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CONTENTS

CONTENTS—Continued

ACCIDENT PREVENTION FUNDAMENTALS

PART I — KNOWING YOUR PROBLEM

GATHERING ACCIDENT FACTS

By RICHARD M. BRYANT

Superintendent, Engineering-Audit Dept., Glen Falls Insurance Co., Glen Falls, N. Y.

No accident in itself is of primary importance, even though the resultant cost and inconvenience may be of great consequence. Studying the results of accidents merely informs us of their number and severity, but leaves us wide open for more of the same. What is important is the reason why the accident happened, and whether or not the conditions still exist which might result in another. Gathering the facts of the accident must include a careful investigation of the cause or causes that were responsible.

All of us here have one thing in common: an interest in safety. Not all of us work at it from the same point of view, and not all with the same size budget. My particular interest as supervisor of the engineering department of the Glens Falls Insurance Co., is to help our insureds to eliminate accidents. I'll admit that we have the ulterior motive of trying to make a profit on the various types of business which we service, but our department is interested in preventing accidents rather than in compiling statistics.

In our efforts we try to work with the people responsible for safety in the plant, institution, hotel, or whatever the risk may be, in analyzing the accident for the contributing factors. A knowledge of these factors is a primary requirement. I'm sure that all of you are familiar with the American Standards Association's Code Z-16.2 "Compiling Industrial Injury Causes" but I would like to re-state and discuss these five factors. They are: 1) The agency and agency part, 2) The unsafe mechanical or physical condition, 3) The accident type, 4) The unsafe act, and, 5) The unsafe personal factor.

There is other information that must be included in an accident report in order to be complete. Such data as the workers' name, sex, age, and occupation; the date, hour and place of accident. These, however, have little direct bearing on our efforts to prevent further accidents of the same nature.

Getting back to the five major factors involved in an accident, let's consider them one at a time. First, the agency and agency part. There will normally be little difficulty in determining the machine, elevator, hand tool, or what-have-you, and the particular part of the agency involved in the accident. In Amarillo a scaffold turned over, causing an employee to break an arm and be badly bruised, resulting in an insured loss of $3,975. There was no question but what the agency involved was the scaffold. Any time there is personal injury or property damage, the injured person, foreman, or supervisor will be very willing to place the blame on the inanimate object. The agency might even be an animal, bird, or insect, but here again, there will be no reticence about placing the blame.

Factor #2: The unsafe mechanical or physical condition. Here again, with no great effort, it can be determined if the accident resulted from improperly guarded or defective equipment, hazardous arrangement or procedures, improper illumination or ventilation, or unsafe dress or apparel. In the previously mentioned scaffold case, the unsafe physical condition of the scaffolding was the cause. In LaFayette, Ga., a mechanic and helper were taking a track off a caterpillar dozer. A chip from the mushroomed head of the chisel took the sight of one eye of the helper who was holding it. The chisel was defective and the man should have been wearing safety goggles. Due to the fact that the management had refused to cooperate in eliminating such unsafe practices, our coverage

Q. What special qualifications are required of LP-Gas tank truck operators? What is the industry doing about 18 year old drivers?

A. It is doubtful if there are any drivers below the age of 21 and industry trains their people thoroughly. One plant calling for three months on the job training was explained. Most operators in the industry secure men of stable, reliable temperament and when they are hired they are placed on a 90 day probation period. They must have an interest in understanding the fuel business. The biggest safety problems are usually human problems. In spite of all the work concentrated on this phase of the industry's safety program, a considerable amount of engineering goes into the design of foolproof equipment. As an example, outlet connections on tanks are protected by excess flow valves which automatically cut off the flow of gas in the event of a leak from the piping downstream.

Q. Are firewalls used around LP-Gas storage tanks?

A. Because of the rapid vaporization of LP-Gas, firewalls are not considered necessary, except in the case of large volumes of refrigerated gas. LP-Gas does not flow a great distance without vaporizing. In fact, many persons have handled LP-Gas for many years without ever seeing it in liquid form.

