of our physical facilities, equipment, materials, buildings, and so forth.

However, the risk manager looks at this subject from the very broad aspects of "total loss control." We consider such things as inland and ocean marine cargo exposures, general and products liability, fidelity exposures, boilers and pressure vessels, property protection, workmen's compensation, and so forth. The fact is that the risk manager looks at a total loss control program involving any exposure that may effect employees, customers, products, the public in general and, of course, to assure the conservation of the assets of the corporation.

Risk management has been heralded by many people within the realm of business as a new and all-inclusive management science. Equally so, many others have said the area of risk management is not new, not all-inclusive, and by no means a science. The actual truth is that risk management falls somewhere between these two extremes. Then what about risk management being heralded as a science of management? "Science" is defined, in this instance, as attacking and solving a problem by a formula. This historical development of risk management indicates how we come to consider it as a science. Only in the last 10 years has there been much written material available dealing specifically with the risk management function.

Again, risk management as a term has normally and naturally been associated with risk of loss. This natural association has existed even within our present modern management by objective methods of business. The management team has traditionally looked upon loss and risk as synonymous and as a problem to be solved by insurance. This transfer of risk was delegated to an insurance buyer for the business. This person, in cooperation with his counterpart, the insurance broker or agent, functioned within the management team by use of a survey to point out potential losses.

To understand why risk management is looked upon as a science of management, we must recognize also the desirable results aspects of our problem. We must look beyond the definition and concept of planning undesirable results. We must reconsider the role of the insurance buyer as going beyond providing recommendations of insurance.

Within these same 10 years, the logical step-by-step analysis to total exposure and probability results has been formulated to a point of science. Regardless of the concept you choose, we must recognize the risk manager has progressed in his field of endeavor in a manner similar to what the family physician has in his field. We no longer look only to a cure for our problem, but more deeply and beyond to the cause of the problem. Risk management is a function of any business operation, as are the personnel, sales, and production members of the management team.

The concept of risk management evolved from a period prior to 1920 when insurance was considered as a necessary evil. During this time, executive management gave little consideration to risk analysis and the best methods of handling risks. The general prevailing attitude was that the problems were simply not worth their time. The buying and handling of insurance functions were delegated to "unskilled" individuals. These "unskilled" individuals were gradually able to persuade top management of the intricate involvement of risk protection as a vital part of the business profit picture.

The increased awareness led to greater understanding of the problem confronting the early insurance buyer. The support of management in evaluation of the problem enabled the insurance buyer and insurance broker or agent combined to eventually develop recognizable areas. The two primary areas became insurable and uninsurable risks by category and definition. The need for protection of the business in what was considered an uninsurable area was the beginning grass roots of risk management.

The concept of formal planning for or against undesirable results got off the ground about 1950 with the introduction of the survey of hazards application forms. Although the style and format of the survey forms was not standardized, the use of them was a step in the problem-solving process. There are many formats available in the problem-solving process; the point is that it is important that a format be used and that you discuss the format with the risk manager of your company or corporation.

Problem solving is the essence of risk management. Risk management, by definition, is "planning to make the most efficient before-the-loss arrangement for an after-the-loss balance between resources available and resources required to maintain operating effectiveness." This, then, is our problem as risk managers.

The risk manager's objectives are to observe, evaluate, judge, act, and follow-up. The risk management process requires skill and knowledge in many broad fields. The risk manager also must be keenly aware of his own lack of depth or expertise so as to be able to draw on experts within a specific problem area. The risk manager should have knowledge of management, accounting, statistics, safety and engineering, law, employee relations, and sales. With this broad base of knowledge, the risk manager can now begin the risk management process and the application of three fundamental rules, which are: (1) don't risk more than you can afford to lose; (2) don't risk a lot for a little; and (3) consider the odds.

The risk management process is best described as a series of logical steps concluded by follow-through of the most efficient solution. These logical steps are: exposure identification; analysis and evaluation of risk; elimination, avoidance, or control of risk; and transfer of risk. The most difficult step within the risk management process is the first, that is, exposure identification. Probably added to the above list should be retention of risk and follow-up evaluation and performance.

The risk manager must obtain multiple sources of data to be able to identify the exposures confronting the particular business involved. These sources of data should include at least the following items: field inspection, preferably personal observations; organizational charts; financial statements; flow charts; and checklist, survey of exposures. In addition, it is desirable to also have available sources of data such as: maps and blueprints; internal reports, development research data; contracts; geographic area reports; and disaster-control plans or reports. Many times, included in this list is also key personnel biographical data, which many risk management departments do not have in their files but which is readily available to them.

I believe a risk management policy can be broken down into four separate topics which produce the broad policy mentioned earlier: personnel protection; property protection; product quality assurance; and insurance management.

1. First, let us review personnel protection. A safety policy should be one that is people-oriented and represents the views of the corporation. Only through the efforts of employees can any company succeed. Therefore, when we say that people are a corporation's most important asset, we say this with firm conviction and knowledge based upon many years of successful experience. The safety policy should be broken down into four basic points: provide a safe work environment; train employees to do their work in a safe efficient manner; promote participation in the safety effort; and comply with all statutory requirements. These points are based upon the premise that accidents can be prevented, and a good safety record is clear evidence of a complete safety program.

Every plant should have an active safety

program. Each manager, from the foreman to the group vice president of a corporation, should be held accountable for safety effectiveness.

2. A property protection program, of course, is concerned with conservation of tangible assets. This includes buildings, equipment, materials, and products. Whether you have operations just in the United States or all over the world, a "high protective risk" philosophy should be developed for any operation. We find this type of program to be highly developed in the United States and Canada, but it should not be limited to just these two countries. It should be promoted in your plants in every country.

3. Each plant should have a quality assurance program. This is particularly true with the passage of the Consumer Products Safety Act. Since the passage of this act, all corporations are now reviewing the programs in effect. The President's commission to administer the Act has only recently been appointed. Undoubtedly, this new commission will in the very near future become active and important to us in the risk management area.

4. The fourth area of a risk management policy involves the insurance program. The effectiveness of the safety program determines how the risk manager will place insurance. Every corporation relies upon insurance; however, the use of deductibles in an entire insurance program is important, and the size of the deductible is determined upon how viable a safety program the corporation has. The size of the deductible is determined by the amount of losses a corporation can assume up to a certain point without materially effecting the profitability of the assets of the corporation.

It is not uncommon to carry deductibles on general and products liability insurance, automobile liability, and umbrella coverage. In addition, however, deductibles can be successfully carried on fidelity and forgery coverage.

Fire insurance is another area where deductibles can be successfully carried. Deductibles may also be carried for business interruption coverage.

I mentioned earlier that a risk manager must have specialists on his staff to cover the areas we have discussed, since no risk manager-can profess to know all areas of exposure. This is where you come in, as a safety engineer, to assist the risk manager in determining the coverage to be carried within the area of your responsibility. From this point, the risk manager can then place the insurance coverage at the most economical price. Although the risk manager has to receive approval from his superior concerning the deductible limits that a corporation can carry, the amount of the deductibles must be determined between the safety engineer and the risk manager.

Through a good staff, the areas of exposure can be determined and, in the final analysis, limited so that appropriate insurance, when possible, can be arranged to protect the areas where controls break down.

A total loss control program contains five major elements: leadership; planning; organization; controls; and measures of performance. Let us review each one of these five items in detail.

Leadership.

Any program, to be successful, must have top management support as well as personal participation from top management. In other words, it is necessary to have total commitment from top management for a total loss control program to be successful. The first step in expressing this total commitment would start with a corporate policy. This policy should be signed by the chief executive officer and distributed by him or his office.

The leadership does not stop with the issuance of a policy, but rather top management must express a continuing interest in a total loss control program and be able to relate this interest to subordinates. It is important that the policy be all encompassing so as to include concern for employees, consumers for whom the products are manufactured, and the public in general.

With the passage of such acts as OSHA, EPA, the Consumer Products Act, and so on, the federal government has had a large part in directing the attention and interest of management in developing corporate policies as well as personal participation in loss control programs. However, whether these acts had been passed or not, I believe most managements have always expressed an interest in the welfare of their employees, being good citizens in a community, and producing products which, if properly used, will not cause injury to the consumer.

We find that many times the federal government enters into an area and places stringent requirements on a company. In turn, the company reacts to these requirements and feels that as long as they comply with the regulations they have fulfilled the obligation in these areas. Top management should go beyond federal regulations in specific areas. It should be an overall concern which is not limited to just those laws passed by a government body. Yes, a corporate policy is extremely important.

Planning.

We have to plan for five important areas: employee safety; property protection; consumer safety (or products safety, if you prefer); public or environmental safety; and security—this includes both internal and external security perils.

Employee safety programs are usually directed through the corporate office. The actual implementation, of course, is at each plant level. Every plant should have a safety program.

The next item is property protection. This also, of course, comes down to the plant level, and there must be a property-protection program at each plant. This program would be a facet of the overall corporate property-protection program.

A products safety program must also be a part of the overall loss control program. This would be directed from the corporate office, but implementation again would be at the plant level.

The fourth item would be a program to assure public protection; that is, protection of our neighbors and, of course, an environmental program to assure that we do not allow any of our operations to violate what is considered normal practice or legal requirements.

The fifth part of our program would be security. We are concerned with two types of security. One of them would deal with external perils and the other would be the internal security program for the prevention of theft of our assets, embezzlement, and so forth.

Organization.

How will all of this be accomplished? It will be accomplished by an organization that will be assigned a responsibility for these various items. Let us consider the first, employee safety.

There should be a corporate safety program, and it should be directed by the corporate office. Implementation, of course, would be at each plant level by specialists at the plant, depending upon the type of organization, the degree of hazard involved, and the size of the organization. This might be a full-time safety engineer, a safety supervisor, perhaps; or if it is a small plant with a relatively light hazard operation, it could be a part-time responsibility of the plant engineer or perhaps the industrial relations director, and so forth.

In any event, primary responsibility for the safety of employees must be maintained at the plant level. The corporate safety engineering staff would be concerned with providing advice and consultation and auditing the performance of the individual plants. Industrial hygiene services must also be provided. As you know, there is an extreme shortage of competent industrial hygiene personnel in this country. And, of course, as you also know, the Occupational Safety and Health Administration is being more and more concerned with the health hazards of the job. The majority of plants cannot afford the services of an industrial hygienist full time. Therefore, depending again upon the degree of hazard and the problems involved, the corporate office may supply this expertise through a corporate industrial hygienist, or, as the majority of plants now seem to be doing, industrial hygiene services should be contracted from a firm that specializes in this type of work.

The organization for property protection is concerned primarily with fire protection. On a corporate staff, it is wise to have a full-time fire protection engineer. If this is not possible, then fire-protection engineering services are often provided at the plant level

by the insurance companies or the insurance agents. We find that normally the responsibility for property protection at the individual plant is assigned to the plant engineer. In the majority of plants this responsibility is carried very well at this level, provided assistance of a qualified fire-protection engineer is furnished either by the corporate office or by the insurance company or agent.

The organization for product safety usually becomes a little more complicated. Usually, on the corporate staff most companies have established a committee composed of representatives from the legal department, safety engineering, and the insurance department. At the individual plant level, product safety committees are also organized. Normally these committees consist of the plant engineer for products quality control, the sales manager, outside services are often contracted for toxicity studies, and so forth; and, of course, the assistance of the engineering department of the insurance company which insures the plant for products liability is also used.

The public and environmental safety organization is also quite complicated. The corporate office usually provides assistance in the form of either a safety engineer or an environmental protection engineer or specialist and, of course, the assistance of the legal department. At times, they may also contract for additional outside services. At the plant, the normal responsibility is usually assigned to the plant engineer, and he is provided with assistance either from the corporate environmental protection specialist or an outside consulting service. Services are also provided in a limited form by some of the insurance companies.

Security programs are usually rather straight forward. The corporate office may or may not contain a security specialist; more often than not this rests in the safety office. Another form of security is provided by the finance department. The corporate office usually provides a traveling auditing staff. At the individual plant level, plant protection is usually assigned to the safety office or the industrial relations area; and, every plant finance department also has an individual internal audit group.

Controls.

What are the controls necessary to assure a good loss control program? First and foremost is probably data collection and analysis. Careful records and a collection of data with appropriate analysis probably provides the best control and points the way for additional work that may be necessary to make a program effective. It is possible also at times to reduce the severity of injuries. For example, this can be accomplished by providing appropriate in-plant medical services, including good pre-employment physical evaluations and providing for monitoring of all industrial injuries.

Statistical data should also be collected and analyzed as it relates to injuries from products manufactured by the company. Areas in which accidents are repetitious due to certain products should be reviewed to determine the reason for these accidents and whether or not there can be improvements made in the manufacturing process or quality control of the products. If there cannot, then consideration should be given to perhaps withdrawing the products from market. Many times it takes a great deal of courage by top management to come to this decision; however, such courage is not uncommon in industry today.

Further analysis should be made with regard to other areas of a total loss control program. These would include employee dishonesty, theft, damage to products in shipment, and so on. After the analysis has been made, corrective action can be taken and the exposure controlled. Periodically, of course, all loss-prevention programs should be reviewed by top management and by the insurance companies or even perhaps by outside consultants, and recommendations to improve the program should be implemented.

Measures of Performance.

The fifth and perhaps the most important part of any loss control program would be to establish appropriate measures of performance. This is a very difficult thing to do in some areas, but let us consider some of the measures that may be established.

First, you are familiar with the normal measures for an employee safety program. Such things as frequency rates, severity rates, and workmen's compensation loss ratios when used intelligently can provide good data on the effectiveness of a program. This data must be used properly. It would be very unfair, for example, to compare a chemical plant with a sheet metal plant and expect them to have the same frequency rate.

What are the measures of performance in the areas of property protection? Well, there have been established by various groups loss ratios based upon the dollar value of losses to the total value of property. These also require a good deal of study. Another measure in the area of products liability, general liability, and security would be the cost of the claims paid. A ratio could be prepared based upon the dollar losses divided by the total value, and so forth. It is advisable to periodically bring in outside consultants or experts in these areas to give you an objective outside evaluation of your program.

After careful review of your performance with the safety experts, the risk manager is then in a position to determine which losses can be safely assumed and up to what limit. He can also determine which losses cannot be assumed, and insurance must then be placed. It should be pointed out that up to a certain point in any insurance coverage, you will pay from 25 to 40 per cent to the insurance company for insuring a loss from the first dollar. Therefore, deductibles through self-insurance or non-insurance must be determined by the risk manager through the co-operation of the safety specialist or an outside consultant. The risk manager then recommends to his management those areas which can be safely assumed without jeopardizing the financial position of the company. We know, for example, that many corporations today self-insure "difference in conditions" because of the extremely high premium for this coverage. However, only through measures of performance over a period of years can it be determined whether it is advantageous to a company to self-insure or non-insure this exposure.

After a careful review of the measures of performance and evaluation have been made by the risk manager, he then considers what to insure, how to insure, and for what amount. Insurance should basically be purchased only for those losses over which the company can exercise little, if any control. You should note that the risk manager feels that his primary responsibility is to provide all feasible controls possible to minimize losses, and only at this point does he consider the purchase of insurance to protect the company's assets and profitability.

I believe that all risk managers as well as safety engineers accept the premise that a total loss control program is essential. This then is my philosophy as a risk manager of a total loss control program and the part, the very important part, that the safety engineer would play in this total program. There is undoubtedly a great future in safety engineering. With your very proper concern for the welfare of people, we now realize that in addition to protecting corporate assets we must also protect the environment and the public.

IMPLEMENTING A TOTAL SAFETY PROGRAM

By GERARD O. GRIFFIN
Consultant, Pittsburgh, Pa.

I am an old guy; I've been around a long time. I started in safety on subway construction work in New York City before that Black Friday in September 1929 when the only loss prevention possible was running around Wall Street with firemen's nets to catch those jumping from high buildings. I'd hate to think what the accident frequency rates were then.

I don't have to think about it, because we didn't have Z16 in those days. But I was on a subway construction contract in Brooklyn where we had 72 public liability injuries reported in one month. Let your imagination run for a minute; think what would happen today if any project, no matter what size, had as many as 72 public liability incidents in a 30-day period.

I've been fortunate enough to sit at the feet of giants, the giants who were pioneers in this accident prevention business. I learned a lot from them. I hope you won't think that you can learn all there is to know about safety, loss prevention, risk management, and total safety concept by reading or listening to formal papers like this. You've got to sit at the feet of today's giants, of which there are some, to learn what it really takes to do a job in this field.

I'd love to be able to tell you that early on I recognized the need for "total safety concept," got into it due to my own deep thinking in recognition that this was the direction we ought to go. Frankly, that is not true; I backed into it during World War II. I had at that time been safety director for Dravo Corporation for about five years, doing pure personnel accident prevention with some effort in the public liability field, fire, and a bit more than that in highway safety with our fleet of ready-mixed-concrete trucks. I was beginning to suspect that there was a need for work of this type in the river marine field, where some of our crew injuries were caused by collisions or cargo incidents involving marine equipment.

When World War II started, we expanded two shipyards from 1,000 people to 12,000 in one and 8,000 in the other. I was given administrative responsibility for the medical department in both yards and was far too busy hiring safety people, nurses, buying equipment, etc., to do any of the niceties. The corporation hired a director of security, and I very happily turned the fire protection over to him and concentrated on my first love. Unfortunately, he didn't take, and in February 1943 the president added plant security at the two shipyards to my other duties. One of the vice presidents, a very kindly but verbose individual, wrote a page-long memorandum delineating my responsibilities, which included almost everything but Saturn and its three moons. We were responsible for all uninsured losses, hired a claims man to handle them, and gradually developed a system of using fire inspectors, security guards, particularly plainclothesmen, to see what our safety supervisors were too busy to see or what was being hidden before they got there. It worked.

The war program lasted almost till 1948, and we just about got straightened around and concentrating on our main mission of personnel accident prevention, when on February 15, 1951, I was made insurance manager in addition to being director of safety. My predecessor had been an oldtime boiler and machinery man, with background as an officer in both the British and United States Navy, who accomplished one tremendous thing as far as I was concerned. Using his best quarter-deck stare, he succeeded in getting from all the divisions and subsidiaries their insurance policies and convinced them that this was to be handled from a central corporate office. So, there I was, a safety engineer by training and inclination, handling a program in which we were insuring plate glass, laboratory glassware, etc., all to first dollar of loss in a typical, old-fashioned, full insurance program. We quickly changed much of this, using our safety supervisors as the eyes of the insurance department, and boy! what they turned up! So much for history, and now to problems.

The major problem is acceptance by operating people. Acceptance in the total safety area depends a lot on your acceptance in your present role. At first it's the old "Shoemaker, stick to your last"—"Your job is to prevent injuries of employees. Don't be telling me how to handle my equipment," etc. So, you show him the policy statement from above and, hopefully, he goes along. Then if the edict mentions "insurable losses," it's, "This isn't insured, it's none of your business." Hopefully, the policy statement states, "Insurable losses, whether insured or not." Then you have them and can move in.

When the first major total loss control problems were on the way to being taken care of, I began a personal survey of our permanent installations. And here is where I disagree with some of the statements which have gone before.

Edicts from the top are essential, but operating management receives so many of them that only the ones they like are ever fully accomplished. Therefore, you must sell the total safety concept as one of the edicts which will help the operations manager to accomplish his goals. I found business or production interruption loss control one of the best entrees for this.

My first inspection of our largest plant with the operations manager was specifically on the hazards of production interruption. We covered air compressors and decided we could rent portables. We considered nonflammable lubricants for some machines. I showed him a plasterboard house for a d.c. generator set he didn't know about. He showed me some irreplaceable spare parts for out of production overhead cranes I didn't realize were important. On this one, we ended up reactivating the sprinklers in two abandoned paint spray booths and storing the crane parts there. The laugher, though, was finding that the only plan of the electric layout of the marine railway was hanging nicely framed in the control house, where it would burn along with the switchgear it depicted. We fixed that but quick, and then got the chief electrical engineer to give us an estimate of how soon he could get a Rube Goldberg version of the electric controls working in case of a fire.

The upshot of this tour was: (1) We decided not to buy business interruption insurance for that plant; (2) some changes were ordered; some additional spare parts stocked; (3) a quarterly plant inspection by a safety supervisor and a different superintendent or an engineer strictly on production interruption exposures was set up; (4) an increase in rapport between operating management and safety department developed.

Business interruption is a good entree to a newly acquired subsidiary or a newly hired project manager you aren't acquainted with. Example: a rock fill dam depends on an electric shovel with a 12 cubic yard bucket. What can happen to it? Do you have spares? If not, where are they available? How transport? Air? Too heavy? Truck? Preventive maintenance?