Q. Should LP-Gas tanks be installed above or below ground?

A. Either type of installation is safe so long as it is made according to the rules of NFPA Standard No. 58. One panelist preferred above ground when possible as the fittings could be checked more easily.

Q. What is the industry doing about gas impurities?

A. The specifications of the Natural Gasoline Association of America are accepted by the industry and followed closely. Marketers are constantly on the alert to keep off-specification product off the market. This problem is an operational one rather than safety.

Q. What is recommended where a radio and an LP-Gas tank are in the same auto trunk?

A. The trunk should be vented. Trained mechanics avoid fuel and ignition sources in the same area. This can be done by compartmentation. It was explained that gasoline vapors are heavier than LP-Gas, which is about 1½ times as heavy as air. In closing the discussion, Mr. Wherry summarized the efforts of the industry in maintaining a safe record and recommended that those using this fuel provide a continuous program of safety education.

SAFETY IN MULTI-PLANT OPERATIONS

SOLUTIONS FOR MULTI-PLANT SAFETY ADMINISTRATION PROBLEMS

(A Panel Discussion)

Moderator:

W. Eugene Stuffing, Director of Safety, Carrier Corp., Syracuse, N. Y.

Participants:

Gordon L. Bowen, Safety and Workmen's Compensation Administrator, American Radiator and Standard Sanitary Corp., New York, N. Y.

Russell DeReamer, Safety Manager, International Business Machines Corp., New York, N. Y.

Raymond D. Harvey, Safety Director, Industrial Safety Section, Ford Motor Co., Dearborn, Mich.

H. M. Huntington, Supervisor of Safety, International Harvester Co., Chicago, Ill.

Stanley W. Parsons, General Safety Director, The Carnation Co., Los Angeles, Calif.

Fred R. Temple, Chief Safety Engineer, Convair, A Division of General Dynamics Corp., Fort Worth, Texas.

Quincy W. Tuma, Chief Safety Engineer, Texaco, Inc., Houston, Texas.

Stuffing: I have selected 15 questions which in turn have been assigned to various panel members for discussion before your group. In the interest of covering as much ground as possible, I have asked each panelist to restrict his discussion periods to a maximum of five minutes. After formal discussion, the other panel members will have an opportunity to speak to the same question, should they desire.

Question 1: What factors constitute the essentials of a minimum basic accident prevention program applicable to multi-plants?

Bowen: The philosophy and policy of my company does not constitute anything possibly that you gentlemen have not heard in the past. First, may I say that we are a large company of small plants, largely self-insured for Workmen's Compensation. We are adopting a basic program of ten points, effective throughout all of our plants. We have some way to go in this; it is not entirely in effect at the present time.

This program is premised upon the responsibility of supervision, from the plant manager to the line foreman—for the safety program. In our 40 plants in this country and Canada we presently have only three full time safety engineers as such. The average plant runs 400 to 500 people, so therefore you can appreciate that our personnel managers, employee relations managers must wear several hats.

Our first program point is *management direction and support.* This is an old point and you are all familiar with it. However, we must insist that this be a regular and routine part of all of their responsibilities and just not window dressing. To this end a series of cost and accident statistics measurements are being validated on the basis of quantity as well as quality and are being carefully studied on a periodic basis by our top managements. This starts with our executive offices in New York as well as at the divisions and the plants operating under these divisions.

The plant manager is held responsible for his cost of operation, safety and workmen's compensation being a part of that cost.

Our second point is *supervisory responsibility.* This also includes our personnel managers, who are also our safety administrators. Supervisors must be trained, and they must be oriented to the proper place of safety in their everyday operations. This training starts with the very basics of safety. What is safety; lost time accident frequencies; severity; Workmen's Compensation insurance; costs; the basic elements of the program; supervisory responsibility and all the other phases of it. This must explore the supervisor's participation at the department level, working with his people and training them on the spot. The supervisor will work on the safety committee and thus have a continuing orientation and training by his rotating participation in these safety committee activities, which also include plant safety and housekeeping inspections.