I could give dozens of examples of loss control in this area: (1) Project office manager keeps duplicates of master tapes for the job computer at his home. Not very scientific I agree, but at least the two sets won't be destroyed in the same fire; (2) Duplicate power feed to TV stations; (3) Ordering at high expense duplicate fabricated steel for a tunnel shield replacement in case the second one also failed.

Against most hazards except fire, business interruption insurance is not available economically, but the business or production interruption risk is ever strongly present. The solution is at least two-pronged: Do all possible to prevent the incidents from occurring, and minimize the interruption loss with duplicates, spares, or substitute equipment.

Non-fire losses to company owned equipment and property do not receive the attention they deserve. Losses of or on contractors' equipment are notoriously high and also cause many personal injuries. Many reasons contribute: hiring hall, lack of continuity of employment, no time to train, etc. Strict con-

trols and training are essential.

In addition, the safety professional needs an ally in the auditing or controller's office to spot the hidden losses in this area. Plant and field people have ingrained in them "Don't let the home office know anything. Hide it under maintenance." A sharp accountant with the will can be a big help in uncovering such incidents and providing the cost foundations for a preventive program.

Here, again, the safety professional can contribute to the profitability of the operations manager and cement him as an ally if he can demonstrate the savings available in reducing equipment and corporation property losses. Each corporation, each division, each plant has its own problems in this area. It's hard to generalize, but don't be snowed by anyone—the problems do exist and can be solved, or if not solved, markedly reduced. And as an adjunct, you save blood and sinew.

Another problem—products liability, consumer protection (call it what you will)—can be a moose or a mouse, depending on the products, the corporation, etc. There are those in production and sales who feel that products liability is all a legal racket and there is nothing the safety professional can do to prevent these losses. Not so, of course; there is much in quality control, rewriting of directions for use with proper warnings, and quick recognition of potential losses and investigation thereof by trained personnel. My experience was in heavy industry, and whereas our product liability or completed operations losses were of relatively low frequency, they were generally severe. Therefore, I don't feel competent to comment on consumer product losses. The best approach to operating management in this and other segments of losses is *dollars.* Show him the dollars involved in various classes of losses, convince him it adds to his costs, subtracts from his bonuses, reduces the business his division gets, and despite the fact that he may say he doesn't quite believe you, he'll probably do something about it.

Then there is disaster control, a name we used because its initials are the opposite of Civil Defense and grew out of the same organization. Every major company should have one, or at least a paper organization. I'm talking of prevention and control of losses from elements, i.e. flood, wind, earthquake, etc. My experience has been confined to floods and hurricanes. But the problems and principles involved are the same for these and fire, earthquake, etc. Here's a great chance to innovate. Do (1) Have a corporation skeleton organization chaired by experience; (2) Do your homework before the event: establish rapport with National Weather Service; discuss company needs; establish areas of responsibility in management; prepare plans and update. Every plant and project is different. However, escape and protection i.e. battening down, are the two basic principles.

Afterwards, activate the committee: (1) set up headquarters; (2) take pictures and call underwriters; (3) start clean up; (4) keep costs by detailed codes.

Not really a problem, but certainly a further opportunity in the greater aspect of the total safety concept, is loss prevention and control in health insurance. Off-the-job safety, sure, but expand it to include illness prevention by health education in plant papers, vacation and travel hints, flu shots if the medical director agrees, etc. What about visiting nurses? Often because of shift changes and relief, an extra nurse for one or two shifts a week is available. Have her visit the injured and ill in the hospitals and at home. It develops good employee relations and discourages malingering. For those too far away to be visited, give the second trick nurse a list and the use of the WATS line and see what she can accomplish. Even a one or two per cent reduction in group health losses is frequently a substantial saving.

The "hows" of solving many of the problems of the implementation of total safety concept are not few or simple:

1. Train the safety professionals and safety technicians to be the eyes of the risk manager and the insurance department. Security forces, fire inspectors, etc., should be used in the same fashion if they are available.

2. The safety professional must have full access to loss costs, including indirect and production loss figures.

3. Loss costs, whether insured or not, should be charged directly to the division or plant sustaining the losses.

4. The safety professional must have an "in" with accounting or auditing to get the above figures on equipment and property losses that might be concealed.

5. Having the confidence of top management and getting them to issue edicts is essential, but the CSP must go beyond this and see that the operating people feel it's to their advantage to carry out the edicts.

6. The safety professional must have more imagination and be able to innovate better than his operating and accounting peers.

Lastly, but far from least, preferably the safety professional should be the risk manager or the risk manager should be a safety professional. Then, he *has* the loss dollars, he knows how losses affect premium costs, he can demand loss prevention and claims services from underwriters that he knows are needed.

The safety professional can explain to operation people losses, hazards, and liabilities in terms they can understand. One of operation's handups is, "It's all insurance gobbledegook, the heck with it!" Boiler and machinery insurance coverage aren't casualty just because the insurance companies say it is. From a corporation standpoint, a loss here is damage to the corporation's property just as a fire is. The same with fidelity coverage. If the till is rifled, a safe robbed, or someone, employee or not, forges checks, its loss of corporation property (money, that is) and is there is a more important corporation property? In my discussions with management, top or operational, I never mentioned casualty coverage. We had and discussed with management property insurance with moderately high deductibles, liability insurance with no deductibles, and marine insurance with moderate deductibles. If the risk manager and safety professional can't be the same person, one should work for the other, or both should work for the same boss and each should try to qualify at least basically in the other's specialty.

The average American shrinks from considering death or injury particularly his own. Either he has the Tarzan approach—"Too quick, too smart to be caught," or the Scarlet O'Hara one—"I'll worry about that tomorrow." But he's strangely willing to consider dollar losses when properly presented. Therefore, in your discussions hit the business interruption losses and company property losses heavily, and mention the injuries later. When properly presented, the total safety concept approach will enhance the safety professional's standing and make him better accepted and more a member of management.

Don't get the idea it's all roses; there'll be some resentment. Here's where you have to fall back on the edicts. However, these can be overcome, and dollar savings speak loudly.

THE ADVANTAGES OF BEING SMALL

By JOSEPH R. SHELTON
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In the late 1940's it became apparent that a formal safety program would have to be implemented in our company. Oh yes, many different methods of rewarding a driver for doing his job were tried. Cash awards were one; merchandising plan was another. And as you can guess, they all worked temporarily, but a temporary safety program was as bad as not having a safety program at all. The same problems that plague the larger carriers were not uncommon to us. However, our approach to solving these problems may differ.

For many years we had recognized that safe driving was not an accidental happening and that many factors are involved. So out of necessity we had to structure and implement a safety program to fit our needs. This program, of course, was compatible with the overall objectives of our industry in reducing accidents and making our highways safer for all the motoring public.

Recognizing that safety is everyone's responsibility, but that an effective program needs leadership, the responsibility for directing this program was delegated to the transportation manager. In this capacity he is responsible for the selection and motivation of all employees. More and more, our industry is becoming subjected to closer scrutiny by regulatory agencies in the matter of accidents and the measures being taken by us to operate a safe trucking business. In light of these dictates we felt that an effective driver safety program was not just the man behind the wheel of a truck; he is also the mechanic in our shop, the dispatcher on duty, as well as all management personnel.

Our safety program had to start with a good employee selection program, and by definition, this selection of personnel is the process of matching the individual as a whole with the job as a whole. Job success is the result of many highly complex relationships involving the individual, his supervisor, his associates, and his job. We could not be too careful in the hiring and training of a new driver. It is an important decision and has to be done carefully and thoroughly. Tremendous changes in design and manufacturing of motor vehicles and equipment have occurred during the last few years and must be matched by similar advances on the part of the truck operators to skillfully and safely handle modern commercial vehicles. Most such vehicles in inter-city service are articulated trucks with sophisticated air, electrical, and mechanical systems, and a complex power transmission system. Our vehicles operate under all weather and road conditions, requiring utmost in skills and judgment. So all of our drivers are hired on a 30 day probationary period, in which time we are able to develop facts and opinions about him. This data will come from a number of sources: What the applicant says about himself; what others who have known him in the past think about him; and what objective test and medical examinations reveal about him. All previous driving experience and past accident records must be confirmed. All motor carrier safety regulations pertaining to qualification of drivers are strictly adhered to. A credit check is made on all applicants. During this 30 day period and prior to actually going on the road, each driver is checked out in equipment he will drive by a designated driver, or by fleet management, until such time he is deemed to be capable of safely operating a motor vehicle.

Since gathering of such information involves an expenditure of time and money, the procedure is organized into successive sequences designed to discover as quickly as possible those applicants who do not meet the job requirements and who therefore can be eliminated during their 30 day probationary period. To help minimize the elimination of drivers, we encourage our present employees to refer friends or relatives to us for employment. Once it is known that their friends or relatives will receive due consideration for employment, they tend to refer better qualified people, because it is a direct reflection on themselves.

With this in mind, we begin to see the advantage of a selection program, for it is a direct responsibility of management. Here you may remove the incompetent; you may determine and evaluate attitudes; you may make more efficient use of each employee's potentialities, since you will know his strong points as well as his weak points. Employee's problems become easier to evaluate and correct, since background information is available. Stability, morale, and cooperativeness can be predicted to some degree, and savings will result from a stable work force with less labor turnover. Employees in our transportation group do not leave by their own accord. After we once select an employee, he is usually with us until he retires.

The importance of attitude has long been recognized as an important factor, and most companies have some sort of psychological testing questions on their applications. The majority of applicants are aware these days, however, that the answer to the question of water in a glass is "half full," not "half empty." However, by being perceptive we can in personal interviews quite often recognize whether the person has a negative, self-centered attitude.

The outstanding safety record our drivers have achieved has shown us that our employee selection program has been successful and that the best safety item that can be installed in a truck is a good driver.

This assurance is only temporary if a driver is not motivated. Being a private carrier, we do have a day to day contact with the drivers, where our safety program can be discussed, and it is as any good safety program should be; simple and easy to understand. Some of the methods we use are the "Safe Driver" booklet and "Safe Driver" letter published by the National Safety Council. These are distributed to each driver each pay period.

A 8 1/2" × 11" National Safety Council safety poster is placed on a special bulletin board in the drivers' room. A 17" × 22" National Safety Council safety poster is placed on a special bulletin board at the entrance to our garage and our dispatch office. All tractors are provided with safety dash cards which are changed each month. Fleet contest records are posted in our dispatcher office for observation and discussion. National Safety Council and Department of Transportation letters are duplicated and copies given to each driver. Copies of the Motor Carrier Safety regulations and all interpretations issued by the Department of Transportation are distributed to drivers as they become effective.

An individual driving record file is maintained so that recognition can be given safe drivers at our annual safety outing, and to eliminate drivers whose record of chargeable accidents is inconsistent with a safe operation. This annual safety outing and the public presentation of driver safety awards has motivated all drivers to do a better job. We have several drivers between 20 and 25 years service without a chargeable accident, and they have shown to us and their co-workers that good drivers are safe drivers. They are tops in their field because they have developed safe habits. Defensive driving is second nature to them. And because they drive better, they have a much better safety record. This means fewer claims on our insurance and lower rates. It also means that our cargo gets through on time and our equipment stays out of the repair shop or the junk yard.

Some of you may have an accident review board, and this is well and good if it works for you. We feel that this is a management responsibility, and when an accident does occur it becomes the responsibility of the fleet manager to obtain all necessary information. The following items are included in our accident report. Driver's name, equipment numbers, date and time of accident, place and description of accident, plus unsafe driving act involved. The usual unsafe driving practices in our operation are operating too fast

for conditions, contesting or failing to grant right of way, following too closely, improper passing (such as on hills, curves where prohibited or where risk is involved otherwise), failing to look in direction of motion (backing, etc.), insufficient clearance (low viaduct, parked cars, or when passing moving cars). Rarely does the driver's accident report alone enable us to assign chargeability. Information other than that which appears on the driver's report is secured by personal investigation.

On most accidents, a company representative will be sent to the accident scene to assist the driver as to medical or legal attention he may need. We will assist him in gathering information on all the factors which contributed to the accident. Along with the driver we will determine how the accident occurred and what may be done to prevent its reoccurrence. Together they have an examination of the vehicles involved and an examination of the accident scene with measurements and pictures relative to the area.

After the investigation has been completed, a decision is reached as to the chargeability of the driver involved and any disciplinary action that may be necessary. It is management's responsiblity at this point to discern wisely. Let us not be like the college boy who was troubled with hangovers. In trying to establish a cause, he investigated the facts. On Monday night he drank gin and soda. On Tuesday night i. was whiskey and soda. Wednesday night his hangover was brought on by vodka and soda. On Thursday it was vermouth and soda. So he reached the conclusion that it must obviously have been the soda.

At the time we started our safety program we also implemented an equipment selection and preventive maintenance program. Although a vehicle must first be chosen to handle our fleet's work, they need to be standardized insofar as possible. Drivers on operation where equipment is interchanged frequently can become accustomed to similar driving characteristics. Mechanics who work on the same make vehicle develop expert knowledge and can save valuable time. Parts inventory can be lowered and more easily controlled when there is no need to stock parts for a variety of makes and models.

We had discovered the advertising and public relation value of our rolling billboards. The bright attractive color design of our company product and logo has turned our fleet into an effective company salesman. And it is perfectly natural for our drivers to be proud to identify with us and drive accordingly. All equipment is washed on a regular schedule, and this makes it much easier to enforce good housekeeping rules. Vehicles are assigned to an individual driver, and in a sense it becomes his truck. Often a regular driver who has been off on vacation will complain that whoever drove his truck during his absence has abused it or left it sloppy. This attitude, which is typical among our oldtimers, is a healthy one because it shows that he feels a real sense of pride and responsiblity for the appearance and operating efficiency of his truck. We have found that such drivers compile the best safety records and have a lower operating cost.

We have one driver who every year when he leaves for vacation will request to take his seat cushion home with him so that his wife can make new covers. You know as well as I do \ hy he wants to take his cushion home with him, and if you saw his truck on the road or sitting on the line you would see that it has that spit and polish appearance both inside and out that says, "Here is a driver who cares." In a large fleet, taking a truck out of service may not be possible, but in a small fleet such as ours where other drivers are on vacation at the same time, we can sometimes schedule a truck out of service for a major PM inspection and paint job until he returns. This driver has a 24-year safe driving record behind him, and his attitude is typical of our younger drivers who look forward to equaling or surpassing his driving record.

To assure ourself and our drivers that they would not be at a disadvantage in a safety program and would have to operate a faulty piece of equipment, our preventive maintenance program becomes an intricate part of our safety program. Preventive maintenance is the scientific care that guarantees top dependability and maximum life to all vehicles. It requires careful, planned inspection by our maintenance department at regular mileage

intervals, followed by immediate attention to all reported daily defects. These inspections combine well-balanced checking procedures with cleaning, tightening, and lubricating, with adjusting and replacement of component parts before failure. Actually, preventive maintenance is the simplest and most economical means of protecting our original investment and keeps our equipment in a safe operating condition. Our company has two fleets entered in the National Safety Contest. One is our city fleet and the other is our over-the-road fleet. These two fleets have a combined average of 2 1/4 million miles in a year, with an average maintenance cost of 3 1/2 cents per mile. Weighing this average cost per mile against the national average, which is considerably higher, we found we had accrued many dollar benefits that were not anticipated at the beginning of our safety program.

Preventive maintenance depends for its success upon a high degree of cooperation between driver and our maintenance department. Although the mechanic does the work, he depends on the driver to supply him with the information he needs, because the driver is on the road with the vehicle for most of each day and he alone is in a position to observe the vehicle's performance under all operating conditions. We do not ask the driver to diagnose any trouble that may develop with his truck but to describe accurately what he hears, feels, smells, or sees. In this way he does not confuse our mechanics on what problem he has, and the mechanic is free to diagnose his truck objectively.

In conclusion, our primary concern is for the safety of people. On and off duty, twenty-four hours a day, every day of the year, we set standards for our drivers to drive without a preventable accident. The adoption of this standard as a company standard of driving performance is the first step in organizing an effective safety program. So get involved in the selection of employees and equipment. See what your motor vehicle losses and maintenance are, if you haven't already done so. Go to your management with a sound set of standards for all your employees and your recommendations.

Get involved in keeping score and recognition of jobs well done. Setting standards for employees, equipment, and maintenance does work and does get results.

MEETING OSHA HEALTH STANDARDS —CARBON MONOXIDE

By HOWARD L. KUSNETZ
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The title of this paper is somewhat misleading. There is no OSHA health standard for carbon monoxide at this time. At this point, therefore, I should sit down and let my fellow panelists get up and make their presentations. What they will probably also say if I do that, is that there is no standard for noise and there is no standard for heat stress, and this session will have ended at that point.

I said that there is no OSHA health standard for carbon monoxide. This, too, is not quite correct. What OSHA has done is to adopt a 1968 threshold limit for carbon monoxide and incorporate it into the initial standards package. So, today the only standard that we have for carbon monoxide is 50 ppm. The Occupational Safety and Health Act also has a general duty clause which says we should not expose employees to harmful concentrations of materials. This, in a way, can be construed as a standard.

We also have a rather thick volume published by the National Institute for Occupational Safety and Health known as the "Criteria for a Recommended Standard. . . . Occupational Exposure to Carbon Monoxide".[1] In this document there is a recommended standard which would lower the 50 ppm level to an eight-hour time-weighted average of 35 ppm with an allowable peak of 200 ppm. In a report[2] at the American Industrial Hygiene Conference in Boston, May 1973, a NIOSH spokesman predicted that the level will be down to at least 20 ppm in three to five years. Similarly, the criteria document warns of revisions in the recommended standard.[3]

Let us then discuss the recommended standard, look at the basis for the CO criteria, and explore the bases of NIOSH criteria documents in general.

The legal authority for such criteria documents stems from the Williams-Steiger Act which says: "The Secretary of Health, Education, and Welfare . . . shall develop criteria dealing with toxic materials and harmful physical agents and substances which will describe exposure levels that are safe for various periods of employment, including but not limited to the exposure levels at which no employee will suffer impaired health or functional capacities or diminished life expectancy as a result of his work experience."

This limits considerations of other, non-work related, insults to the worker. To set criteria for standards, therefore, two fundamental questions must be answered. The first is, "What is the nature of the population?" In other words, for whom should the standard be written? Should it cover all workers, only those who are non-susceptible, or only those without frank or even incipient disease? This is in contrast with the mandate for the Environmental Protection Agency, for example, which calls for standards for the entire population.

The second question is, "How should the standard relate to exposures that are not work-related or that may be self-induced?" In other words, how can we separate the work contribution form the non-work? What weight, if any, should we give to home exposure, hobbies, traffic, smoking, and all those situations where exposure may be a significant fraction of occupational exposure, and in some cases even exceed it?

I hope to show in the analysis of the CO criteria document that these fundamental questions are not properly answered. In fact, they are inconsistently treated in the criteria documents issued by NIOSH to date. If the CO document is any example, however, it appears that the criteria are concerned with the most susceptible members of the work population. I question whether this is the proper approach.

The Standard Itself

In its recommendations for a carbon monoxide standard, the NIOSH authors make two statements which may be considered as objectives of the standard. The first states: "Control of employee exposure to CO at his place of employment at the limits stated will (1) prevent acute CO poisoning, (2) protect the employee from deleterious myocardial alterations associated with levels of carboxyhemoglobin (COHb) in excess of five per cent, and (3) provide the employee protection from adverse behavioral manifestations resulting from exposure to low levels of CO."[4]

Further in the document we learn that: "The criteria contained in this document were developed to assure that the recommended standards based thereon would (1) protect employees against both acute and chronic CO exposure, (2) be measurable by techniques that are valid, reproducible, and available to industry and governmental agencies, and (3) be attainable with existing technology."[5]

It is obvious that there is internal inconsistency here. It is not clear if the single standard proposed is for acute or chronic exposure or both. Further, the levels proposed for the standard are not applicable to the general class, "employee," but are for specific groups of employees.

If the first of the statements I have quoted expresses the intent of the standard, then the NIOSH document presents no evidence that the levels recommended are necessary for achieving those goals. Certainly, a time-weighted average of 35 ppm is not necessary to prevent *acute* CO poisoning. In fact, even the 15-minute, 200 ppm exposure is overly stringent for the prevention of acute CO poisoning. If we look at both statements as operative, then we have the contention of NIOSH that a single value will prevent both acute and chronic CO intoxication.