The third and fourth points of the program are *accident analysis and accident investigation.* To this end we put the supervisor and his department to the test by determining and showing his accident record from the standpoint of the number of accidents and the types occurring in his department. This involves a monthly, cumulative accident analysis. This accident analysis is made, broad and general, not particularly specific for individual detailed problems of a department.

It lists the basic types such as material handling, eye accidents, machine accidents—to orient us and reveal where the problem is in his department. Then the supervisor can find the further detail and what the individual problems are under the broad type headings. He can use the staff services of his personnel and safety departments.

The fifth point involves *accident experience and progress measurement.* Lost time accident frequency and severity is all well and good, but for really close analysis of accident prevention progress, we have found that total accident frequency and costs are of greatest importance to the supervisor in relating to his part of the program. It shows him what the true accident frequency cost is in his plant and in his department. This goes all the way back up the line to the plant manager and relates to his gross sales and net income, and can be shown as a percentage of his profit. All of our managements are quite interested and actively concerned with these accident records and safety performances. Progress is thus measured on a departmental, as well as a total, basis. We in New York get summary information so

that we can determine the individual and total picture, and where we can possibly work with and help individual plants. We have no direct line of control over any of our plant operations; we provide strictly staff, safety advisory and consultant services.

The sixth point is the *safe operating practices requirement.* Each department, each supervisor will develop his own safe operating practices in conjunction with his safety committee at the location. These then become most practical; they are operating practices which the supervisor himself has had a part in making and something with which he can live, train his employees and enforce.

The seventh point is *safe plant and equipment* and the eighth is *industrial health and medical services*—both adequate and satisfactory for the individual location as needed.

Our ninth point provides for proper orientation of supervision, as well as the personnel department, in workmen's compensation *claims control.*

And, finally, getting to our tenth point, *staff services,* we consider here the corporate, division and plant levels. These services should provide a practical minimum, for otherwise we are then doing the supervisor's job for him and defeating our purpose.

However, these services involve technical advice and consultation to aid in the set-up and administration of all of the involvements of an effective safety activity. We have prepared, and are at the present moment circulating among our divisions and plants, three basic policies. They are safety services, medical and workmen's compensation policies. These three policies state our philosophy and provide basic activities which we require of our divisions and plants. I can best describe these policies as umbrellas under which the individual plant can live and operate, because of their varying needs and situations, but which provide for and require the basics which I have outlined here, placing these responsibilities on local plant management and their supervision.

This we consider to be a basic and minimum accident prevention program.

Huntington: Companies with scattered operations over the country are faced with special problems in organizing for safety and need a guide to follow in setting up an overall safety program so that such operations adhere to the program insofar as local conditions will permit. My idea of the essentials for a multi-plant accident-prevention program are:

1. First of all, top management must be sold on the idea and the reasons for a sound accident-prevention program to include all of its operations, regardless of size.

2. The selling job is best done by those closest to the over-all problem and by whoever is in charge of the company's or corporation's safety activities. This may be a safety engineer, safety director, safety supervisor, or the like.

3. From my personal experience and observations, and knowing what other large companies are doing along this line, there appears to be a common pattern set up by all.

(a) A staff safety department at the main office or plant is set up and acts in an advisory capacity.

(b) A central safety committee, or governing body, made up of operating and staff people is needed to lay the ground rules for all to follow. This group should meet quarterly or as often as there is adequate business to be conducted.

(c) A statement of policy is adopted by top management to provide a general plan for all plants and operations to follow.

(d) Local management at the various operations have the prerogative to determine how they can best adhere to the policy. After all, it is their plant and they should run their own show.

(e) Depending on the size of the operation, someone must be delegated by the plant manager to the safety responsibility, whether it be on a full or part-time basis —safety supervisor, safety engineer, or the industrial relations manager. In my own company a safety supervisor handles this program at most of our operations; however, the industrial relations manager in some of our smaller plants also serves as safety supervisor.

(f) A local safety committee, consisting of equal representation from management and the union, I feel is an essential part of the program, for by having them as a part of the act you are more apt to get greater cooperation in your safety program and in carrying out the company's policy. Minutes of the various meetings held by this committee at each operation should be sent to your top safety man so he can analyze them and feel the pulse of the safety program at the particular operation.

(g) Last, but not least, follow-up must be made at the local plant level by the head of safety for the company, or his assistant, on a periodic basis to see that the safety policy and the general safety rules of the company are being complied with and to give whatever help he can on all matters pertaining to safety.

Then, too, where you have multi-plant operations it is advisable to get all of your safety men together on an annual basis to talk over their various problems, and this affords the top safety man the opportunity to review the various policies, introduce new programs, discuss the results of his plant inspections, etc.

Stuffing: Now you have heard two different answers to this question from two highly successful safety engineers who work for vastly different types of industry. Undoubtedly there are other opinions on this question, but in the interest of saving time, let's proceed to the second question.

Question 2: What minimum field data is needed to conduct a multi-plant accident prevention program from an Accident Prevention Director's point of view, as distinguished from an Accident Prevention Supervisor of a division who may have multi-plant operations?

Harvey: I'd like to tell you at the beginning that our policy on safety in the company is written into a manual that goes to all locations, called our Safety Program Guide. We ask our people at all locations —they are full-time safety engineers at all assembly and manufacturing plants, but even in a parts depot somebody is responsible for safety—to follow the instructions given in Section 200 of the Guide. In general, we insist on enough data coming in through standard forms which we supply so that we can follow all of the requirements in the two American Standards Association codes in compiling work injury experience.

This doesn't constitute an endorsement of those codes—I think they should be rewritten. There are lots of things wrong with them. But as long as they exist, that's what we have to follow in order to get industry-wide comparison. There is one addition—that is, that in a fatal, critical or serious injury we insist on immediate notification so that we can take whatever action we deem necessary from a staff standpoint.

Beyond that, we ask all of our locations to compile all sorts of statistics. We want them to compile them, but all that we need in this area is that they let us know what they are compiling. We may have a branch that compiles statistics on cable life and breakage; non-injury accidents. That's fine; we may want to pass it on to other plants if we agree with it; but our basic statistics are simply the necessary reports to compile our frequency, severity and causes under the ASA Code.

De Reamer: Concerning how much data is needed by a corporate safety manager or director to conduct a multi-plant safety program varies from one end of the pole to the other. I don't think we particularly need any.

I've advocated for a long time that a safety program has to be run following the same basic management principles that we apply to any other function of the business. And one of the principles of management that certainly applies to safety is the principle which states that a staff function is in place to perform a service to operating management.

It has the authority of facts well marshalled rather than the power to command or direct. A staff function teaches; it advises and appraises. Frankly, about the only information that we insist upon from operating plants is that if any one of our operating plants discovers an unsafe condition, an unsafe act, unsafe material or unsafe procedure that they feel might exist in another plant or in another division, then they communicate such information to the corporate staff. We in turn can decide whether or not other divisions in the company need to be told about it. Now, how about accident statistics?

Again, we are performing a staff function. The only accident statistics that we want are accident statistics that operating managers ask us for. But it is a staff job to educate them as to what they need. And I mean that very frankly . . . at IBM we are in the process of trying to decide what kind of accident statistics our general man-

agers would like to have. And I think this makes sense. We could decide in New York City that they ought to have a report of all the injuries that are occurring throughout every plant of IBM; we could decide in New York that maybe they would like to have accident frequency and severity rates reported to them.