The first set of objectives is misleading from another consideration. It implies that the levels quoted are necessary to protect *all* employees from cardiac manifestations. Yet, this is inconsistent with the evidence presented in the criteria document section on background. In this case NIOSH has failed to answer clearly the first fundamental question, "What is the nature of the population?" To examine this point further, and before we can answer the second of the fundamental questions, let us examine the standard itself. Specifically, it calls for:

1. An eight-hour time-weighted average of 35 ppm.
2. A peak level of 200 ppm. (No time is mentioned, but based on other NIOSH criteria, it is reasonable to assume that they mean for a period not to exceed 15 minutes.)
3. Concentrations to be measured with a hopcalite-type meter or with detector tubes.
4. A medical program to be instituted with special consideration to the cardiovascular system and to medical conditions which could be exacerbated by exposure to CO.
5. Warning labels and signs to be prepared.
6. Respiratory protection to be provided only in the event of an emergency or when the secretary of labor has allowed a variance which permits the use of a respirator.
7. Emergency procedures to be initiated, including automatic visual and audible alarms when CO reaches 500 ppm, and semi-annual emergency drills.
8. Employees to be apprised of exposure, with "significant exposure" being defined as a 25 ppm time-weighted average.
9. Work practices to be instituted to maintain a minimum level.
10. Monitoring and recordkeeping to be instituted, recording the time-weighted average concentrations and ceiling levels. The frequency of monitoring to be on an annual basis with continuous monitoring if in the judgment of an industrial hygienist this is warranted. Records to be kept for three years.

I submit that these aspects of the standard are attempts to come to a political rather

than a scientific compromise of what a standard should be. To get a further appreciation of this statement, let us look at NIOSH's own words which describe the basis for the standard and its background, and then look at the standards themselves in relation to the objectives NIOSH is trying to achieve and relate them to the mandate set by the OSH Act.

Basis for the Standard and Background

Section II of the criteria document indicates that the potential for exposure of employees at the workplace to carbon monoxide is greater than that for any other chemical or physical agent. I have already quoted two statements of objectives. Because they differ somewhat, it is important to consider the two statements as a whole. It becomes apparent that the proposed standard is based upon a concern for the effects of long-term, low-level exposure, including the effects of air pollution and smoking. At the same time, the standard is directed to the acute effects of exposure. What is remarkable is that the levels proposed are single values which are presumed to protect against both the acute and chronic effects. We also note that central nervous system and behavioral manifestations are part of the standard. In fact, the same levels which will protect against acute effects are also deemed to be proper for the more subtle effects. We also have the caveat that based on behavioral manifestations, the levels are certain to be reduced.

Although there is no standard ratio between behavioral, chronic, and acute effects, it would be reasonable, as a first assumption, to consider at least an order of magnitude difference between each of them. Thus, between the behavioral effect and the acute, there could be two orders of magnitude of a hundred-fold difference. Yet, neither the proposed time-weighted average nor the proposed ceiling value make any distinction. Further, the behavioral considerations are related to the EPA standard for carbon monoxide. These, in turn, are based primarily on a study by Beard and Wertheim [6] which presented evidence that low levels of COHb may be associated with impairment of ability to discriminate time intervals. Beard and Wertheim's work has not been reproduced as of this date.

What of the factor of self-induced exposure? Although the criteria document would so imply, not all CO produced in industry necessarily leads to worker exposure. In a refinery catalytic cracking process, for example, the CO generated is retained within a closed system and used as a fuel. Further, as the NIOSH document points out, 58 per cent of the atmospheric emission is produced by the gasoline-powered internal combustion engine. Immediately, therefore, we have to separate the contribution to worker exposure by his occupation from his exposure by other means.

NIOSH has recognized that a worker's smoking habits might lead to levels of carboxyhemoglobin equal to that which the standard is designed to set as a limit. Recall that NIOSH is concerned with any level of COHb in excess of five per cent. In the case of the smoker, therefore, there would be no protection afforded by the standard. As a matter of fact, the population is not at zero COHb but, because of many sources, is at some finite, not insignificant level. An assessment of all these sources is therefore necessary for an appreciation of the COHb burden extant on the "normal" population.

In a study by Stewart et al [7] published May 1973, the carboxyhemoglobin levels of blood donors in the U. S. were examined. This included a sample population of approximately 29,000 adults in 17 major U. S. cities and 1,525 donors in 13 smaller communities in New Hampshire and Vermont. Stewart's findings indicated that 45 per cent of all nonsmokers had blood CO levels in excess of 1.5 per cent. The level associated with the 90th percentile was as high as 3.7 per cent COHb. As would be expected, the levels in smokers were even higher. Median COHb concentrations in cigarette smokers ranged from 3.2 to 6.2 per cent in the 18 locations. The 90 per cent figures ranged from 7.8 to 10.4 per cent. Other (non-cigarette) smokers showed corresponding medians of 2.0 to 5.1 per cent and 90 per cent limits ranging between 7.2 and 10.5 per cent COHb. Stewart also noted, "Persons sampled in urban areas with high automobile

density consistently had COHb saturations greater than those measured in persons sampled in areas of low automobile density."

It is evident that if a standard is based on a 5 per cent COHb level, and that if there is some lower finite level for nonsmokers and levels in excess of five per cent for smokers, there is no allowance for industrial exposure. If this line of reasoning is followed, one must come to the conclusion that because there are so many smokers in industry, if there is a desire to limit a potential blood COHb, then for smokers no additional CO level should be permitted. One must conclude that for nonsmokers even the 35 ppm may be excessive. Thus, either the standard is wrong or the reasoning on which it is based is wrong. What is necessary is to turn to epidemiologic experience of the effects of CO in industry and to define, very strictly, the population that one wishes to protect. It might be just as logical to insist that as a condition of employment, smoking not be permitted at all.

NIOSH further makes the assumption that this standard is for the protection of the health of workers who are assumed already to be suffering or potentially suffering from asymptomatic coronary heart disease.[9] If this is so, then the basis for the standard and aim for protection are inconsistent with the requirements of monitoring and recordkeeping. I will demonstrate this subsequently.

Let us turn now to the other basis on which NIOSH has recommended the standard: behavioral impairment. We are told, "The recommended standard is based upon the cardiovascular and behavioral evidence presented in Chapter III of this report. . . ."[10] But a reading of Chapter II of the criteria document shows: "The diversity of opinions and the conflicting experimental evidence existing in [the behavioral] area does not permit the clear-cut assessment of the scientific merit of such data or its extrapolation to the normal working population at this time."[11]

When one looks at the "fine-tuning" of alleged effects from which the worker is to be protected with the recommended methods for doing so, one comes to a rather wide credibility gap. If the concern is for subtle behavioral changes, changes in fractions of a per cent of blood COHb, or protection for those suffering or potentially suffering from significant, latent, or asymptomatic coronary heart disease, it becomes difficult to equate these concepts with a requirement that frequency of workroom air monitoring should be at least on an annual basis. Merely stating "at least" in the criteria document does not guarantee more frequent monitoring, since in the very same paragraph NIOSH states " . . . more frequent monitoring requirements cannot be recommended until there are extensive studies of specific operations in industry." The provision for medical monitoring are just as inadequate.

A standard must be exact. The NIOSH document states that the standard is for very subtle, small changes; and yet, § 8 of Part I of the standard says that blood analyses shall be left to the judgment of the OSHA industrial hygienist. This may be just the excuse many segments of industry need not to perform blood analyses. Given the size of the present OSHA industrial hygiene force (about 50), if we assume that all of the people in OSHA with the title "industrial hygienist" are, in fact, industrial hygienists, and if we further assume that they are hardworking, versatile individuals who can visit one establishment per day and take no time off (perhaps they will have to write their reports at night), and recognizing that there are some four million establishments under OSHA, even under the best of circumstances, an industrial hygienist will not be able to visit any given establishment more than once every 320 years. Somehow, I don't think this is adequate to protect the health of workers who are assumed to be already suffering from significant, latent, or asymptomatic coronary heart disease.

Records of these analyses and of monitoring are to be maintained for three years. Given annual monitoring programs and a concern for chronic or behavioral changes, the usefulness of this short period escapes me.

The basis for the standard is further compromised when one investigates the methods of monitoring required. The two official methods recommended by the document are very gross measurement methods, indeed.

The hopcalite detector is sensitive to am-

bient moisture, must be calibrated properly, and carefully maintained. There is even wider error permitted in the use of detector tubes. The NIOSH regulations (42 CFR 84) which set forth the criteria for detector tubes permit an error in the range of the standard of ± 35 per cent. To what extent can we use these data to determine or protect against behavioral change or to protect workers who are assumed to be already suffering from significant, latent, or asymptomatic coronary heart disease?

The document attempts to refine some of this error by a rather elaborate but erroneous statistical treatment of samples. It is obvious that in the use of detector tubes, small numbers of samples will be taken. In an attempt to correct this, a table is given indicating the number of samples that should be taken to determine if the environment is in compliance with the eight-hour time-weighted average. The table given in the criteria document, even if it were copied correctly from the percentiles of the student's "t" distribution, assumes a normal distribution of sampling results. On this basis, it is almost impossible to prove non-compliance. Nelson Leidel of NIOSH has determined that environmental variation which has a log-normal distribution is of greater significance than instrument error.[12] Therefore, there is still no adequate sampling scheme for determining CO concentrations in order to determine compliance with the proposed standard.

Perhaps the most amazing section is the one on controls or work practices. Aside from delineating the type of labeling and respiratory equipment to be used, the entire section on controls is but two paragraphs which equate work practices with the handling of CO containers. Respirators are a secondary control measure. Labeling is not a control measure. Certainly, there are more sources of CO than CO containers. Control measures, whether they be engineering, administrative, and/or medical, must of necessity be wide-ranging since the industrial situations that ought to be controlled are themselves so varied.

Summary

In his letter of instructions to the members of this panel, the director of the National Safety Council's industrial hygiene activities suggested that each speaker analyze and explore the necessity for an OSHA health standard, the background of the criteria document, the factors to be considered in evaluating the hazards, the monitoring techniques, and the controls. What I have tried to show here is that the proposed CO standard is one that would attempt to measure and control for very subtle health effects with the coarsest type of tools. It is a standard that neglects the self-abuse of workers and does not account for those who have already exhibited frank disease. It seems to me that any standard so promulgated must consider these differences. Perhaps what we need is not a single OSHA standard for carbon monoxide but a series of OSHA standards for this gas.

Post Script

Since this paper was written and prior to its presentation at the 1973 National Safety Congress, there were two developments which have some bearing on this subject.

First is an announcement in the *Federal Register*[13] of August 23, 1973, announcing the intent of the OSHA to consider a standard based on the NIOSH criteria document. Significantly, data and comments are requested in seven different areas. These are:

1. Whether a new standard on occupational exposure to carbon monoxide should be issued.
2. Each section of the standard recommended by NIOSH.
3. Suitable alternatives to the recommendations of NIOSH.
4. Work injury and illness experience with carbon monoxide.
5. Supported cost data of the estimated costs of coming into compliance with the standard recommended by NIOSH.
6. Supported data on any possible environmental impact of the recommended standard, and specifically (a) any adverse environmental effects which cannot be avoided should the standard be adopted, (b) alternatives to such standard, (c) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and (d) any irreversible commitments of resources which would be involved if the standard should be implemented.
7. Any other related issues.

Of greater significance, however, is a paper by R. D. Stewart co-workers at the Medical College of Wisconsin.[14] These investigators tried to duplicate the work of Beard and Wertheim. It was the Beard study on which the EPA standard was based and on which NIOSH leaned heavily for its considerations of the behavioral aspects of their proposed standard. Stewart states, "These exposures, which resulted in a range of carboxyhemoglobin saturations up to 20 per cent, produced no impairment in the ability of the subject to perform the Beard-Wertheim time discrimination test . . . ."

More amazing is the statement in the Stewart paper, "The issue became more confused when Dr. Beard announced that he was unable to reproduce his original findings when he used a double-blind procedure." Dr. Beard made his statement to an audience of scientists at the first Annual Conference on Environmental Toxicology, in September 1972. To date I have not seen a revision of its standard by the EPA. The NIOSH Carbon Monoxide Criteria Document also makes no reference to the Beard statement.

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MEETING OSHA HEALTH STANDARDS ON NOISE EXPOSURE

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Over the years there has been continuing controversy over the setting of standards for noise control. Up to the adoption of the Walsh-Healey noise standard, most groups, such as the TLV Committee of the ACGIH, the ASA (ANSI), the Intersociety Committee, CHABA, and the medical groups avoided setting a standard. Instead, they came up with risk tables or charts and left the selection of risk to the user. There is a large body of uncontested data which clearly establishes that excessive exposure to noise can and does cause permanent hearing loss. Why, then, is there so much controversy over noise standards? Why can't the experts agree? Why, following the submission of a NIOSH Criteria Document, did the Secretary of Labor find it necessary to convene an OSHA Advisory Committee on Noise, a committee whose statutory time to make its report runs 270 days, ending on November 22. Clearly, there are many who feel that a standard is necessary but are unable to agree on the specifics.

What should the standard be? OSHA defines an occupational health standard as one "which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment." The Secretary of Labor is further directed to "set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life."

In the initial OSHA regulations, the noise standards in the Walsh-Healey Act regulations were adopted; i.e., 90 dbA for eight hours' continuous exposure. It is their revision that is currently under consideration. Thus, there is a need for a consensus noise standard which will provide a measuring stick for the acceptability of noise in the work environment, a design basis for reducing noise exposure when it is excessive, and an enforcement tool when voluntary compliance is not forthcoming.

This paper deals first with the definition of impairment and the relation of noise exposure to hearing loss, the two major areas responsible for much of the controversy over standards. Then the recommendations in the NIOSH Criteria Document and in the latest available draft of the OSHA Advisory Committee's report are discussed.

What is Hearing Impairment?

The CCH (Committee on Conservation of Hearing) of the American Academy of Ophthalmology and Otolaryngology has defined impairment on the basis of an individual's ability to hear and understand the spoken word in sentence form in a quiet environment. As a basis they followed the American Medical Association's Committee on Medical Rating of Physical Impairment "Guides to the Evaluation of Permanent Impairment," the basis of over 20 other standards for bodily impairment. Since speech comprehension tests are time consuming and require special expertise, the hearing levels in the 500, 1,000, and 2,000 Hertz pure tone audiometric tests were selected for field use as they correlate well with the speech tests. The definition of impairment relates only to the narrow band of frequencies necessary for speech comprehension. It excludes many of the frequencies normally present in speech sounds but not essential to comprehension. It also excludes frequencies still in the audible range but not involved in speech.

Hearing level is defined as: HL = 20 log $P/_{P_o}$ where 20 log $P/_{P_o}$ is a dimensionless ratio expressed, by convention, as decibels. P_o corresponds to the smallest pressure fluctuation detectable on the average by young adults with excellent hearing at each test frequency, while P corresponds to the least pressure fluctuation detectable by the person being tested at the same frequency. Decibels of hearing loss differ from decibels of sound pressure level, e.g., zero decibels of hearing loss at 1,000 Hz is equal to 6.5 decibels of sound pressure level re 0.0002 microbars.

Audiometric zero is based on the hearing acuity of a group of young people who have no known exposure to excessive noise nor any history or signs of other hearing problems as described in ANSI S3.6 (1969). The current standard zero was adopted in 1969 as the result of studies which showed that "normal" hearing was more acute than it was thought to be in 1951. From 1951 to 1969 this zero was six to 15 decibels higher, depending on the test frequency. Audiometric zero differs from Sound Level Meter zero. The SLM zero is referenced to 0.0002 microbars, while the audiometric zero follows the frequency sensitivity of the human ear. In relating the audiometric zero to real-life situations, CCH has assumed that the median hearing level of 20 year old workers with no previous exposure to noise exceeding 80 dbA is 10 db.

CCH has determined that impairment begins when the average of the hearing levels at 500, 1,000 and 2,000 Hertz exceeds 26 db. The per cent impairment is calculated by subtracting the 26 db "fence" from the average and multiplying by 1.5. An example of a calculation is shown below:

Frequency	*Decibel Loss*	
CPS	*Left*	*Right*
500	35	35
1,000	55	60
2,000	*55*	*60*
Average	48	52
Minus 26 db Fence	22	26
% Loss (1.5 x db Loss)	33	39

Binaural % Loss:

$$\frac{(\text{Best Ear } 33\% \times 5) + (\text{Poor Ear } 39\% \times 1)}{6} = 34\%$$

The 26 db fence covers many sins. In combination with the 500, 1,000 and 2,000 Hertz frequencies, it eliminates the need to correct for loss of hearing with age or presbycusis. Presbycusis loss mimics to some degree noise-induced hearing loss. CCH data show that 40 per cent of the population who do not have habitual exposure to noise above 80 dbA nevertheless surpass the fence by age 65. The fence also takes care of differences in individual hearing ability, measurement variables, and includes hearing losses too small to constitute impairment. According to CCH, losses below this fence do not cause significant difficulty with faint speech in quiet surroundings.

This definition of impairment is at the root of much of the controversy over the correct standard. First, it permits a measurable shift in an individual hearing threshold; i.e., larger for someone who starts out with a low threshold than for someone who starts out with a high threshold. Some argue that the definition of an OSHA standard does not allow this inequity. Second, it does not protect against hearing loss in higher frequencies not essential to speech but of esthetic value and important in listening to music. Third, recent evidence suggests that using the 3,000 Hertz tone in place of the 500 gives a better correlation with the ability to understand speech in a noisy environment, remembering the definition of impairment was based on quiet surroundings. However, the typical shift at 3,000 is greater than at 500. A test calculation on a group of men with impaired hearing showed that this single change in the definition of impairment would increase the average calculated impairment by more than 30 per cent, with no change in the actual hearing.

There is also a vital but often overlooked effect on risk tables. For example, a risk table may show that at age 65, after a lifetime of exposure to 90 dbA, there will be 15 people out of 100 who will have an average hearing loss for the 500, 1,000 and 2,000 Hertz test tones which exceeds 26 db due to exposure to noise. It does not say that the remaining members have not had any shift, nor does it tell whether the affected members started at zero threshold and had a 30 db shift or at 25

db and had a five db shift; i.e., it shows neither how much their individual thresholds have shifted nor to what extent their hearing is impaired. For example, if the "fence" were raised by five db up to 31, instead of 15 per cent only one to two per cent would be shown as impaired. This means that for nine out of ten counted as impaired, the impairment is very small; i.e., no more than five db.

Alternately, lowering the fence to 20 would dramatically increase the per cent shown as impaired. At the same time, the hearing level of 40 out of each 100 members of 65 year old group without noise exposure will exceed the 26 db fence. Surprisingly little has been published on the effect of changes in the fence on the risk tables, perhaps due to the difficulty in working up the data. It is not hard to see how figures like these can lead to different interpretations.

Hearing measurements are also susceptible to error due to malfunctioning of the equipment, masking by excessive background noise during the tests, temporary threshold shifts in the hearing of the individuals being tested, and poor measurement techniques. It has often been stated that clinical audiograms performed by a competent audiologist in an otological clinic on fully rested ears show on the average five db lower baseline than those determined competently in industry.

Summing up, the definition and measurement of hearing impairment both have an important role in setting a standard, and some of the controversy has arisen because that role is not clearly understood.

How is Noise Exposure Related to Hearing Loss?

The controversy is over a standard to separate hazardous from nonhazardous exposure. Therefore, the concern is not over high exposures that are considered hazardous by everyone, but over exposures that are marginal in their effects. Conclusive laboratory studies on humans to determine the effect of such marginal exposure would take a great many years, and in their course some of the test group would sustain a permanent noise-induced hearing loss. This is clearly unacceptable. No suitable animal species has been found which could be substituted for people. Therefore, investigators have turned to past experience; i.e., the same experience which has shown that grossly excessive exposures are hazardous. Unfortunately, such retrospective studies are inherently limited in accuracy.

First, the pre-noise exposure hearing thresholds of the individuals in the study group are unknown, and therefore their individual change in hearing threshold is likewise unknown. Second, as discussed previously, individuals vary widely in their susceptibility to noise-induced hearing loss. Third, noise exposure is likely to have changed over the study period even if source levels have remained nearly constant. Working conditions, working hours, operator location, and even the length and spacing of work breaks can have an effect. Minor changes in technology may produce significant changes in source levels which were not noted at the time they occurred. Fourth, the study population may be subject to selection factors so that it is not representative of the general work population. Fifth, hearing threshold shifts are caused by other things as well as noise. Finally, the extent and variation of non-occupational noise exposure is not well known.

To deal with the above problems, investigators have been forced to turn to statistical techniques. Insofar as possible, individuals with hearing shifts due to causes other than noise and those with non-occupational exposure are excluded, together with those whose noise exposure varied in an unknown or poorly defined manner.

The bulk of the usable data turns out to be for continuous all day exposures in the same noisy area, such as in textile mills or prison workshops. The data from such studies are reliable to no more than plus or minus five to eight db. Exhaustive study has shown no way to significantly increase the accuracy of such retrospective data. Unfortunately, statistical techniques are also unable to deal with individuals. Thus, statistically derived tables can predict that 15 out of 100 people will develop hearing impairment, but not which 15, nor the extent to which individual susceptibility enters in. Some means of identifying those who are more susceptible would greatly ease

the process of setting standards.

Intermittent exposure limits are usually set somewhat higher, as there is some recovery during the quiet periods. The extent of recovery depends both upon the length of the rest period and the noise level during that period. The effect of varying the duration of the noisy period, the quiet period, and the noise level during both has been studied by measuring the temporary noise-induced hearing loss. There is reasonably good correlation between many temporary shifts and permanent shifts, but early optimism in the value of this approach has been dimmed by inconsistencies in more recent studies.

Another troublesome area involves the exposure group. Should the standard be based on the group with the maximum years of exposure as suggested in the Act, how many years should be selected, how large is the group, and is it shrinking or growing? Is the number of exposure years increasing with increasing longevity, or decreasing with earlier retirement?

The treatment of non-occupational exposure can affect the standard setting in two ways. First, assuming an overall tolerance for noise exposure, how much should be allotted for occupational vs. non-occupational exposure? Second, current standards assume the off-the-job time is largely recovery time; i.e., quiet time. How does one deal with noise levels which are within acceptable exposure limits but exceed the levels allowable during the recovery period? Some reduction in non-occupational exposure should result from implementation of the Noise Control Act of 1972.

Summing up, the inaccuracies in the available data result in a range of possible correct standards rather than a single value. This leads to controversy over the value in that range to be selected, with one value being about equally as justified as any other. While it will not provide an immediate answer, a series of carefully conducted propsective studies offers the best hope for setting improved standards.

NIOSH and OSHA Advisory Committee Proposed Standards

The proposed standards can be categorized as follows: noise exposure limits; medical surveillance; work practices; warning notices; personal protective equipment; apprisal of employees; and monitoring and recordkeeping and requirements.

Noise Exposure Limits. Noise exposure combines the environmental noise level and the exposure time to occupational noise exposures at places of employment. The environmental noise levels are measured at the head position of the employee during normal operations. Exposure times are measured for each different environmental noise level during an eight-hour workday. Noise levels are not restricted, only exposure.

Compliance with noise standards is measured with a sound level meter, conforming as a minimum to the ANSI specification S1.4 (1971), Type 2, set to use the A-weighted slow response, or by an OSHA-approved audiodosimeter of at least equivalent precision and accuracy. An ANSI standard for audiodosimeters is under study. Hopefully, it will be issued in the near future and be acceptable to OSHA.

The proposed OSHA noise limits differ from the limits currently in the regulations in that all exposure at 85 dbA and above, rather than 90 dbA, must be counted. For example with the existing limits, exposure at 85 dbA does not contribute to the daily noise dose. With the proposed limits, four hours at 85 dbA would be 4/16 or 25 per cent of the allowable daily noise dose.

The daily noise dose D is calculated as follows:

$$D = \frac{C_1}{T_1} + \frac{C_2}{T_2} + \ldots + \frac{C_n}{T_n}$$

where C is the exposure duration at level L and T is the maximum permitted duration of exposure at level L.

In the NIOSH proposal, the extension of the limit from 90 dbA for eight hours to 85 dbA for 16 hours was " . . . not to be regarded as defining noise exposure limits for work days which exceed eight hours." The OSHA Advisory Committee draft is silent on

this point, implying that the limits are to be used for work shifts exceeding eight hours. This is important in any standard since, for example, DOT permits a ten-hour work shift in the trucking industry, isolated locations such as offshore platforms often work 12-hour shifts, and some guidance is needed in dealing with overtime.

Medical Surveillance. Medical surveillance is based primarily on audiometry. Requirements include:

1. Audiometric technicians must be certified.
2. Audiometers must meet "Specifications for Audiometers" ANSI S3.6 (1969).
3. Test rooms must meet "Standard Criteria for Background Noise in Audiometer Rooms" ANSI S3.1 (R-1971).
4. Test tones must include 500, 1,000, 2,000, 3,000, 4,000, and 6,000 Hertz.
5. Baseline audiograms must be preceded by 14 hours of quiet.
6. Baseline audiograms must be made on all employees whose exposure equals or exceeds 50 per cent of allowable limits or who wear personal protective equipment to prevent excessive exposure.
7. Tests must be made within 90 days of initial assignment or re-assignment or within 180 days if already assigned on the effective date of this regulation.
8. Audiograms must be taken every year.
9. If any shift in hearing threshold equals or exceeds 10 db at 500, 1,000, or 2,000; or 15 db at 3,000; or 20 db at 4,000 or 6,000 Hertz, retest within one month to confirm the shift. If confirmed, refer to a physician for evaluation and action if required. If done adequately, these tests should identify individuals unusually susceptible to noise-induced hearing loss before excessive threshold shifts occur.

Work Practices. When employees are employed under conditions where noise exposures would exceed the prescribed limits, administrative or engineering controls shall be utilized to reduce exposure to within those limits. Administrative control is defined as any procedure limiting daily exposure by control of work schedule. Engineering control is defined as any procedure other than personal ear protection or administrative control reducing sound levels at the source or in the hearing zone of the employee.

Warning Notices. Clearly worded signs shall be posted at entrances to and/or at the periphery of areas where there is sustained environmental noise in excess of the limits prescribed.

Personal Protective Equipment. Personal protective equipment is authorized only until engineering and administrative controls and procedures can be implemented. It must reduce exposure to within prescribed limits, as determined by a rather complex calculation procedure. This procedure is intended to convert laboratory attenuations to attenuations which may be realistically achieved in the work place. Personal protective equipment must be fitted by a trained person and must include training by the employer in proper care and use. The OSHA Advisory Committee recommended two exceptions: (1) occasional exposure—where occupational noise exposure is excessive as the result of occasional exposures which occur on no more than one day per week, personal protective equipment capable of maintaining the effective noise dose within allowable limits is acceptable; (2) sensitive ears—personal protective equipment shall be provided to and used by employees receiving a daily noise dose between 0.5 and 1.0 if their audiograms show any significant increase in hearing level as a result of occupational noise exposure.

Apprisal of Employees. Each employer must advise and keep information accessible on hazards, relevant symptoms, proper conditions, and precautions.

Monitoring and Recordkeeping. Monitoring is required annually for ongoing operations and within 30 days for new or modified operations. Records must be maintained of environmental exposure monitoring (five years), audiograms (duration of employment plus five years), audiometer calibrations (five years), use of administrative controls, and use of personal ear protection.

Conclusion

The OSHA Advisory Committee included a provision for the review of the standard: "Specific provisions of the standard shall be revised as necessary in view of additional information which may become available. Moreover, the standard shall be given a complete review at least every five years and changes made commensurate with increasing scientific knowledge relating to effects of occupational noise exposures and aspects of noise measurement and control." This provision gives equal opportunity and a means for those defending the 90 dbA time average to come up with supporting data and for those supporting an 85 dbA limit to prove their case. Looking to the future, a means for improving the standard through careful prospective studies has been built into the proposed standard.

NIOSH BEHAVIORAL AND MOTIVATIONAL RESEARCH

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Behavioral and motivational research activities within the National Institute for Occupational Safety and Health (NIOSH) can be grouped into three program areas:

1. Human factors bearing on accident potential in high risk jobs and the effectiveness of psychological strategies in accident reduction.
2. Behavioral capacities and neural functions affected by exposures to chemical and physical agents.
3. Psychological job stress and worker health and safety.

This presentation will describe some projects in each of these three program areas.

Human Factors in Accident Potential and Strategies for Improved Worker Safety

On-going research in this area includes attempts to contrast behavioral abilities, attitudes towards work, perceptions of job hazards, and work habits of workers having few versus many accidents or drawn from workplaces with good and poor safety records. Currently being studied are workers from underground coal mining, the industry with the highest frequency and severity rates of accidents,[1,2] and from roofing occupations, a segment of the construction industry which OSHA has targeted for accident control.[2]

Included in the study of roofers are performance tasks designed to evaluate equilibrium, complex reaction time, speed-accuracy trade-off, eye-hand coordination, and short term memory, all of which are deemed important in roofer work routines. Task presentation and measurement of performance has been greatly aided by a computerized system which is battery operated for on-site use and compacted in a suitcase for easy portability.

Along with psychological interviews to establish job attitudes, sketches depicting certain hazards in roofing work or violations of safety rules are also being presented to the workers as part of the test protocol. Each roofer is asked to describe the events leading up to the particular scene portrayed, as well as to rank all such scenes in terms of the likelihood that an accident might occur, and its seriousness should it happen. Individual responses to the sketches are being used to define a measure of the roofer's perception of job risk. Some working hypotheses of the study are that roofers with few or no accidents in their work histories will offer different, perhaps more sensitive interpretations of the apparent hazards in the sketches than roofers who are accident repeaters, and will also show relatively better performance capacities. This project also calls for job sample analysis of roofing work routines in an effort to define new or alternative work practices more conducive to safety.

The coal miner's study, using strictly interview-questionnaire approaches, seeks to define psychological factors which may impede or enhance coal miner acceptance of job health and safety practices. Underground miners, foremen, union stewards, and management officials from coal mines displaying extremely high and low accident frequencies but otherwise matched in size of work force and method and volume of coal extraction are to be sampled in this study. Responses of miners relative to those of their immediate foremen and management are to be compared for the two sets of mines to determine whether their attitudes and concern about safety rules and health protective measures differ, and why they do.

Another project within this program area is aimed at showing the utility of behavioral science principles in reducing worker accidents. Almost complete is the development of an index of suggested contingency schemes for accident control which are wholly derived from psychological principles as found in the literature on learning and motivation, organizational behavior, behavior modification, and human factors engineering. The index is the product of psychological experts who reviewed established concepts in each of these different fields and considered their applicability and potential value in improving worker safety. Their efforts yielded over 100 guidelines, each framed as an action statement followed by some elaboration of its conceptual basis. At this point, these guidelines cannot be treated as proven ways of coping with unsafe worker acts of hazardous job practices. Rather they are ideas or hypotheses which are deserving of a try-out and evaluation. In this regard, a follow-on effort is being initiated to apply these guidelines in work settings such as mining, long-shoring, and mobile home construction where there exist evidence of frequent worker accidents or near misses. The effectiveness of these procedures in reducing accident potential in these instances will be monitored over a suitable period of time. Also involved in this follow-on work will be the drafting of a diagnostic technique which a foreman or safety officer could use in analyzing accident risks or unsafe acts connected with a specific job. The technique would enable one to select an appropriate behavioral strategy for control from the index of suggested schemes.

An example of a guideline statement drawn from the field of organizational psychology is "Organizations should have as part of their work philosophy a commitment to safety."

In elaborating on this idea, it is indicated that companies with a strong commitment to safety tend to have workers with an equally strong commitment to safety. The attitudes and behavior of top management toward safety matters tend to filter down to workers and supervisors at all levels. Notable signs of safety commitment are the size and cost of the safety program, level of position and prestige in the establishment of the top ranking safety officials, and the kinds of steps the company is willing to take to reduce accident level. Will they, for example, forego production goals for a time when a safety hazard has been identified, the correction of which necessitates temporary shutdown? If a machine guard breaks and a worker or supervisor has to hesitate to think about whether work should stop until the guard is fixed, then a proper climate for safety has not been created.

A guideline statement drawn from learning theory is: "Proper responses to emergencies should be defined and practiced to the point of being overlearned."

By way of elaboration, if a task is practiced allowing for a correct response to be made so often that it becomes almost automatic, then even under high levels of stress, the correct response will generally be made. This idea, referred to as overlearning, has been popularly used in training drivers to handle emergency situations and seems particularly applicable in working environments in which emergencies may be fairly frequent and where appropriate emergency procedures are well specified.

A third example, taken from human factors engineering, is: "Displays of irrelevant signals or cues in machine operations should be minimized to reduce risk of error and accidents."

The presence of irrelevant or extraneous display indicators in a machine work area imposes an added burden on the operator of sorting out important from unimportant signals. This can increase the probability of making a wrong response to a given machine cue or signal. Indeed, the greater the similarity between relevant and irrelevant information, the stronger this probability is. If irrelevant information cannot be removed from a worker's control display, then added cueing with color, location, or other enhancing features should be employed to ensure distinction of relevant from irrelevant signal indications.

It should be mentioned that along with these and other guideline statements will be numerous examples of possible applications. The index of these suggested schemes for accident control and related background information should be available in a contractor's report by the end of 1973. Subsequently, this material will be modified and published as a safety textbook.

Another activity which deserves mention is in an advanced stage of development. It in-

volves an analysis, via questionnaire and on-site walk-through surveys, of safety programs and practices in companies displaying consistently successful safety performance versus matched companies with less notable records. Specific characteristics to be evaluated in this survey include company commitment to safety as defined by administrative practices and policies, aspects of safety training, effectiveness of safety promotional ideas, adequacy of hazard control programs, and sensitivity of accident reporting procedures and investigations. The objective of this study is to identify distinctive factors underlying superior accident control programs in industry and consider them as building blocks for model programs.

In summary, the activities in this program area are expected to offer the following outputs:

1. A better understanding of the human element in accident occurrences and the input of such knowledge in preparing manuals of good practices in high risk jobs.
2. Ideas for effective safety programs and assorted psychological principles for dealing with specific human factor problems in accident reduction.
3. Procedures for selecting workers for risky jobs which may not be feasibly controlled through engineering means.

Behavioral and Neurological Functions Affected by Exposures To Chemical Physical Agents

The second program area concerns the identification of adverse behavioral and neurofunction changes due to chemical and physical agents. NIOSH has given the highest priority to developing exposure limits for potentially harmful chemicals and physical agents found at the workplace. The schedule of criteria development for recommended standards includes chemicals having neurotoxic properties, e.g., pesticides (parathion), solvents (carbon disulfide, perchloroethylene), heavy metals (lead, mercury), exhaust gases (carbon monoxide) and irritant vapors (formaldehyde). Physical agents such as noise, vibration, and heat which can be injurious to sensory organs or physiologic functions are also listed. The protection goal in setting limits for these chemical and physical hazards has been to safeguard workers against those pathological changes or disabilities which are specific to the different agents. Exposure at or even below these limits, however, may evoke behavioral and nervous system changes whose implications for safety and health are in need of more study. In this regard, on-going and planned NIOSH research is concerned with two questions: (1) whether these pre-clinical behavioral/neurological changes may be an early indicator of the potential disease process; (2) whether the nature of the behavioral change itself may increase accident risk on or off the job. The following offers some illustrations of NIOSH activities:

1. Performance scores on eye-hand coordination, finger/toe tapping, reaction time tasks, and tremor and electromyographical measures were collected on 142 workers engaged in chlor-alkali operations, the process involving exposures to elemental mercury at the recommended TLV.[4] The findings showed exposed workers, with no overt symptoms of mercury poisoning, to display atypical eletromyograms, frequent arm tremors, and fumbling movements in certain psychomotor tasks. These responses revealed some correspondence with increased, though not harmful, levels of mercury in the blood or urine. Removal of such workers from the exposure area reduced the body burden of mercury and also the accompanying nervous system response.
2. Similar to the study above, over 300 workers exposed to airborne lead at different concentrations in the manufacture of storage batteries are currently being tested with a synthetic work battery which furnishes measures of certain cognitive, psychomotor, and perceptual functions. The degree of correlation between body burden of lead and the level of behavioral functioning is to be established for the worker group. Also to be evaluated are indices of health and safety of the exposed workers as extracted from plant medical and accident records. Whether the workers show behavioral changes before they reveal significant or unsafe amounts of lead in their blood is at issue here.
3. Work is in progress to confirm observations from a foreign study which indicated that exposures to trichlorethylene, a solvent, at the recommended limits of 100 parts per million causes losses in short term memory, visual perception, and complex reaction time.[5] Also being verified are the adequacy of the CO exposure limits of 35 parts per million for minimizing behavioral change. The latter work is being performed on toll booth collectors and personnel working at border crossing points.
4. Still another study is evaluating the influence on performance effectiveness of such trace levels of anesthetics as may be found in operating rooms. Performance tasks here include detecting infrequent changes in simulated electrocardiographic traces, short-term memory, and complex reaction time. First results indicate some adverse effects at exposures of 15 ppm halothane and 500 ppm nitrous oxide, which are not uncommon in operating room atmospheres.[7] This study is part of a much larger project designed to justify the need for stricter ventilation requirements in surgery facilities.

With regard to one physical agent—noise—medical, accident, and absenteeism entries in the records of 500 workers taken from noisy work areas in two plants were compared with those for a matched group of 500 workers drawn from quieter workplaces.[6] The tallies, especially for the larger and noisier of the two plants from which the records were drawn, showed those exposed to the higher noise levels had greater numbers of medical problems, more absenteeism, and more job related accidents than those not so exposed. The findings tend to implicate noise at least as a contributing factor in causing extra-auditory occupational health and safety problems. A follow-up effort is to evaluate the record entries for the same workers during the time period subsequent to the establishment of an ear protection program in the plants in question. Reduction in individual worker noise exposures through the use of ear protectors should lower the frequency of the medical, absence, and accident occurrences for the high noise level group if in fact excess noise is a causal factor. Information from this work can clarify issues basic to the development of health and safety criteria for noise which go beyond considerations of hearing conservation. In the same vein, another study is in progress to uncover whether noise conditions complying with recommended limits for safeguarding hearing might still permit noise-induced changes in non-auditory sensory functions sufficient to pose added danger at the workplace. This investigation is evaluating in the laboratory different measures of visual, tactile, kinesthetic, and vestibular sense functions as they may be affected by steady-state and impact noise conditions meeting existing noise standards for ear protection.

All of the aforementioned efforts are aimed at generating behavioral and neurological response data to chemical and physical agents for purposes of criteria development for standards. It is to be emphasized that these observations must be weighed along with the usual pathologic indices in setting exposure limits for different noxious agents so as to provide all-around safety and health protection. In addition, the research activities in this program area may furnish some insights into the usefulness of behavioral and neurological monitoring techniques for providing early detection of potential occupational diseases or increased accident risk owing to physical and chemical agents. NIOSH sponsored a workshop on behavioral toxicology in June 1973 where an array of these techniques were demonstrated and discussions held as to their possible application as preventive measures.

Psychological Job Stress and Worker Health and Safety

The third and last program area deals with the impact of psychological job stress on the worker's physical and mental health. It is important to realize that a segment of the work force may experience stressful or harmful conditions at work other than or in addition to those posed by physical factors or chemical agents. These types of stresses defy measurements by impingers, sound-level meters, gas detector tubes, and other instruments used in characterizing the physical environment. Such stress factors are psychological in nature, stemming from the requirements of the job or other aspects of one's work situation. Information overloads,

decision-making affecting the safety or well-being of others, conflicting or ambiguous job requirements, monotonous routines, and poor worker-supervisor relationships are examples of psychological job stresses, and there is growing evidence linking these kinds of stress factors with increased risk of coronary heart disease, ulcers, and nervous disorders among worker groups. Perhaps the classic example of a worker group subjected to psychological job stress with consequent health problems is the air traffic controllers. Other correlates of job stress are decline in worker morale, intensified feelings of alienation resulting in increased absenteeism, production stoppages, or even acts of industrial sabotage. The Lordstown auto plant episode not too long ago is a case in point.

At present, NIOSH is conducting a large study on contract with the Institute of Social Research, University of Michigan, to define the degree of relationship between known stress elements in 20 job types, the amount of stress actually perceived by the jobholders, and evidence of health problems, either physical or mental, among such workers. The study plan calls for over 1,000 workers drawn from white and blue collar jobs of different sorts, e.g., air traffic controllers, railway dispatchers, assembly line workers, college administrators, and different levels or types of responsibility, e.g., foreman vs. middle management people, responsibility for people vs. responsibility for things. Data on resulting apparent strain and morbidity resulting from job stress problems are being collected from psychological interviews, attitude-adjustment inventories, and medical histories administered to all worker subjects. In addition, biochemical determinations of stress from blood and urine samples as well as cardiovascular measures are being taken on a portion of the total worker group. Correlational analyses will be used to demonstrate the strength of relationships between perceived job stress and measured health outcomes in different job settings.