But maybe they wouldn't be a bit interested in them. I think one of the problems facing safety engineers is that most managers have never really been told what accident frequency means, how it should be interpreted, how good a measurement is it.

We must only ask for information from the operating departments that will help us help them do a better safety job. And at the moment the only information we are asking for is this information that pertains to an unsafe condition or a procedure that might exist someplace else. And this is mandatory, and this responsibility is not to be minimized —information must get out fast to all the plants so that if corrective action is necessary it can be taken. Now I hope that later on somebody will disagree with me on this and we'll have an opportunity to talk some more on it because I feel strongly that as safety people we must operate as staff people, and as staff people we must give our operating departments what they want, not what we think they want.

Harvey: We like to keep our frequency and severity company-wide. Our frequency at the moment is 1.04 and our severity is 208, if you are interested in how we are doing by this system, but I might point out this—we are not all on decision-making levels. In my company, for example, the Industrial Relations Staff has functional supervision of all industrial relations programs.

Tuma: I think that was "what minimum data was needed." I think the minimum data needed at a centralized point is the sufficient data to enable the safety director to convert that information into something that can be presented to management in a form that they can understand. I'm not saying that management needs to have things simplified for them but maybe we can sell our point much better if we can simplify it.

Accident frequency rates, injury frequency rates, severity rates are good and we who are in the safety profession understand them; we can relate them, one with another, but if we are going to sell the top management of the company a bill of goods about what is needed and what is accomplished, then we have to convert that to a point where we would have had in the certain plant or a certain division or a certain group —one man injured, if there were so many people, in a certain period of time. Or, if we are talking about automotive accident reports—if I can tell my sales department people that a truck operator may expect to drive at the rate we are having automotive accidents, he may expect to drive 12 years and 7 months before he has an automotive accident, while the passenger car operator may expect to drive 10 years and 9 months without an automotive accident. These figures are arbitrary, of course. Then I think they realize it much more when we say that our rate was so much per hundred thousand or per million miles of travel.

Stuffing: The next question is "How can a safety director of a multi-plant operation utilize the services of an insurance company engineer to the greatest advantage? Additionally, how far can he go in requesting and expecting services which are considered to be more than normal services that the insurance company provides?"

Temple: Our company represents something a little bit different from the four preceding members of the panel in that we have a much more varied products involved—everything from electric motors in the East Coast division of General Dynamics and the Electric Dynamics plant to large aircraft on the West Coast; in the San Diego Division Convair; aircraft again up in Canada; down to the atomic submarines of Electric Boat Company, and our public relations people are not keeping us too well informed, because I had to find out the other day that we now own a plantation down in South America where they take extract from a flower and make it into vanilla—Standard Vanilla. So, we've got everything in the business—I mean in variety.

Now, how can you or I, involved in multi-plant problems relating to safety utilize the services of the insurance company, particularly their safety engineers? In the first place we're going to have to know something about what the broker consummated in the contract with the insurance carrier so that we can keep our requests within line of the contract, although definitely we should get all that the contract is for and most of

us try to get a litle more. But, by the same token, we've got to stay within the bounds of reason.

Now, what can we get? Well, in the first place, if the insurance carrier has safety engineers we get consultation services on problems. We can get information on what is going on in other plants, for which they are the carrier. We can get some technical services which may not be available in our own plants or in some plants. We can also get benefits of their suggestions from inspections in the plant. Those inspections should be made very closely with the safety engineer in the plant. The inspections should be made for the purpose of improving the plant safety, as should all inspections. They should not be made for the purpose of putting somebody on the spot, whitewashing some fellow who is not doing a good job—but they should be made for the purpose of helping. And sometimes the safety engineer for the insurance company is roaming around through the plant unescorted, contacting people and making suggestions direct to supervision—this can lead to trouble. Another thing that we can expect of them is efforts toward researching some problem on which we are having trouble or a problem which arises out of a new product.

Another thing which we can expect of our safety engineers from the insurance carrier is that they know something about what the compensation experience is in our divisions. Now, here we run into peculiar problems, because sometimes the claims department and the engineering department of the insurance carrier don't seem to know that the other exists.

I don't know why that should be; I think that is a mistake, but it is a fact. So, with one or two insurance carriers that we have had, we've had to get the claims department and the engineering department acquainted with each other and cross-feed a little information, because there is a definite relation between engineering and claims. We asked the engineers to give us back some information on accident analysis. Sometimes the statistical department of the insurance carrier doesn't have that service, but where they do have that service, they can give you good information back in accident and statistical analysis. Of course some plants are big enough—they can do that for themselves.

Another thing we insist that our insurance company furnish back to us—now, this may not come from your engineering group; it may come through the claims department of your insurance carrier—and that is to give us full information on the compensation monies spent. This is most especially important to the companies, to the individual division, particularly if you are on retrospective audit basis, in your insurance contacts, where there is a premium return of monies that are not expended. There are many other services which if the insurance carrier engineers and various other functions of that carrier, if they have, can be very valuable to you.

I would suggest one thing—don't ever expect your compensation carrier to team up with you to put pressure on top management, because this can be a fatal mistake. I remember one instance that occurred in one of our divisions where the top safety man in the division teamed up with the insurance carrier to try to get a little bit more support out of management. They tried it in this manner—of making a rather critical report back to the insurance carrier's general offices, which in turn goes through the broker down through the general offices of the corporation, back to the division. Well, obviously this didn't turn out right because when the answer came back to the division and to the safety man and to the insurance carrier, the answer was, "Any time we want the insurance carrier to make a critical report and suggest that management isn't doing its job, we will ask for an appraisal, and until then please hold that information. We don't want it." So this whole thing had a very adverse reaction on the engineer who was involved in the plan as well as the insurance carrier itself. This should never be done, but we can get a lot of help from good engineering service of our insurance carriers and more especially, if they have good engineers.

Parsons: Before I answer this question, I'd like to give you a little information about Carnation Company and the scope of its operation so you will know why we have our present program. We operate 358 plants in the United States and Canada, and 28 foreign plants. The safety organization is organized and directed from our Los Angeles world headquarters. You can see that we have a problem.

Now, to get to answering the question, "How can we utilize the services of our

insurance carrier?" We in Carnation Company have a very good insurance program. I won't go into it in detail, but actually it boils down to this—it's cost plus. It's our money, and that's one item we speak of time and time again—to managers, district managers, executives. It's our money that the insurance company is spending and they don't forget it. With this in mind, we periodically call in a representative of our insurance carrier. We sit down and go over the various locations in the company and determine at that time, to the best of our ability, a service frequency for each location. This is based on all the statistics that the gentlemen before me didn't want. But this is the only way we can handle it in our world headquarters. A card is made up for each location, whether it be a plant of 1,500 employees or a vacant lot. On this card we give a description of the property, the operating name, the contact man in the company that the insurance carrier should contact upon arrival, number of employees, vehicles, elevators, fired and unfired pressure vessels, etc. We keep a running record of the individual inspections made by our carrier's engineers. These engineers submit a report not only to their own office but a copy to our office in Los Angeles. We review this copy very carefully.

When we determined the frequency of service, we also laid certain ground rules for the engineer to follow in contacting our plants in order to make an inspection. We consider the insurance company representative or engineer a part of our general safety department. They are one of us. They know everything that goes on in Carnation Company. Every time we send a bulletin, frequency rate report, or any other material to our plants, we send a copy to them. When they appear before our manager or supervisor in the plant, they know as much about our safety program as the manager or superintendent himself. They are armed with material. Well, this being the case, we expect some good inspections and we don't mean inspections where they come in at 12 o'clock and say, "John, have you had lunch yet? Let's go out to lunch," and then after lunch, that is the last you see of them.