As part of this same problem, NIOSH has added questions to the DOL Employment Standards Administration triennial interview survey of a national probability sample of 1,500 U.S. workers which seeks representative worker reactions to their jobs. The additional questions are probing for sources of psychological stress at work and any physical or mental health difficulties that may have been a consequence of them. The latest round of interviews has just been completed and data are presently being analyzed.

Other activities in this program area, either in progress or being planned, include the following:

1. Study of job stress in policemen, emphasizing factors of shift work, isolation, crisis situations and confrontations, inter-personal difficulties, administrative support or its lack.

2. Impact of variable and fixed workshift on worker health and safety as well as psychosocial problems.

3. Role of intrinsic and extrinsic job satisfaction as a primary or contributing factor in coronary heart disease.

The aforementioned efforts and others are intended to supply data basic to predicting physical and emotional problems connected with certain job stress factors and to establish stress profiles for different occupations. This is preparatory to actions aimed at reducing stress in the work setting or improving worker adjustment to it. The latter could take the form of employee counseling, sensitivity training, job redesign, modified work-rest regimens, job enrichment, and the like.

While the current thrust of the NIOSH work on job stress is health oriented, data on accident occurrences will also be considered where such problems are notable. There is reason to suspect that personnel subjected to stress from job related or off-job causes may be more disposed to accidents. The research literature on traffic fatalities reports a significant number of instances where the drivers involved in these mishaps underwent a highly stressful or emotional experience just prior to the accident.[7, 8] Brody and others [9] state that from time to time people are subject to physical and emotional stresses which may cause preoccupation or mental distraction seriously affecting their ability to perform a given task. When this occurs, the individual joins the ranks of the temporarily accident prone.

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MANAGEMENT'S RESPONSIBILITY FOR SAFETY

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Anyone who has ever worked in safety recognizes that the real safety job is performed at the first line management level. It is the foreman who has direct contact with production and maintenance employees; it is the foreman who trains them and directs their work activities; and it is the foreman who instructs the employees concerning safety requirements and enforces the requirements. But safety does not start at the foreman level in any organization; it starts at the top, with the chief executive officer.

How does a good safety program really get started in any organization, and what keeps it going? The more I consider this question, the more apparent it is to me that a sincere, aggressive, and effective safety effort really starts with a philosophy or attitude, a personal feeling of responsibility at the top executive level. Such an attitude is the motivation that puts all of the wheels in motion and keeps them rolling.

In this respect in particular we are singularly fortunate in United States Steel. Judge Elbert H. Gary, first Chairman of the Board of Directors, brought to industry a set of high standards and some ideas which, in his day, were quite new.

For example, he believed firmly in the public responsibility of large corporations. He was a leader in instituting welfare and safety programs for the betterment of working conditions. Among the now widely known "Gary principles" was one which stated his belief that "no industry can permanently succeed that does not treat its employees equitably and humanely."

As stated more recently in our Creed of Human Relations, "We believe in the dignity and importance of the individual employee and in his right to derive personal satisfaction from his employment." Also spelled out in this creed is the belief that, "The safety of employees continues to be the first consideration in the operation of the business."

These are expressions of the kind of safety attitude which must prevail at the top executive level in any organization as a prerequisite for effective safety programming and administration. We are fortunate in United States Steel that our top executive officers since Judge Gary have expressed and demonstrated a personal responsibility for employee safety.

What is the next step? Let us consider a situation that I have heard expressed many times during meetings I have attended with safety representatives from other companies. A safety problem is brought to your attention and you investigate it thoroughly. You collect all available facts. In developing your recommendations for corrective action, you consider all possible alternatives and arrive at the most practical and realistic action to correct the problem. And then you sit down with the individual who is responsible for initiating the corrective action. While there is no substantial disagreement concerning the facts involved, you can't seem to get him off dead center. Why does this type of impasse occur? Could it be that you and the other individual are not working toward the same objective, or perhaps he has conflicting objectives that deter him from initiating clean-cut, positive, corrective action?

In our opinion, if there is any one management safety responsibility that is more important than any other it is positive action by executive management to establish a specific realistic safety objective. Without such an objective we really don't know what we are seeking to attain, and if we don't know that, we certainly don't know how to accomplish it. It's much like starting on a vacation trip without any idea as to where you want to go. A map won't help because one road is as good as any other when you don't have a specific destination.

And so it is with safety. We may *think* we know what our organization's safety objective is, but if it is not spelled out precisely by executive management and communicated effectively to every person having a responsibility for attainment, it's a safe bet that members of management will have many different ideas as to what is expected of them in safety. How can an effective safety program be built upon such a foundation, and how can good safety performance ever be expected under such conditions? Again, unless we know precisely where we want to go, it's awfully hard to get there.

That being the case, what kind of safety objective should executive management establish? Before jumping immediately to what we might consider to be a good safety objective, let's just consider for a moment a few simple criteria which must be considered for any kind of an objective.

1. The objective should express a specific goal.
2. The goal expressed by the objective should be recognized as worthy of attainment.
3. The objective should be expressed in simple terms and should be clearly understandable.
4. The objective should be attainable.

Once an objective has been established, there are other important considerations, such as communication to every person whose activities contribute to the goal's attainment, controls to measure performance against the objective, etc., but we can disregard these factors for the purpose of this discussion.

A number of years ago, executive management in United States Steel established a safety objective for all operations in the corporation. Our safety program, our safety administration, our specific management safety responsibilities, our management and employee safety training, and all elements of our safety activities are designed to work toward attainment of that objective. The objective is, "No Injuries." At first blush, such a safety objective may sound like the impossible dream, but let's just consider it for a moment to see how well it will measure up to the four criteria I mentioned a few moments ago.

First, I believe you will agree that "No Injuries" does express a specific goal.

Second, "No Injuries" is certainly a goal that is worth attaining.

Third, "No Injuries" certainly expresses a goal in simple terms and is readily understandable.

The fourth criteria—is it attainable—may be a little more difficult to accept, so perhaps a few words are in order on this point. Perhaps I should start by admitting quite frankly that despite diligent efforts and substantial progress, much work remains before we in United States Steel can accomplish the objective, but we are working toward that goal. Increasingly, we see evidence that the objective is attainable. Bearing in mind that the new OSHA recording and reporting procedures exclude first aid cases in identifying injuries, we find shops and departments in our plants working for increasingly longer periods of time without a reportable injury. A shop or a department is only a part of a plant, but if one shop or one department can do it, so can the other shops and departments in the plant. So long as they actually continue to work toward the objective, some day the plants will put it all together and arrive at a "No Injury" operation. You can bet, however, that such a desirable goal can never be obtained by any operation that does not establish "No Injuries" as the objective.

In case some of you may still think I am talking theoretical nonsense, let me assure you that I am acutely aware that some industries and some operations still have high injury frequency rates. Here we must distinguish between the long-range safety objective and short-range tactics to achieve that objective. It would be unrealistic to expect no injuries on a short-range basis in such locations. On the other hand, continued progress cannot be expected unless the true objective of "No Injuries" is constantly maintained. Let's say, for example, that you now have an injury frequency rate of 10, and by hard diligent work your organization is able to get the rate down to two. Now that's real progress, but how long would you be satisfied with two, or, perhaps even more important, how long would your boss be satisfied with two? I submit that in the final analysis no safety objec-

tive less than "No Injuries" is acceptable.

I have spent considerable time discussing safety objective because I think it is a vital factor too often overlooked. We discuss safety programs, communications, motivations, management safety training, employee safety training, enforcement action, accident investigations, and even highly sophisticated computerized statistics and controls, but unless all elements of safety activities are designed and applied to attain a specific common objective, we and other members of our respective organizations may be directing our attention to the wrong things, thereby diluting our effectiveness.

Establishing corporate objectives and controls to assure continued progress toward attainment of the objectives are functions of the top executive level in any organization. In the field of safety, this is the starting point for all other safety activities. In my opinion it therefore ranks as the most important management safety responsibility. But in order for it to have meaning and in order for it to produce the desired results, the safety objective must be continually reinforced by actions as well as words.

A very important part of the action is a good dynamic safety program that clearly delineates all safety requirements and establishes the specific safety responsibilities for each level of management. But such a safety program does not come into being spontaneously nor can it produce desired results without continued surveillance and a guiding hand. So once a safety objective has been established, the next management safety responsibility is to delegate to a member of management responsibility for developing a safety program and coordinating safety activities. In larger organizations experience has shown that several management representatives in a safety department are needed to perform this function. In smaller organizations it has been the practice to assign responsibility for safety programming, communications, and controls to a management representative who has other non-safety functions as well. With the expertise required to perform an effective safety job, and the proliferation of safety legislation, standards, codes, regulations, etc., in recent years, I find it difficult to comprehend that any organization of appreciable size can ever hope to do a truly effective job in safety without a full-time safety specialist.

United States Steel's safety program is based upon many years of analyzing injury causes and the use of various injury prevention techniques. It is equally applicable to all operations. In addition to steelmaking and processing operations, this includes coal, ore, and limestone mining, cement plants, fertilizer plants, steel fabricating plants and warehouses, chemical plants, plastics plants and, of course, the erection of bridges and steel structures of buildings, such as the new Sears Building in Chicago. These operations vary not only with respect to the type of product and work activity, but they also vary in size, ranging from three or four employees in farm service centers to many thousands in a large steel plant. But despite these many variations, our basic safety program applies to every one of them.

The program establishes and describes all basic injury prevention activities for all locations. It also delineates specific management safety responsibilities, including administrative, control, and training functions, for each level of management. These management safety responsibilities are spelled out in some detail for plant managers and all levels of operating and maintenance management and staff functions, including safety personnel.

The responsibilities include activities such as management safety meetings; investigation and reporting of injuries and accidents having injury potential; developing, revising, and using safe job procedures; weekly individual employee safety contacts; planned observations; correction of and reporting violations and unsafe acts; maintenance of employee safety records; inspection of housekeeping, tools, and physical equipment, such as cranes and mobile equipment; establishing and enforcing requirements for employee protective apparel; and many other safety functions.

The various levels in the organization have different responsibilities with respect to each function. Generally, the higher levels in the organization are responsible for adopting requirements, communicating, establishing, and using controls to assure that the safety functions are being performed, while lower levels in the organization are responsible for performing the delegated specific functions. There are two in particular that I think should be emphasized: safety training, and safety audits.

In United States Steel, actual administration of safety requirements is a line responsibility. We feel that is the only logical approach, because safety requirements must be fully integrated with other job requirements such as production, quality control, and cost performance in order to be effective. But line management cannot be expected to do an effective job of administering safety requirements unless they are provided with the tools and techniques to do the job. A safety program will never be more than a paper program unless it is communicated to those who must use it in a manner that is clearly understandable as to what must be done and why it must be done.

Our management safety training is implemented through a program called "Principles of Accident Prevention in United States Steel." Every foreman and every member of line management must take this course. It not only communicates the safety requirements, it also explains the theory and reasons why each technique is necessary. It also includes helpful guides on creating proper safety attitudes, motivating employees to comply with safety requirements, etc. We believe it is a well-rounded management safety training program and that it satisfies management's important responsibility in this area.

As might be expected, a substantial part of our management safety training is devoted to the techniques involved in effective wage earner safety training. I will not elaborate on this topic except to emphasize the importance of good safe job procedures as the basis for effective wage earner safety training.

As we see it, the word "job" in the term "safe job procedures" is not synonymous with "occupation." For example, an employee in the occupation of "stocker" performs many different jobs. One such job, for example, may be unloading coils of steel from flatbed trailers. This job, which would be described in a safe job procedure, would include a number of separate tasks or functions, such as: opening the warehouse overhead door; directing trucker while backing into unloading area and parking truck; positioning portable stairs for getting onto trailer bed; inspection of trailer and product for tripping hazards and other potential problems; selection and installation of proper lifting attachment for crane; hooking up lifts; movement of product to temporary storage area; directing trucker while pulling out of unloading area; closing the warehouse overhead door.

As we have noted, just this one job performed by an employee on the "stocker" occupation includes many separate tasks, and each of these tasks must be carefully considered to identify the right way—the safe way—to perform it and to identify potential injury-causing conditions or actions which must be avoided.

Management has the responsibility for developing safe job procedures, with the assistance of personnel who actually perform the job under consideration. We feel that development of good safe job procedures is one of the most important management responsibilities involved in wage earner safety training because omissions or inaccuracies at this stage will result in incomplete or ineffective employee safety training and enforcement action. I might add that deficiencies in safe job procedures can also be expected to cause production problems which can have an adverse effect upon costs, quality, or meeting production and shipping schedules.

The second specified management safety responsibility that I want to emphasize is safety audits. While we do have safety audits by teams from our headquarters whenever a need is indicated or assistance is requested, in-plant audits are performed on a regular scheduled basis. These are not just physical inspections, but are in-depth examination of all phases of safety program administration. They examine the quality as well as the quantity of all required safety activity. Safety audits constitute a control device which can identify and correct weaknesses in safety administration before the deficiencies have a chance to be reflected in injury rates. Despite

the best efforts and best intentions of foremen, general foremen, and superintendents, physical and procedural deficiencies do tend to creep into prescribed safety activities over a period of time due to the extensive demands on their time and attention. Safety audits help the area being audited to identify and correct the deficiencies and, perhaps of equal importance, persons doing the auditing frequently discover new ideas that they can take back to their own departments to help their own safety activity.

There is another basic management responsibility, that we prefer to call "Safety Guides." The only positive thing that arises out of an injury or accident situation is that we can learn something about the cause, and we certainly have an obligation to put that knowledge to work.

In United States Steel, our analyses of injuries which have occurred throughout the corporation over many years of experience have disclosed many basic injury causes, some of a physical nature and some involving deficiencies in procedures. This vast storehouse of experience is of no value to the people in the plants who are engaged in the daily job of supervising employees and getting out the production unless it can be made available to them in useable form. So a number of years ago we summarized all of the basic injury prevention data in the form of minimum requirements and provided the material to all locations in two manuals: the "Safety Guide-Physical Conditions" and the "Safety Guide-Procedures and Inspections."

These two manuals are each subdivided into the same identical chapters. They include topics such as utilities, material handling, transportation, burning and welding, stocking and piling, gas procedures-purging, testing, rescue operations, fire protection, design of plants and buildings, stairways, stationary ladders, platforms and walkways, elevators, scaffolds, pressure vessels, liquefied petroleum gas, etc. So, for these and many other topics, our minimum physical requirements are set forth in the "Safety Guide-Physical Conditions" and our minimum requirements for procedures and inspections are included in the "Safety Guide-Procedures and Inspections." Contents of the latter manual, in turn, are incorporated in safe job procedures, where appropriate, to assure continued use with employees.

The contents of these manuals are constantly revised to incorporate new requirements as indicated by experience. Revisions resulting from 1972 experience have already been developed and distributed to all holders of the manuals. Since all such revisions are approved by headquarters operating, maintenance, engineering, and safety responsibilities, management at all levels in the organization accept and apply the provisions in the plants or other work locations.

You may have noticed that some of the contents of the manuals mentioned sound a lot like the contents of OSHA standards. Since these manuals had been developed and were in use long before there was an Occupational Safety and Health Act, and since our minimum requirements incorporated appropriate provisions of ANSI and other standards, our problems of complying with OSHA standards when they became effective were substantially minimized. This is not to say that all OSHA requirements are included in our safety guide manuals; they aren't, but many are and have been for years, and this was a big help. Conversely, our safety guide manuals contain many requirements that OSHA standards writers have not as yet proposed.

The main point, however, in discussing our safety guide manuals and the main reason they exist is to provide line and engineering personnel with the kind of data they need on a day-to-day basis in order to effectively perform their safety responsibility. The results of injury or accident investigations will be buried in the files and no benefit can result unless such a device is provided to keep the information in a current and useable form.

There are many other important management safety responsibilities such as engineering specifications for safety; researching and developing new or improved protective apparel or devices; thorough inspection of new or modified facilities by operating, maintenance, engineering, and safety personnel before they are placed in operation; etc. However, I have attempted to discuss only a few which I consider to be of prime importance.

I cannot conclude my comments on responsibility for safety without mentioning another word: accountability. It is human nature to aspire to a job involving more responsibility with more opportunity for personal benefit. But as we assume more responsibility we also must recognize that we assume more accountability for the results of our efforts. This is the reason that in the final analysis management is responsible for the safety of employees. When there is an injury, only management is accountable for the results. The federal government, the state government, the labor organizations, the many self-proclaimed safety experts don't say, "Here is the money—let us pick up the tab for the accident benefits, or the workmen's compensation payments, or the penalty that may be assessed by OSHA." Recommendations and good advice are welcome and should be given every consideration by management, but demands for partial or equal authority in determining how a safety program is to be administered must be resisted. Since management is solely accountable for the results, management must be solely responsible for all aspects of safety administration.

There is another reason that management must retain sole responsibility for safety. Safety requirements must be enforced. Once an employee has been thoroughly trained concerning the right way, the safe way, to perform his job, the employee is responsible for performing it as prescribed, including the wearing of required protective apparel and the use of safety devices wherever needed. But who is accountable if the employee fails to comply? Is the employee accountable for the cost of an injury or for a penalty assessed due to a violation of an OSHA standard? The answer is "No"—the employer is accountable in all such situations. So the employer must take whatever action is necessary to enforce safety requirements, including disciplinary action when all other measures to change an employee's conduct prove unsuccessful. Since only management is accountable for the results, management must have authority to make the decisions as to what measures are to be followed in the administration of safety activities.

At the beginning, I mentioned that first line management, or the foreman, performs the nuts and bolts of the safety job. In the final analysis, everything we do and every management safety responsibility should be designed to assist that first line supervisor in every way possible to make his job as easy, but as effective, as possible. To accomplish this goal, all management safety responsibilities can be summarized into three categories:

1. Establishing, communicating, and following up a realistic safety objective, consisting of a specific goal toward which all affected personnel are required to direct their efforts.

2. Providing operating management with effective safety training, motivations, tools, techniques, and information necessary for them to do an effective job of safety administration.

3. Establishing and using controls to identify weak points in safety administration and activity as they occur, and following up to correct deficiencies.

It is apparent to us that no single level of management, even in a small organization, can do the safety job alone. While the first line supervisor is on the firing line, top executive management must establish basic safety objectives and responsibilities, and intermediate management must provide the tools to get the job done. It's a team effort. It remains to be seen to whether the recent flurry in federal and state safety and health legislation will result in a forward pass, a lateral, or a fumble insofar as improved safety performance is concerned. But one thing is sure—we must reverse the adverse trend of occupational injuries which has developed throughout this country in recent years. This cannot be accomplished without positive action by management, either on a compulsory or voluntary basis. Regardless of why or how more effective injury prevention activity is initiated, the best opportunity for solid concrete improvements in performance lies in an organized approach, with every employee, management and nonmanagement alike, fulfilling his responsibility and all working toward the same specific and realistic safety objective: no injuries.

TRAINING, MAINTAINING INTEREST AND MOTIVATION

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The gang I work with at the office will tell you they have heard me say many times, "Nothin' ever stays the same." Usually, I say that just after we have had a discussion about something that has changed dramatically; either the amount or the frequency of the change has brought the subject up again. So, we critique the change and agree all over again—"Nothin' ever stays the same." This often brings on a remark that "Things ain't like they used to be," or, "Remember the good ole days."

We see this same scene repeat itself over and over again, and each time we go through the same mental processes we have so many times before. A person can't be successful and resist change. We say it's progress, it's nature's law, it's inevitable, and then we talk about the fact that it's human nature to resist change, and then again someone always says all over again, "Nothin' ever stays the same."

Brother, I've heard that 'til I've got corns on my ear drums from hearing it. And, I have said it so many times that everybody who works around me must must have corns on their ear drums from hearing me say it: "Nothin' ever stays the same."

If we all say it, then it must be true, and if it's true, what should we do about it? Should we stop saying it or start understanding it? Personally, I prefer the latter.

Most people want progress but don't want change. We can't have improved methods and conditions without departure from the status quo. That's the price we must pay.

Change is not often easily or quickly accepted. A new method that is actually easier usually seems more difficult for a while, simply because it is a change from existing conditions. Just as a table, chair, or any other inanimate object retains its shape, so do we human beings hold onto our routine. We are all creatures of habit.

Recently, a father rushed into his five year old son's play room and excitedly said, "Come here, Johnny. On TV an astronaut is walking on the moon."

Very nonchalantly the little kid continued playing with his toys and said, "Dad, I've been seeing people walk on the moon all of my life."

The truth of the matter is the boy had in reality seen this phenomenon, still exciting to the older generation, all of his life. There had been no great transition in his brief existence. Watching a person walk on the moon to him was no greater event than watching a person strolling through the park.

Change is inevitable, it is the only constant thing in life. We can't evade it, we can't avoid it, and we can't ignore it. We can only accept it and adjust to it.

No longer do we question change. Our only concern is regarding the rate of change. History will perhaps label our age as one of transition, an era of change. Change forever has been and forever will be part of human conditioning. The only thing different about change today is the pace of change and it seems inevitable that it will in the future become even faster and faster.

There can be no doubt that in the life-time of anyone 40 to 50 years old or older, there have been more technological advancements in that person's life-time than in all the previous history of the world put together.

We've done so well in all the sciences that we can really very easily conceive that man can reason out and conquer just about any problem in chemistry, electronics, mechanics, and the like that he sets his mind to.

For instance, in the manufacturing plant if the press pierces the hole .012 inch off center, we study the machine, the stock, the tooling,

and make adjustments for correcting the misalignment, and soon the operation is back on center and the performance is near perfect again, just the way we planned it. Do we ever think about studying the operator? Are the people part of the problem?

What about the machinery of human events—when the gears of human endeavor don't mesh, when the human effort is off target, and we want to bring it back on dead center, what do we do? Is there an expert in the house? If we study a machine that is acting up and learn how to correct it, couldn't we perhaps also profit by studying the man and see if we can understand his behavior, understand the problem, and, once we know the cause, have a better chance to know what it takes to get back where we want to be? Just as soon as we begin to understand the problem, we are already half way home in solving it.

In the past 25 to 30 years, many theories have been advanced, lectures have been given, books have been written, and all kinds of experimental studies have resulted in a much better understanding of human behavior. That we should become a student of these and develop a better understanding of them if we would succeed in the field of human engineering is the understatement of the year.

We've seen many labels come into use—Transactional Analysis; Job Enrichment; Parent, Child, Adult; I'm O.K., You're O.K.

The question comes to mind: If we understand these and other theories in human behavior, can we as supervisors expect to learn how to motivate and stimulate our employees? Can we identify communications problems, measure human effectiveness, improve the performance of the average-and-above worker, and even maximize the performance of the non-cooperative or problem employee? The experts say we can. Many companies, already using these newer applications for understanding and controlling human behavior at work, have found that, when properly applied, they are creating better communication systems with resulting increases in productivity.

When a situation is done and it's all over, almost anyone can tell you what happened—we call that Monday morning quarter backing. We may not always have from Saturday afternoon to Tuesday to think about a problem. Even so, if we are going to develop skills in human resources management, we must become more expert in attempting to predict, with a relatively high degree of accuracy, what may happen in the field of human relations.

As difficult as it is to call the shots on the spur of the moment when you would prefer to "have 'til Tuesday" to think about it, this is the price of leadership we must pay as we assume the role of supervisors. Even though we are dealing with something as unpredictable as a hiccough, we still can expand our abilities if we think constructively about the fundamentals of human engineering.

In trying to offer some guide lines, a directional compass for our course, it seems a pity that we will have to be so brief. Our subject is vital to the success of any safety program; for that matter, it is equally essential to any other facet in the management of business and industry. When organizations fail to realize their full potential, it almost always results from a failure to understand human relations problems and a lack of successful communications.

In view of that, let's review some of the important things to remember; for example, if you would provide leadership, here is a partial list of things to do: Provide training for everyone, yourself as well as employees. Know what your employees believe in. Know what they do not believe in. Understand your employees from their point of view; establish and maintain good communications; listen to them attentively, with sensitivity to their problems. Remember, you cannot *not* communicate (if you fail to communicate, the message becomes what they want it to be).

Never argue; ask receptive questions. Know what's going on. Make them feel a part of the organization. Communicate with your actions, as well as with your words; set the example you want followed. Try to understand the norms, the standards of behavior of your employees as they see it.

Be aware of all personal factors involved—take into account both your and their past experience and current personal situation.

Make a specific diagnosis of each behavior pattern you analyse. Assemble and study as many variables as possible.

Create areas of common interest. Help employees develop a sense of belonging. Be willing to take risks. Admit when you are wrong. Learn from other people's experience. Be sensitive to the feelings and emotions of others.

Even though I dislike negative training practices, here are some things you should try to avoid: Don't think unimportant things are important. Don't think important things are unimportant.

Don't fail to interpret actions as well as words. Don't fail to listen to what employees are trying to say, but cannot. Don't fail to take into account that even dead silence can communicate a shattering message. Don't give orders in a situation when you don't know what they are thinking.

Don't try to delegate understanding—this must come from you. Don't operate on the belief that economic incentive and what management says are the only two things affecting behavior in industrial life.

On that last point, there is a very interesting study that reveals the gap between what workers really want and what supervisors *think* they want. It was developed by the authors of *Improving Individual Productivity*, and published by the American Management Association:

Job Conditions	*Worker Rating*	*Supervisor Rating*
Appreciation for good work	1	8
Feeling "in" on things	2	10
Help with personal problems	3	9
Job security	4	2
Good wages	5	1
Work that keeps you interested	6	5
Possibilities for promotion	7	3
Personal loyalty to workers	8	6
Good working conditions	9	4
Tactful discipline	10	7

The wide differences in point of view reflected in this table may be a result of many things—it could be a difference in personal philosophies, backgrounds, and attitudes or some of the codes the supervisors and the group of employees represented. I'd rather not, for our purposes here, try to arrive at how such differences occur or try to find the causes; let's decide instead what we should do in our own lives with similar problems in understanding. Because, believe me, they do exist in almost every instance where special attention is not given to erasing or resolving them.

What do such differences mean? How will they affect our ability as safety supervisors to train, maintain interest, and motivate our employees? Don't you think a supervisor just might have a little difficulty in communicating, in reaching a comfortable understanding between himself and an employee who rated good wages fifth in importance as long as the supervisor operated as though good wages was first in importance?

If we know these differences exist, if we even know why they exist, our knowledge is still as useless as a parachute that opens on the second bounce, unless we can use that knowledge to administer more skillfully.

Since this is a session to increase our "know how", and translate it more effectively into our "do how", here are a few tidbits of this old Hoosiers' hog, dog, and farm philosophies:

1. All supervisors of safety programs should become better amateur psychologists. Everyone already is a sort of an amateur psychologist—with our wives, our children, we try to "psyche out" each other to keep from making too many ripples in the troubled waters when differences of opinion arise. Why not work harder at this same problem with the people with whom we work?

Don't worry about not being an expert on everything there is to know about behavioral science. I love the thing Homer Sanger said: "Any baseball team could use a man who plays every position superbly, never strikes out, and never makes an error; but there's no way to make him lay down his hot dog and come out of the grandstand."

There's no grandstand coach going to boo

you if you make an error in human relations. I can promise you one thing though: your employees will cheer you if you are willing to try. After all, honest effort is sure to improve on the situation, even if you don't consider you have a problem in existence at present.

2. Remember, if you forget everything else I've said, behavior is largely determined by emotions. For the most part, feelings—emotions—are the "facts" we will be dealing with. True, they may be based on inaccurate or incomplete information, but they still decide the direction you are taking.

Accept this principle as a part of human nature if you will, don't insist on understanding why it has to be that way. If how a person feels in large part determines how he will behave, if education and real facts seldom persuade us to act a certain way, but our feelings and emotions do, then don't fight it, simply because it's human nature. Make that work for you in your area of responsibility, because if you are right in agreeing it's human nature, chances are you'll never be able to change that!

I never quite understood myself, why you can tell a person there are 9,906,812,004 stars in the galaxy and he will believe you, but if you hang a sign that says "wet paint" he conducts his own experiment by touching it to see if it really is wet. I don't understand it, but since it's true, and if we really can't change it, we might have more success in controlling the wet paint sampling if we tried another method. All I am saying is, finally, if we can't change it, don't fight it; understand it and work around it.

3. Know all you can about what it takes to insure employee safety, but always remember, your approach in persuasion of the employee must be one of sincere, helpful, concerned interest in his health and well being. Never, never, never try to impress them or throw your weight around—they don't care how much you know about safety until they know how much you care about their safety.

How do you feel it goes with your employees? What is your employee thinking while you are communicating with him about safety? Is he wondering if the supervisor is speaking in terms of the company's interest to cut down the cost of having accidents? Is he wondering if it's in terms of the plant record so he will look good? Or he may be asking, is it because they are really interested in me, because they really don't want to see me get hurt?

How he perceives the answers to these questions determines almost entirely the extent and the type of performance he will give. And, here is the shocker: If his idea is different from your intentions, a tragic situation exists, because his action is determined by his perception, his gut feeling of what you really meant, not necessarily at all even close to what you intended the message to be. That is why this next point becomes so important.

4. Get the words straight! *Communicate.* Even though a dictionary in one volume contains every word in our language, it fails miserably as an instrument of communication because the words are not in the proper order. I can study it and improve my vocabulary and understanding of the definition of a word, but it takes someone to put those words in their proper order in phrases and sentences before I get the message they can convey.

When words are out of order, their meaning can be misunderstood, the results can be humorous such as these examples of church bulletins: "This afternoon there will be meetings in the north and south ends of the church—children will be baptized at both ends." "Tuesday at 4 P.M. there will be an ice cream social; all ladies giving milk, please come early." "Wednesday, the ladies literary society will meet. Mrs. Johnson will sing Put Me in My Little Bed, accompanied by the Reverend." "Tuesday at 5 P.M. there will be a meeting of the little mothers club. All wishing to become little mothers will please meet the minister in his study."

Words out of order in communication can be humorous, but you and I also know poor communications in a situation involving our safety can result in tragedy. The 500 most frequently used words in the English language can have 14,000 meanings, according to the way they are used. Is it any wonder we have breakdowns in communications? Oh, no! I think it's more of a miracle we can succeed as often as we do.

5. Don't underestimate the most effective

tool in the safety manager's kit—habit. The experts tell us that at least 85 per cent of our behavior is probably dictated by habit. Therefore, if we can by any means instill conscious safety attitudes that are good until they can break through the preoccupational barriers of our employees, we have a good chance of winning the battle for better safety performance through the employees' cooperation by force of habit.

6. Make your employees self-actualizing. Don't try to "cram" the safety message if you can let them discover the answer to their question, "What's in it for me?" They are more apt to follow preventive measures. It does miraculous things for your employees' image of you as supervisor to let them discover safety needs for themselves where they can be involved in decision making and planning that affects their safety on the job.

A very profound statement of the effect was written by a Chinese philosopher a long time ago. He said, "A leader (safety supervisor) is best when people barely know that he exists. Not so good when people obey and acclaim him. Worse when they despise him. Fail to honor people, they fail to honor you; but, of a good leader who talks little when his work is done, his aim fulfilled, they will all say, 'We did this ourselves'."

Most of us have a remarkable tool for implementing employee participation in safety matters—the employee suggestion plan. He can through a safety suggestion enhance his own personal safety and at the same time receive monetary reward for his interest in submitting an idea. Are you making full use of this means of effective employee safety motivation?

7. Study the best documented findings in human behavior. Do you have any idea how much it would cost you to hire a consultant to come to your place of business and advise you? Fantastic, maybe! Yet, you and I know we can have the results of studies, the counsel of experts, from the best in the country in books they have written, and usually they will only cost something like $4 to $10. Other media, such as lectures at seminars, and cassetts recorded by experts are available to us.

8. In designing your program to train, maintain interest, and motivate your employee, remember this principle in human behavioral science: People resist taking blame for their judgment or thinking if the results are undesirable or non-complimentary to them. If I own something worth more than I paid for it, "I bought it." If it is a "dog" of a product, you can be sure I'm going to tell you some "fast talking, high pressure" salesman "sold" it to me. In industry, we all investigate accidents and find a common denominator in the reasons given by the injured—"the machine double-tripped" is always the fault of the "other" guy. Or, as my favorite speaker on human engineering, Cavett Robert, so aptly puts it, "In the court room of our Conscience, we only have witnesses for the defense."

9. Don't expect miracles. As far as I know, there have been no miracles of any significance in the last 2,000 years, so my advice is to expect nothing in results! Then, go ahead and study human behavioral science, understand it better, practice it, and then every incident with an inkling of success will stimulate you to continue, and as you benefit from one experience after another, you will grow in your skill and the advantages will increase.

In this field, one of the few things we can predict with 100 per cent accuracy is its unpredictability. This is no reason, however, to be discouraged; on the contrary, it makes it more exciting to have the results uncertain until we try. Ed Howe once said, "Nothing is wonderful when you get used to it." So, let's you and I resolve to stay interested and keep growing—we don't have to win 'em all. And, let's vow to continue to believe that if we remain sensitive to the feelings of others with whom we work, and we maintain a steady, conscious evaluation of our experience, we surely will gain not only employee cooperation but, more importantly, the respect and good will of our fellow man.

I'd like to offer an experiment in human engineering—in fact, I'd like to give you a magic charm to help you find the answers, and if you will take it and use it exactly as I tell you, it will add charm to your life and work like magic in your human relations problems. But, first the story of the magic charm.

A farmer once asked a wise man for help in improving an unprofitable farm. The wise man wrote a charm on a piece of paper and sealed it in a box which he gave to the farmer. "Carry this box into every part of your farm three times a day for a year," he told him.

The farmer did so. In the morning he carried it into the fields and found a hired man asleep instead of working. At noon, when he carried it into the barn, he found the cows deep in filth, the horses unfed. At night, he carried it into the kitchen and found the cook wasting food. Every day, as he took the box from place to place, he found things to correct.

At the end of a year, he returned to the wise man. "Let me keep the magic charm another year," he begged. "My farm has been a hundred times more successful this year than ever before."

The wise man smiled and took the box. "I'll give you the charm itself," he said. He broke the seal, lifted out the piece of paper and handed it to the farmer. On it was written: "If you want things to prosper, look after them constantly yourself."

An effective accident-prevention program, like any other part of your job, requires your constant attention.

The experiment I want you to conduct is an easy one—you already work at it on a daily basis. Write down some goals in human motivation you would like to accomplish. From your research and experience on the subject, write down some additional things you can do on a regular basis. Use the magic charm as your daily reminder of your commitment to do a better job, and never let a day pass that you don't do "one more thing" toward the achievement of your goals. Establish some dates for check points to evaluate your progress, and let the magic charm stimulate your effort and interest in keeping with your timetable.

In summary, I hope you will have gotten from this discussion two very simple little things. Like most simple little things, they are very, very important.

The first is not a big deal, but I wish for you just a little increase in your ability to do the job, just a little bit of an increase in your ability to learn from your own experience and to teach from it. That we have all learned a little bit more about what we know and, perhaps equally as important, we have learned how much we do not know about this challenging subject. This means that next week, you will ask one, two, or three questions, which you would not have otherwise asked. This means that next week, you will listen a little bit more attentively, and hear one or two other facts, and five or six other feelings which you would not have heard. This means that next week, you will see one thing going on that you would not have otherwise seen. No big principles, no package of notes; just the awareness and the ability to see, to hear, to observe, to ask a question, to feel a feeling when it passes you by. Of course, also, just a little bit more ability to express your feelings to your own boss, to let him know how you feel and think and believe. If he's the man I hope he is, he wants to know how you think and feel and believe. He can't help you learn, he can't administer you unless he, too, understands you. So, we have the dual obligation of trying to understand others but also of making it easier for them to understand us.

The second thing is not only a little increase in your ability to learn and grow from your experience, but also a little bit more willingness to exercise the freedom that your experience gives you. To me, this is the difference between the man and the boy. What he does with his experience, whether he sees that his experience gives him a great deal of freedom to learn and to teach, whether he seizes that experience, whether he uses it, whether he drains it dry. Not everyone does, you know. The boy doesn't.

Let me give you an example. A four-year old runs to his mother and says, "Mama, now what should I do? What can I do now?" The boy at 50 (because age doesn't differentiate men from boys) runs to his boss and says, "Boss, give me the answer, tell me what to do." He denies himself the freedom to learn from his experience, running from his experience, escaping from his freedom. He seeks the answer from his boss. He neither learns

nor grows. The boy of six who asked his daddy to build a fence around his back yard so nothing could get in to hurt him—of course, the boy at six doesn't see that once the fence is built, he can't get out of the yard to learn anything about the wonderful world of his neighborhood. The boy of 50 builds the fence around his own little function–"Why that is not my fault; that was manufacturing, that was production, ask purchasing about it; don't know a thing about it"–building his own little fence, protecting his own little interest, not being able to get out and interact nor to understand to grow and to teach. He is looking only at the narrow confines of the organization chart, the organization manual; not an administrator, just an accountant, drawing the narrow confines around his own job, denying the freedom of his experience.

There are other boys who do not want to find out what is going on, how people believe, and what people think. Why? You see, if you start listening, if you start observing, if you start asking questions, you won't get any easy answers. You will find there in your office or on the factory floor the same differences you have heard articulated here. All you'll get yourself is a new headache if you start asking, seeing, and observing. You don't know quite how big the problem is. All you can find out by being more observing and more listening and more questioning is an expression of more differences, and there are some boys who can't live with differences.

Let's understand differences. You see, it's the difference in color that makes the really great painter. It's the difference in orchestration that makes the great symphony something other than a monotone. It's the differences, our differences in attitudes, in beliefs, in social values, our differences in assumptions, our differences in religion, our differences in color, our differences in heritage and background that make us what we are in our nation. I think we should treasure these differences!

To live with difference, to recognize it and see it in front of you and not be afraid of it, is not the world of the boy—this is the world of the man. As we have differences, sometimes our uncertainty will grow. It is only the man who can admit to himself, "I do not know."

So, while the young boy may ask his mother, "What do I do now?" or hide himself off in his own department or shut himself up and write a book or declare that everyone should believe and think and act in exactly the same way, the man, tall and unafraid, can admit both to himself and to his fellow men, "I do not know. Help me." He can turn to his subordinates and say, "You must help me; I am not certain," and in that mutual help there is mutual growth as he develops and trains his subordinates and learns something. It requires a man to do that, and a humble man at that. It also takes a man to say to his boss, "I do not know; I am not certain. Share with me your experience, give me the benefit of your years; counsel me, advise me, help me." I think this is the portrait of a man, a man who doesn't have all the answers, but with one arm stretched out to his people below and one arm stretched out to his people above, he says, "Help me." This takes a man!

Please give your best to the experiment in human behavior. Please let the magic charm stimulate you to better performance. I didn't tell you it would be easy; nothing worth while ever is. But, I can assure you that as safety supervisors you will get better cooperation and your employees will respect you more as a man. You'll have more respect for yourself as a man. And so, in the last analysis, I hope you go back to your job the way I go back to Anderson—a little bit less the boy, a little bit more the man.

THE ROLE OF THE CONSUMER PRODUCT SAFETY COMMISSION

By COMMISSIONER LAWRENCE M. KUSHNER,
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Today's Consumer Product Safety Commission is the "adaptive instrumentality" called for in the 1970 Report of the National Commission of Product Safety. But by no means is it a self- sufficient tool for accomplishing the mission spelled out for it by Congress—to reduce the risk of injury faced by our citizens in their use of consumer products.

The Consumer Product Safety Act of 1972 provides roles and responsibilities for everyone concerned with the safety of consumer products—product designers and engineers, manufacturers, those who market, distribute, and sell consumer products, and ultimately the individual consumer himself.

To substantially reduce the number of accidents involving consumer products, all of the parties must work together. Part of the role of the Consumer Product Safety Commission is that of team manager.

The Commission must take the charge given by Congress and translate it into operational objectives: it needs to identify the set of problems that must be addressed; it must communicate with the rest of the team; it must plot strategy to remedy the problems; and, finally, it must orchestrate the responses that are required from all of the groups.

Let me turn first to defining the problem. The best known estimates of the magnitude of the consumer product safety problem are those given in the National Commission's Report: 20 million injuries per year, including 30,000 deaths, 1/2-million hospitalizations, and more than 100,000 permanent disabilities.

There have been many detractors and critics of these figures. Most claimed that they were just wild guesses and, in any event, much too high. However, today we can confirm that these early estimates were remarkably good, particularly as to the total number of accidents.

But, more importantly, today we can provide the much needed detail on precisely which products are involved in these accidents and in what ways. We now have the basis for developing a rational, priority-based approach to dealing with hazardous products.

We can do this because the National Electronic Injury Surveillance System is an operational reality. This system consists of 119 hospital emergency rooms tied to CPSC Headquarters in Washington through a computer network. Data on consumer product related injuries coming into these 119 emergency rooms are relayed daily to Washington, where they are analyzed and incorporated into a rapidly growing data base. We now have over 400,000 accident reports in this data base and are accumulating new ones at the rate of 1,000 a day.

Our staff has taken these data and prepared a list which ranks some 400 consumer product categories in terms of the frequency and severity of the accidents with which they have been associated. That list, called the Consumer Product Hazard Index, was made public about a month ago.

I might observe that the list provides no big surprises. In a nutshell, it shows that children do indeed lead a dangerous existence, and the home is a hazardous product.

Let me make it clear that this list, the Consumer Product Hazard Index, is not a priority list. It tells which products are associated with accidents. But without further indepth investigations of the accidents, we do not know whether the product was the cause of the accident or, if it was, what the hazard pattern was. But at least we now know on which products to begin to focus attention.

To turn this list into a set of priorities involves many kinds of information. In addition to a better understanding of the details of the accidents involved, we need to know: whether the risk is assumed voluntarily or without knowledge by the user; whether the function the product performs is an essential one; whether or not there are alternative approaches to performing that function; whether there are ways to eliminate the hazard; the likely effectiveness of the various ways that are available; and finally, the likely impact of the proposed solution on both the cost and the utility of the product.

The legislative history as well as the wording of the Consumer Product Safety Act makes it clear that the Commission needs to take all of these factors into account in dealing with hazardous products.

While cautioning that the Consumer Product Hazard Index is not a priority list, I do not want to give the impression that it is an unimportant document. It is important for all of us.

For the Commission, it is the starting point for developing a set of rational priorities. Industry should use the Consumer Product Hazard Index for guidance in product improvement and for voluntary standards activities. The list identifies areas to which organized consumer groups can turn their attention. And certainly for the individual citizen, the list highlights the need for care and concern in the use of these products.

The Consumer Product Safety Act provides many options for dealing with hazardous consumer products. Certainly the one that has commanded the most attention is the authority to issue mandatory safety standards. But it may be possible to deal with some kinds of products through voluntary programs. In addition, one can mount information and education campaigns to alert and protect the consumer. Imminently hazardous products are subject to immediate ban and seizure. Products not meeting applicable safety standards or presenting substantial hazards because of manufacturing defects can be ordered recalled, repurchased, replaced, or repaired by the manufacturer.

One of the principal concerns of the commissioners is that we use the appropriate remedy for each hazard we address. We want to suit the remedy to the problem.

We can use these remedies in combination. Let me cite the case of cribs. Nearly 200 children a year die in accidents involving cribs, and some 50,000 are injured. A safety standard for cribs will go into effect February 1, 1974. The standard addresses the three important hazards associated with cribs.

First, it provides for a maximum spacing between crib slats which will eliminate the risk of strangulation or other serious injury.

Second, it will assure a tight fit between the crib and the crib mattress, thus eliminating a common mode of infant suffocation.

And finally, the hardware for raising and lowering the sides of a crib will need to be of a type that cannot be accidentally activated. We believe that this is a good standard and that new cribs meeting the standard will be safer.

But how about the risks that may be associated with many of the 11 million cribs which are already in use? Surely not all of them are unsafe, but equally surely some of them are. Because of the many circumstances which surround cribs already in use, the commission has taken the view that they should not be subject to a mandatory recall, repurchase, repair, or replacement. Instead, in conjunction with the issuance of the standard, we will have an information and education campaign in the press and on radio and television to alert the owners of cribs to their potential hazards. More importantly, we will give them useful suggestions for how unsafe cribs can be made safer by actions easily and inexpensively taken in the home.

The commissioners take the matter of communicating with the rest of the team very seriously. We have announced a policy of openness. We are willing to work in a "goldfish bowl" and to make ourselves accessible to the public. Let me cite three examples.

1. We recognize that the *Federal Register* must remain the official means of communicating with the public. But *Federal Register* notices have been and will continue to be supplemented by announcements in non-legal language in the public media.

2. We have adopted and published a policy on meetings. It identifies the various kinds of meetings which occur in the conduct of the Commission's business. Virtually all of these meetings, with the exception of the executive sessions of the commissioners themselves, are open to observation by interested parties and, in many cases, open to their participation as well. We also issue a weekly public calendar which lists forthcoming meetings.

3. Many of you are aware that the Consumer Product Safety Act calls for the establishment of a Product Safety Advisory Council which is required to meet at least four times a year and with which the Commission consults in the conduct of its programs. We have issued a public notice soliciting nominations for membership on the Advisory Council. The announcement appeared in the *Federal Register* and in the public press. It is now some two months since the notice originally appeared, and we have received more than 300 nominations from all sectors of the public. These are being evaluated by our staff, and we expect shortly to make the appointments. The law requires that there be a balance on the Council among consumers, the business community, and public agencies. Should this solicitation of nomination of nominees not give us the distribution that we need, we will go to the public again.

There is no question that implementing a policy of openness will involve inconveniences for us. However, we are convinced that, in the long run, what we learn through these contacts with the public and the increased public confidence we hope to gain from this openness will more than compensate for any short-term inconveniences.

How can the Consumer Product Safety Commission and manufacturers and consumers work together to implement the Consumer Product Safety Act?

Turning first to the consumer, I know that we can count on individual consumers and organized consumer groups to continue to identify hazardous products and lack of compliance with safety regulations. They have been doing this for years. Now they can expect that something will be done with their information, and if not, they will be given an explanation why.

Traditionally, the consumer has been at a disadvantage in the processes through which voluntary standards are generated. The standards system in the United States was developed to meet the needs of industry. And for this purpose, it is second to none. However, its deficiencies in dealing with consumer products are well known and acknowledged by the standards developers themselves.

The standards-developing community now appears to be willing to direct attention to consumer product standards, and many potentially useful institutional changes have already been made in organizations such as ANSI and ASTM.

But the standards-developing community continues to tell us that it is very difficult to get technically competent consumer representation on standards committees. Several years ago, I would have questioned the diligence with which technically competent consumer representatives were actually being sought. But this is no longer the case.

The problem appears to be a financial one. Representatives of industry who serve on standards committees do so as part of their paid duties. So do public officials. But who is to pay for the individual engineer who wants to serve on one of these committees in his role as a consumer?

The Consumer Product Safety Commission can and will provide financial support for technically competent consumer representation on committees developing safety standards for consumer products where appropriate. We have not yet developed the rules or the criteria that will apply, but rest assured we will have them soon.

Let me acknowledge that ASTM has already set up a modest fund from which it will provide support for consumer representation on its committees. ASTM is to be commended, and I hope that the many trade associations under whose auspices standards are developed will follow suit.

The commissioners, however, look for another mode in which consumer groups can influence the development of product safety standards. Under the terms of the Consumer Product Safety Act, there are no reasons why consumer groups cannot offer to develop a safety standard which the commission has found to be necessary. An offeror does not need to have all of the technical expertise

necessary to develop a standard on its own staff. The offeror need only present a convincing case that it has access to such expertise and that the provisions in the law requiring broad participation in the development of the standard will be complied with. An offeror need only administer the development of the standard. It doesn't write the standard itself. The Commission can provide financial support to such groups to help defray the costs of administering the development of the standard.

We have already received valuable assistance from consumer groups in compliance activities. Recently, a public interest research group conducted a survey of a number of retail stores to check compliance with the flammability standard for childrens sleepwear. The group made the results of its survey available to us, and we are now following up on their findings.

We have reviewed the experience that the Food and Drug Administration had with a pilot consumer deputy program this past year. Our evaluation of the report on the program leads us to believe that a consumer deputy program can be a useful supplement to our own surveillance activities. We have a consumer deputy program to help with a toy safety surveillance campaign for the coming Christmas season. And we plan to expand the program.

We, therefore, look to consumers for continued assistance in identifying product hazards. We look forward to making consumers more important participants in, and even sponsors of, the development of standards, and we need the assistance of consumers in assessing how well our regulations are being complied with.

Turning now to manufacturers, I have a much longer list, but it all adds up to urging manufacturers to develop a safety ethic in their approach to consumer products. The safety of consumer products must become as much of a concern to manufacturers as are, for example, function and style.

This could well start with an examination of the Consumer Product Hazard Index. An intelligent manufacturer would look at that list to see if any of his products appear on the list. If so, he should contact the Commission to get the results of our indepth investigations of the accidents involved. He should study this information and use it as the basis for a product redesign, if necessary, or perhaps for only minor modifications which could eliminate the hazard.

Manufacturers need to pay more attention to their quality control programs. When the Consumer Product Safety Commission was activated, a requirement went into effect that manufacturers must notify the Commission if they learn that a defective product which could present a substantial hazard to the user was introduced into commerce. We have had over 30 such defect notifications. None of these notifications have involved trivial defects. All of them were the result of failure in the manufacturers' quality control systems. In many cases components which were supplied by another company were inadequately checked. In others, it was a matter of poor materials selection in the design of the product. In others, it was poor workmanship in the manufacturing process. The main point is that poor quality control can be a source of serious hazards in products which would ordinarily be considered safe.

As a followup to these defect notifications, the Commission has required that the manufacturers involved initiate a recall or, following a freeze on further movement of the articles in the distribution chain, undertake correction on all of the potentially defective items.

In either case, it has been essential that the manufacturer and his distributors have good records so that they know where the offending products are—particularly, how many are already in the hands of consumers. Manufacturers should examine their record-keeping requirements with a view to the possibility of their being involved in a recall or repair program. Are they satisfied that they can locate their products once they leave the factory?

Historically, only a small fraction of all manufacturers take the development of voluntary standards seriously. Most voluntary standards in this country have been developed with the participation of only a very small percentage of the affected manufacturers. These standards are now, particularly as they apply to safety, too important to be beyond the concern of any responsible manufacturer. And if a manufacturer does decide to participate on a standards committee, I would urge him to use one of his best men. This has not been universally true in the past. Writing good standards, whether for safety or for other aspects of performance, is a demanding task meriting the attention and time of our best engineers.

But even the best standard will serve little purpose if it isn't used. Responsible manufacturers must make sure that the manufacturing practice throughout their industry does in fact reflect the standards that are applicable to those products. Ultimately, this must mean the development of credible certification programs with effective sanctions for nonconformance.

Every manufacturer should be certain to have a means for staying abreast of what is going on in the Commission that can affect him. The Commission's procedures offer many opportunities for manufacturers—and all other interested parties—to participate in the development of the rules and regulations that will affect them. These opportunities should be taken seriously. Pleas that, "We didn't know," or "You didn't ask us," after the regulation is promulgated are unlikely to be effective.

All businessmen should study a report entitled, "Safety in the Marketplace; A Program for the Improvement of Consumer Product Safety," that was put out recently by the National Business Council on Consumer Affairs under the sponsorship of the Department of Commerce. This is a report prepared for businessmen by responsible leaders of the business community. I would find its recommendations hopelessly inadequate as a substitute for the Consumer Product Safety Act; but on the other hand, they offer good advice to businessmen, and if taken seriously, could make living with the Act much more comfortable.

A final word to manufacturers about their relationships with the Commission. I urge all manufacturers, and indeed all groups that must interact with the Commission, not to rely solely on their lawyers to do so. The matters that are of concern to us are not only legal, they are moral. They are matters of ethics and they are matters of the public interest. As such they are the concerns of top management. They warrant full consideration in Board rooms.

I mentioned earlier that the Consumer Product Safety Act affects and requires the cooperation of other groups as well. Before closing, I would like to call particular attention to two of these groups—importers and retailers.

In the eyes of the law, importers are the equivalent of domestic manufacturers. They are subject to many of the same requirements as manufacturers and have the same responsibilities. Importers must know which of the products they are bringing into this country are subject to regulations of the Consumer Product Safety Commission. They must give evidence of compliance and must maintain records that would permit tracing these products should the need arise. With the rapidly increasing quantities of imported consumer products, the importer becomes an important member of our team.

To date, the Commission has gotten excellent cooperation from some of the very large chain retailers. However, small, independent retailers are, I am afraid, by and large ignorant of the Consumer Product Safety Act and of their responsibilities under that law. Our inspectors are often told by a retailer found selling a violative product, "I didn't know about the law," or, "It's the manufacturer's or my distributor's responsibility to sell me only products that conform to the regulations."

Small manufacturers and retailers complain that the burden of complying with the law will force them out of business. I believe this is a gross overstatement. The Consumer Product Safety Commission is not against small business. However, as I mentioned before, keeping hazardous products from getting into the hands of consumers is a moral and an ethical responsibility. As such it is applicable to small businesses as well as large ones. Those who would sell to the public must shoulder the obligations that privilege entails.

I believe that the Consumer Product Safety Commission has gotten off to a good start. If we can work together in mutual understanding and in a spirit of cooperation we can get our job done.

THE ROLE OF THE MANUFACTURER IN PRODUCT SAFETY

By J.F. YOUNG
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Our national concern for consumer safety is, of course, not just a new, "in" thing. It has taken many early forms. The National Electrical Code, for example, had its beginnings in 1881. Underwriters' Laboratories, Inc., traces its parenthood to 1894; our National Safety Council has been active for over 61 years. And these early responses have been supported by an ever expanding number of voluntary safety efforts over the years.

What is new is recognition of a growing gap between the safety expectations of the consumer, on the one hand, and his evaluations of the performance of his suppliers on the other. There have been some notable supply system problems or faults. The poisonous beans, botulism, secondary effects of DDT, TV x-ray, and automobile recalls are examples. But in the main, the gap has been widening not because of a general reduction in safety consciousness or quality of consumer products. The gap seems basically to be the result of expanding consumer expectations.

Some analysts explain this as the space syndrome—"If you can put a man on the moon, why can't you make an absolutely safe whingding?" Some cite the increase in ownership of consumer products as the public gains in affluence. More products bring more exposure and more incidents of accident. Some point to the increasing dependence on consumer products and more frustration with any product failure. Others note the expanding competition for the consumer dollar which puts many consumer products in a "taken-for-granted" category. But whatever the reasons, concern does often spring from valid complaint, and consumers have been expressing increasing frustration and disappointment.

In the broader view, these concerns seem to be fed by, and to be but a part of, more widespread concern for the rights of the individual. Arthur E. White, writing for the October 1973 *Public Relations Journal*, describes the phenomenon as the "galloping psychology of entitlement"—the process whereby a person's wants or desires become converted to presumed rights. He points out that this is "indeed a very old trend, long recognized as part of a worldwide revolution of rising expectations. But in recent years it has accelerated and assumed new political and institutional forms"—sort of a pyramiding of events.

Since stories usually are a reflection of the current mood of society, I'm reminded of the local minister's story last week. It seems a local butcher had had a great sales week. Late Saturday afternoon as he was cleaning up he had only one small chicken to return to his walk-in refrigerator. Just as he was about to go home, Mrs. Jones, a regular customer, knocked on the door. As he let her in, she said she had some unexpected company and needed something for dinner. He suggested chicken and brought out the one he had left. After checking the weight, Mrs. Jones asked if he didn't have something larger. The butcher took the little bird back to the refrigerator, spread the wings and legs, stretched it and puffed it a bit and brought it back out. With aid of his thumb on the scales, he was able to increase the scale weight by about a pound. And then Mrs. Jones said: "That's just fine. I'll take both of them!"

I won't try to guess what the butcher replied, nor how everyday incidents affect consumer expectations in general or their product safety concerns in particular. It is sufficient to my role today to note consumers do expect more from the supply tier than they used to, and that the Congress and the administration agree upon the importance of federal action to serve this expectation. But as the format of this program indicates, the efforts of all three—consumer, government,

and the supply tier—will be required to achieve our society's evolving product safety goals.

For suppliers of goods and services, there are many roles and interfaces associated with meeting the consumer's product safety expectations. One set emerges from legislative issues and operating procedures under the Consumer Product Safety Act of 1972. Another set is related to the process of supply. And a third set is associated with relationships to the consumer public. Let's review each in that order.

The Consumer Product Safety Act

In April 1973 the *National Journal* described the Consumer Product Safety Commission as probably the most powerful federal regulatory agency ever established by Congress, and certainly the most independent. It concluded that the Commission would have an immense impact on American manufacturers and consumers.

By October, representatives of both were being reassured by the Commission's conscious dedication to reasonableness and balance, by its objective of matching solutions to problems, by its non-political concentration on its mandate, by its determination not to try to inspect safety into the marketplace, and by its openness and frankness in its activities, including the weekly press lunch and the Product Safety Letter.

The Commission has made it clear through speeches and press interviews that they intend to take a hard line on enforcement, using the motivations of the civil and criminal penalties authorized under the Act. So this sets the tone and provides the impetus, if any were needed, for the foremost role of suppliers—that is, obey the law!

The suppliers mentioned in the Act include manufacturers, private labelers, distributors, and dealers. For some products, product safety is affected by other suppliers of goods or services, such as tradesmen who deliver or who install the product, those who maintain and service the product, and even those who dispose of the product after its useful life.

So while we are here concerned with the role of the manufacturer, there are many others in the supply chain. Their roles and interfaces often parallel those of the manufacturer. And while each cannot be accountable for the responsibility of the others, all will benefit from product information exchange that can enhance the product safety performance of the supply chain as a whole. In what follows, I will reference particularly to the manufacturer, recognizing there are others who carry their own responsibility for product supply and use, and that the points made may often be applicable to other suppliers of goods or services.

The Consumer Product Safety Act specifies many interfaces between manufacturers and the Commission. Some are elective on the part of the manufacturer. Some are mandatory. Examples of elective interfaces are:

1. Contributions to the data base of the National Electronic Injury Surveillance System beyond disclosures requested under the special order powers of the Commission.

2. Analysis of the NEISS data not only for determining where mandatory standards or education are needed, but also for evaluating good practices that may have generic applicability.

3. Comments on proposed rules, such as the Commission's recent proposed rule to govern notification when a non-complying or defective consumer product is discovered. Trade associations expressed concern in this instance for departures from the statutory language and for implications to enforcement of other parts of the Act. Hopefully, this first interchange will serve as a useful starting model for discourse in further rule making.

4. Offers to develop a proposed consumer product safety standard or submittal of an existing standard under a proposed Commission rule. The Act allows but 150 days for development of a standard, although the Commission can with reason extend the time. All of us can agree with the need for speed in devising and adopting standards which will reduce unreasonable product risks in reasonable ways. Yet, many manufacturers who have a background in standards development work are skeptical that the 150-day time period will prove adequate. Thirty days of this period can be taken up with selection of offerors, and the 120 days remaining leave

little time to create corrective standards, to assemble the data base, and to perform proof tests that may be needed. This puts a premium on advance effort in the voluntary sector that can either avoid the need for a mandatory standard or provide a basis for one if the voluntary standard is not employed as needed or not as effective as it could be.

Future rules can be expected on other procedures and criteria to be followed by the Commission, especially in certification, labelling, inspection, record-keeping, banning of products, disposition of products declared to be imminently hazardous, and in definition of terms like significant hazard, unreasonable risk, and imminent hazard.

The mandatory interfaces between manufacturers and the Commission are more extensive and more specific. Examples are:

1. Avoid or discontinue manufacture, sale, distribution, or import of any consumer product that does not meet the requirements of promulgated mandatory product safety standards, or any product that has been banned as hazardous.
2. Establish and maintain records according to Commission Rule.
3. Provide reports and information as requested by the Commission.
4. Present data, views and arguments with respect to a proposed rule banning a product.
5. Issue certificates of compliance with safety standards promulgated under the Act, based on a test of each product or upon a reasonable test program.
6. Accept Commission employee visits for inspection of activities related to the safety of a consumer product.
7. Carry out orders to notify the public of a product declared imminently hazardous, and to recall, repair, or replace the product, or refund its price, as specified.

This whole set of mandatory interfaces will require extensive and responsive additions to day-to-day operating procedures for manufacturers. Some of these will be covered under the process of meeting consumer expectations. Some will be mere extensions of present procedures to meet the new requirements. In addition, there will be an opportunity for elective comment on associated rule making as the Commission formalizes its procedures and its modus operandi.

Let's now turn to the process to assure that safety of the product is taken into account throughout the activities of its life cycle.

The Process

Many of you have probably received a copy of the report titled "Safety in the Marketplace—a Program for the Improvement of Consumer Product Safety." This report was issued in April 1973 before the Consumer Product Safety Commission was established. It is the work of a Product Safety Sub-Council of the National Business Council for Consumer Affairs established by President Nixon in August 1971.

This report covers the causes for product-related accidents, including a review of host (user), environment (home), and agent (product) factors. It explores and presents information on: a system for identifying and evaluating product hazards; the types of consumer information that might be prepared by manufacturers; the formation and establishment of product safety standards; certification of compliance with standards; retail and service activities associated with product safety; and public safety awareness programs. While this report differs from the Act in certain respects and some manufacturers would be unable to endorse all the proposals, its recommendations for voluntary action are a useful overview. I will not attempt a summary of their many recommendations, leaving them to the report itself.

Significant to this presentation, however, is recognition that manufacturers will need to maintain and enforce written product safety policies, internal standards, and operating procedures, assuring compliance of all corporate activities pertinent to product safety.

Generally, these policies and procedures will involve interfaces with liability insurers, advertising agencies, trade associations, professional technical societies, national and international standards-making organizations, testing laboratories, and governmental agencies other than the Consumer Product Safety Commission, such as HEW, EPA, FTC, Agriculture, Labor, Bureau of Standards, etc.

Such efforts associated with the process of assuring adequate attention to product safety

can, of course, be a prelude to the role of manufacturers in participating in the CPSC activity or in complying with its rules and orders. But a deeper purpose will be to anticipate and prevent safety concerns from reaching the stage where banning or mandatory standards are needed. This is the role and objective of the voluntary standards work. It includes expanded participation and consensus of all interests. And it involves voluntary certification.

The Act recognizes that use of qualified outside testing laboratories is optional for persons required to certify a product's conformance to a mandatory standard. This is based on the argument that the manufacturer is not relieved of responsibility if a test laboratory audit is erroneous. So independent audit is optional, depending on the manufacturer's need for an independent view or capability to assure himself of compliance.

Recently, OSHA announced its intention to introduce third-party certification for products sold for use in industry. Since many consumer products have industrial uses as well, and a manufacturer may not know whether a product goes to one user or the other, it would seem essential that manufacturers not be burdened with the duplicity of two certification schemes. In my view, OSHA should favor self-certification , just as they have adopted the practice of the voluntary standards system, as being responsive and economically superior.

Before leaving this area, mention should be made of the design process itself. In short, this process is becoming increasingly sophisticated because of product trends toward automation, new features, complexity, specialization, higher ratings, larger sizes, greater reliability, and continuation of cost reduction along some traditional learning curve. Generally, these trends introduce conflicting requirements that must be traded off in the design process.

Examples of product attributes that can involve trade-off are: versatility vs operational simplicity; accessibility vs safety; compactness vs serviceability; power output vs installability; special features vs reliability; and speed of response vs stability.

New techniques are also influencing the design process. Safety analysis, productivity analysis, quality assurance, failure mode and effects analysis, reliability techniques, and computer optimization are examples.

So while the sophistication and value of products is advancing, it is being accompanied by technological advances in design techniques that introduce many interfaces with vendors and within the manufacturing organization itself, usually with trade-offs for product conception and rendition. While much of this may be beyond the concern and the scope of the Consumer Product Safety Commission, it is significant to the necessarily larger role and interfaces of the manufacturer.

The Consumer Public

Now, let's turn to the third category of interfaces related to the role of the manufacturer, the consumer public.

A manufacturer is highly motivated to avoid production and sale of a product that may be banned, or may require rework, replacement, recall, or a refund of the purchase price. These are very costly events. With most of American industry realizing profit levels around five per cent of sales, it takes on the average about 20 times the sales of other products just to make up for a goof that renders one of them useless.

Large as this incentive becomes, the manufacturer has equal if not greater motivation from the marketplace. Some customers feel strongly enough about a product's failure to perform to their satisfaction that they seek direct relief. Often these cases are handled promptly and efficiently so the customer's faith is not only retained but actually enhanced. In a world where nothing is absolutely perfect, recourse to prompt product service is essential. This is true whether the problem is faulty installation, a defect in performance, or some need for operating instructions. What worries most manufacturers, though, is dissatisfaction of customers who do not seek a correction, but will merely refuse to buy the same manufacturer's product again. If a manufacturer expects to continue in business, he can ill afford to lose repeat buyers and their "word-of-mouth" in-

fluence on their friends.

This, I know, is old hat. But we tend, I think, to forget this is a democratic society—that the consumer calls the turn. He will make the judgment between voluntary and involuntary risk. He will determine who merits his continuing support.

What the consumer must have are the facts so he can be conscious of the trade-offs he is making in a product choice and in this way can be assured he is making an informed decision. In the new arena of concern for social costs, like production or product pollution, there is evidence that the business system is responding. Given the facts and given the choice, consumers are opting more and more for the lowest social cost, from returnable bottles to energy conservation.

For consumers, this is but one interface in the need for information and education on consumer product safety. According to the report of the National Commission on Product Safety, it may also be the most productive area for improving the safety of the American home, since consumer care and environmental factors are regarded as the cause of some 85 per cent of all product-related accidents.

In this connection, I have wondered whether the National Safety Council should not seek additional sources of resources to support efforts of its network of some 250 state and local organizations in voluntary consumer safety education. Should we enlarge the "All About Bikes" Program? Consider bicycle, minibike, and trailbike training programs—our children now learn to ride by riding.

I have also wondered whether the proliferation of certification labels will be to the benefit of the consumer. The hearings of the NCPS indicated that few consumers could identify the labels now in use. If laboratory accreditation by OSHA results in more labels, if trade association voluntary certification systems introduce new labels, if the professional societies and standards-making bodies participate in certification with their own labels, the result, it seems, would be utter noncommunication at the marketplace. Consumers would be either indifferent or confused rather than recipients of the reassurance intended. The answers here are not clear. Formation of new labels would lose the momentum gained by those in use for years. One label for everything is presumptuous in its confiscation of existing labels and in its extraordinary scope of product. Licensing of existing labelling may be a significant alternative to proliferation. But the matter needs business, government, and consumer study before unleashing an avalanche of labels.

Product safety, despite its importance, is but one of the new trends upon which our business system is being measured and is subjected to censure. Other examples are environmental compatibility, worker health and safety, honesty and completeness of disclosure, political action, support for minorities, protection of rights of the individual, and so on. In short, we are facing what many have described as a new era of social responsibility for business.

Henry Ford, in his talk at the Harvard Business School a couple of years ago, noted that the old tests of business were economic production. His grandfather had perceived this measurement,but today it was not enough. He suggested three alternatives available for business to meet the new expectations, which I've paraphrased as follows:

First, business could continue as it had in the past, but take a little from business profits to serve social responsibility. This, he concludes, would be inadequate in meeting the expectations of tomorrow.

Second, a business could combine the two goals—seeking both profit and service to society. Here he points out one goal must always be sacrificed or appear to be sacrificed to the other. No matter what the balance, if services exceed profits or profits exceed services, share owners or the public could withdraw their acceptance, and economic ruin would be the prospect.

Third, he urged that business regard the new measures differently, interposing "means" and "ends." For business itself, he suggests that social responsibility be the means to the end profits that will provide investment support. For society, he suggests that the public look upon business as deserving the continuity of profits to provide means to serve the end of social responsibility.

His talk went on to emphasize the need to preserve the opportunity for entrepreneurship and innovation to meet the new role. The modern manager would, in his view, not just be the administrator, problem solver, and cost cutter of the past. He would seek to preserve the freedom of choice of the individual. He would seek new opportunities for production to employ those available from productivity improvement in older lines. In all, he would be an entrepreneur in matching capability to opportunity.

This is perhaps the most significant interface of all for the manufacturer. If he fails to merit the acceptance of the consumer public, whether in product safety, product quality, business ethics, or societal responsibility, he will not have the support needed for continuity. The consumer can vote him out of business. This is as it should be in a democratic society. But it adds to the motivation of the manufacturer in ways that assure responsiveness.

In summary, one can say that the manufacturer's role in consumer product safety is representative of the role of other participants in the supply chain; is enlarged by the "federal presence" of the Consumer Product Safety Commission and its interfaces for elective participation and specific mandatory requirements; is advancing in sophistication of product and technique; is widening in its scope of participation with its own supplier tier, with users, and with voluntary standards-making bodies; and is facing its greatest test in meeting the enlarging expectations of the consumer public, not only in product safety but in the much broader context of social responsibility.

American business has been called upon to solve many of the societal issues of the past, from unemployment to balance-of-payments. It seems now that it is facing its most extensive call of all—the implementation of social responsibility in an era of rapidly rising expectations.

OCCUPATIONAL SAFETY AND HEALTH LAWS

By JOHN H. STENDER
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The U.S. Department of Labor is the people's department of the United States Government. Its primary role is to look after the interests of the working men and women of this fine country. Certainly, that interest can best be hallowed by a person who has gone through the trials and tribulations that men and women who work with their hands must experience. Since labor people are so active in the leadership of the U.S. Department of Labor, I believe that the labor movement should provide President Nixon with the consideration deserved for providing this kind of administration in the department. There is a saying that if something goes wrong it is more important to talk about who is going to fix it than who is to blame. I think that is the base the Congress had in mind when they passed the Williams-Steiger Act into a national law. They knew something was wrong, they had the statistics in hand, and they set up a system by which the problems could be corrected.

The U.S. Department of Labor is the designated department to carry out this Act, and it established the Occupational Safety and Health Administration, of which I am proud to be the assistant secretary.

The National Safety Congress and Exposition has always been a gathering of the most concerned people in this country for the safety and health of our fellow citizens. My own background of 26 years in an active leadership role in the labor movement and in public office has enabled me to see that the labor sector of our nation has continually been in the forefront in a campaign to reduce deaths, injuries, and accidents on the job and off the job. The combined efforts of the National Safety Council and the labor movement is a very worthwhile combination to help us to work together to meet the real problem. Naturally, I am honored to join that kind of company.

The quest for dignity in the lives of working men and women has assumed many forms throughout the nation's history. In colonial times, the working man played a large part in helping to win our freedom. However, he was not given the right to vote for 30 years after the struggle for independence. The strength of his craftsmanship was used to build the industry in this country. However, it wasn't until the next century that he was granted the legal authority to organize for his own benefit. The struggle for a decent wage and proper working hours lasted for decades.

At the present time the labor movement, along with other segments of the society, is caught in an era of rising expectations, and rightfully so. Our economic system has proven itself capable of providing us with the greatest number and highest quality of goods and services in any nation in the history of the world.

The working men and women of America no longer need to devote all of their energies to the struggle for a decent wage. They can reap the benefits that our predecessors have fought for and gained. And now they can concentrate along with all Americans on improving the overall quality of their lives. They can help in cleaning up the air they breathe and the water they drink and the land upon which they live. And, most importantly, they can concentrate on making sure that the place in which they earn their living is safe and healthful.

It is in the working place that a man spends a great deal of his waking hours. Its quality is directly related to the quality of his life. Our concern for the improvement of our environment is a task of highest priority. For the first time in history we have a federal law

which explicitly states that our nation is committing its efforts to assure a safe place for every American man and woman. That is the Occupational Safety and Health Act of 1970. Under the leadership of Honorable Peter Brennan, I am responsible to provide the direction the department is going to take in order to achieve these goals. As OSHA realizes its goals, the American labor movement also realizes accomplishments.

Already we are seeing tangible evidence of labor- management cooperation in bringing a greater degree of job safety and health in our workplaces. Several very important bargaining agreements have been reached which include significant safety and health protection for workers. The International Oil and Atomic Workers Union recently signed a major agreement with several oil corporations. That union stated that OSHA was the primary force for allowing them to take these significant steps forward in safety and health.

Last month a comprehensive safety and health program was negotiated for the first time in the history of the automobile industry, a major industry in this country. The agreement between the United Auto Workers and Chrysler Corporation spelled out in detail specific measures for protecting the lives and limbs of the auto workers. I feel sure that OSHA was responsible for assisting in achieving this agreement.

Also, the Teamsters and the National Automobile Transporters have signed an agreement to set up a program for voluntary compliance with the mandates of OSHA. We have asked 20 different unions this question: "What effect has the Act had on the collective bargaining process?" There was complete agreement in the replies that the requirements of OSHA have had a significant effect in resolving safety and health issues.

As we move ahead in the months to come we surely will see many more examples of OSHA, union, and management cooperation. A regulation directed to protect telecommunications workers was developed with the help of six unions and the involved employers. Further efforts involving union and management input into the standards making process are both expected and encouraged.

As we move ahead in our program, we will be focusing an increasing amount of attention on health standards. This is a problem that has not been fully explored as yet, but one that is critical for millions of American workers. Health hazards rarely have the impact of an accident; however, their effect can be even more deadly.

Now that we are beginning to move in the area of toxic substances and their exposure to workmen, we are finding that the professionals who have been involved in many other ways are now finding themselves in direct opposite views of what needs to be done. Take, for example, the pesticides standard submitted as an emergency standard last May. A hue and cry arose over those standards from many areas and different people, including members of the Congress. The different viewpoints of various professionals was so frustrating that I wonder, looking ahead, just what we may expect.

After the first pesticides standards were promulgated, they were amended due to certain pressures and objections. Court actions were instigated, and finally a court in New Orleans stayed the effective date. This stay is still in effect; therefore, no standard is now available in the workplace. And we are required to promulgate a permanent standard. In the meantime, the Environmental Protection Agency, which has considerable amount of responsibility, has become involved in hearings. We are at a time now when we must provide a permanent standard on pesticides, and I am in a complete dilemma as to how this will come about. This is a very difficult problem, because there is so much information and divergent views on this subject that it will be extremely difficult to determine what should finally be done.

We are in the process of making permanent standards for carcinogens, and here I can report a brighter picture because we should not have nearly as much difficulty in promulgating a permanent standard, even though many of our opponents have gone to court to oppose our decision. It is now pretty well in hand that these standards will encompass the various toxic substances. There will not be a single package type of standard, but for the 14 carcinogens involved there will be

separate standards applied where necessary. I am sure that we will not satisfy everyone in this regard, but I hope that these will do a good job at the beginning. As we proceed and as we learn what alterations are necessary, they can be added and we can move ahead.

OSHA next year will be devoting quite a bit of effort to a standard on excessive noise. We have received data upon which we can base our efforts for the development of a standard for carbon monoxide. The heat stress standard will be effective next spring. Other health hazards that are currently being investigated are chromic acids, mercury, inorganic lead, beryllium, and others.

Another problem we are confronted with is that the information we obtain in our tests at worksites relative to health hazards is really public information, yet many management people object to letting this information out to the public. However, I feel that the Act requires that we do not conceal information resulting from our testing. We do not want to sensationalize problems in workplaces. I do not think that is beneficial to the program. Sometimes the news media likes to develop these types of problems into sensational news. I do not think that will happen in these cases. However, I do believe that the workers who are affected have a right to know what problems exist and the statistics resulting from the various tests. This data will assist the workers to know what the problems are and what should be done to prevent hazards.

Safety in excavations and trenches requires an extreme amount of attention at this time. We are going to exert an extreme amount of effort to reduce the high number of deaths that are occurring because of caveins. I am not sure that we are making any progress. I am sure that we are not making the progress that we desire. Our inspectors are now assigned on a high priority for inspecting trenches and excavations. We need everybody's help in this particular problem.

Recently in Washington, D.C. a young worker was buried in an excavation. This boy was only 17 years old. I don't believe that any one of the bosses who sent that kid into that ditch would have gone in there themselves. However, they will risk those young lives to save the few dollars that it would require to shore up the trench properly. I would be willing to bet that they knew the requirements of the standard.

Since this is such a big and serious problem, I would like to solicit all of you to let us know at our regional and area offices when it is observed that men are working in trenches and excavations that are in violation of this standard, because we will drop everything and get to that worksite immediately. It is impossible for our compliance officers to be walking up and down all of the streets in this country to detect these types of violations. Naturally, we have many more conscientious, good contractors than we have these poor, gypo types that can underbid jobs because they do not pay the price for safety and health.

We are training instructors in the construction industry to teach first line supervisors their responsibilities for construction safety. I am not so sure that the international unions view this as an important aspect of our endeavors. I have sent some feelers to international unions requesting their comments on the value of this type of training, and I am sorry to report that I have not received any responses. But it is in my mind, and I hope yours, that you believe that a first-line supervisor should have a knowledge of the standards that pertain to the workplace where he is supervising. As an example, to go back to the boss who sent the 17 year old worker into the ditch; this may not have happened if he had had proper training relative to the standard. He and his associates may have sent that employee into the ditch without really knowing the hazards and the standards involved. That is why this type of training is so needed. This free training for supervisors can be extremely valuable to OSHA, employers, and especially the workers.

Now I want to talk about state plans, primarily because I am aware of the recommendations of the AFL-CIO. I can understand the AFL-CIO's position, which is against state plans because of the very poor track record of the states over the past years. However, the Occupational Safety and Health Act specifically states under Section 16 that the Assistant Secretary of Labor shall provide approval of state plans when it is merited. I feel sure that no Act would have been approved at all without a provision for approving state plans. I am told that all safety bills in the past have always carried a provision for state plans. Therefore, it is difficult to do anything but follow the provisions of the Act, and it is difficult to clearly understand how labor can originally agree with the Act and now indicate that it is against a portion of the Act which provides for state plans. So, I must approve state plans that are "as effective as." Naturally, it is up to our administration to monitor these plans accurately to be sure they are "as effective as." In addition, these plans must be monitored forever. I vouch that state plans that do not consistently meet our regulations for "as effective as," will be disapproved. When this happens, federal jurisdiction will replace the state plan. That is not a threat, that is merely a mandate of the Act.

Thus far, OSHA has made some 100,000 inspections with a minimum force of a little over 500 compliance officers. With the approval of the state plan that has been accepted in the past, we have added 1,800 more inspectors to enforce the regulations and requirements of OSHA. This should help significantly in getting around to more of the over four million worksites that are in existence. I do not believe that the thrust of the Act will be depleted in any way by including these additional inspectors.

In the past, all compliance officers had to make their inspection and then carry their recommendations or citations back to the area director for a final decision. Some of our area officers cover areas that are extremely expansive. We have a lot of circumstances that require that decisions be made right at the worksite. We do not think that an employer should have to wait 27 days after an inspection before he receives a citation, and that was our average when I came on board. I have just changed that procedure so that the inspectors that have the knowledge can make citations immediately after the inspection, during the closing conferences. Exceptions have been taken to that decision, because there are always some people that believe you do not know what you are doing. After looking over the whole picture, I believe that I am right in this case and have the ability to make a few judgments that are in the interest of the Act.

I ask your help, primarily because our budget is somewhat limited and training is so valuable to the success of the Act. I was able to get $3,000,000 set aside for the purpose of training employers, employees, and their representatives. I had to do this rather quickly, because if the money is not used by the end of the fiscal year, it is lost to the Department. Therefore, I have contracted with the National Safety Council to provide training for employers and employees of small companies all over the country and, if at all possible, to perform the training right in the plant. We have found that the small employers are the ones who seem to be mostly in the dark about the Act and do not seem to know what they should be doing. Naturally, the $3,000,000 is not enough; however, it should provide a good start, and in a few months we should be able to determine if we are gaining benefits that are in the interest of the Act. I hope that all of you will let me have your views as to what you think about the failure or success of this type of a contract.

I'm sure all of you know that OSHA prohibits discriminating against an employee who files a complaint or takes part in instituting proceedings or otherwise exercises his rights under the law. There is no provision which will entitle employees to walk off of their jobs because of possible unsafe conditions in the workplace. Of course, this is not withstanding that an agreement has been made to this effect in a contract. Therefore, an employer would not be considered in violation of 11C of the Act for taking disciplinary action against an employee for refusing to perform ordinary job activity because of alleged safety and health hazards. That's what our solicitor's opinion is. As a trade unionist, I have a different view. I don't think anyone has to expose themselves to hazards that are apparent to him. If there is discrimination exercised, I think you will find the Department of Labor right at hand on the side of the employee. We may not win, but we will be there.

Then we have the other side, where the

employee refuses to comply with the rules. I ask you who are leaders in your unions to take the message to your people that the Act was passed for them. The Act was not passed for the employer, and I am sure that most of them, if not all of them, would like to see the Act appealed. Therefore, I think it is up to us to get the message to our workers to be sure that they do not equivocate. The talk of "He is not wearing his personal protective equipment, therefore I do not have to wear my personal protective equipment" is merely talk for kids, and not men and women who are mature.

In closing, I want to say that in this era of automation and new techniques a person depends too much on getting orders and directions for everything he does. The time is still far distant when a machine or a manual of instruction can replace human intelligence. I would like to share with you a motto that was printed in large letters and hung in a plant, which was directed to the inexperienced: "As a last resort, use common sense." OSHA and the labor movement, in cooperation with industry, can forge ahead beyond the issues which our predecessors struggled for, with the goal being significant improvement in the quality of our jobs and lives.

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