He has to turn in a report following our outline. On the other hand, our superintendent or manager also turns in a report to us, following an outline, as to what that inspector did in his plant—whether he liked his service, whether he is doing anything for his program. This is a personal and confidential report that comes to me only. Over the period of years we have established a relationship with our insurance carrier engineers to the extent that during hunting season the boys get together over a few cocktails; they're buddies, and that is the only way it can come about, through some direct program where each one knows what part he has to play in it. So we look at it this way—if we're paying for this service, by gosh, we're going to get it.

And if we don't get it, then we can go to our insurance carrier and say, now, here is proof of poor service. We would like to have better service, even to the extent of replacing the engineer who services our plant, because as I said before, it is our money that it is paying these men to visit our plants.

Now, as far as material is concerned—I said before, we give them all the material that is sent to the plants such as bulletins; our monthly safety news and other items of interest, which they can read in advance of attending the plant safety meetings or talking to the plant manager. Also, we give them our standards. We have standards issued by the General Safety Department on safety which have been approved by all of the operating departments of the various divisions. They have these standards in their possession, so if they see an unsafe condition, they can go to the manager and say, "Look here, Mr. Manager, on page so and so, article 2, here are the standards pertaining to this hazard." Now it is so easy for people to go through a plant and say a hazard exists and then drop it. We don't want to drop it there. If they submit a recommendation, either verbally to the local plant manager or to us, they not only have to give the hazard involved but how it can be rectified, in detail; how it can be eliminated, following our standards. If it is not in our standards, then any other standard which they may be able to refer to and sometimes it may be a violation of a state code, and if so, we want to know the number of that state code. Also, we come up from time to time with new products. You never know when we are going to come up with something new. So if we don't know in Los Angeles, surely the

insurance engineers in the field don't know what we are coming up with.

They may arrive at a plant for the monthly inspection and in the meantime we have slipped in a few pieces of equipment which they don't know exists. Well, we know it exists through our engineering department. Every piece of equipment which is designed and installed in any one of our plants, is submitted to the safety department. The design is approved and immediately after the approval we send out a notice to the insurance carrier engineer that services that location. So he knows what to look for, he knows what to follow up on if there are some particular items which we want him to follow up on, he does and reports back to us. That is special service. Special service is something which we try to get as much of as possible. We are paying for this service and I think we are entitled to it, so we should be able to control their actions in the plant as much as the actions of our own safety engineers in Los Angeles.

There is one item which we still have difficulty with—we would get reports in from insurance carrier engineers saying that "I called Mr. So and So, the manager, and he said, I have no problems." Sure, he didn't have any problems, he was probably going out to lunch or had another meeting, so he said, "Well, let it go by—we'll wait for another month." We require that the engineer tell us the conversation that took place on the telephone and why he thinks he should not have made that visit, because we want to know why he didn't make it, as there must be a good reason for it. Also, in this list of instructions we state that he must make an appointment with the superintendent or the manager—he does not walk in the back door, or even the front door, unannounced. He makes an appointment, our manager knows he's coming, and there is a man assigned to him, if the manager himself cannot make the rounds. They inspect the entire plant from stem to stern and verbal recommendations are given at that time. He cannot make out what we call hotel room recommendations. If he thinks of these items after he leaves the plant, he identifies them as such and they are discussed in such a manner.

Now, we get back to how we dispose of these recommendations. The recommendations come to us from the insurance carrier's inspector. We review them and then pick out the recommendations for that particular plant and write a letter to the manager advising him that on a certain date this man entered his plant, discussed these recommendations, and please advise us when they have been complied with. If there is a recommendation where we can help him to comply, through past experience in other plants, we give him an explanation of how he can correct this situation in detail. Now, if there is a recommendation we do not understand, we eliminate it from the letter. We don't confuse him with recommendations which we know he can't understand. And some of them we eliminate altogether. Our program may seem rather strict, but as I say, we're in business to make money and that is our money being spent.

Tuma: We have just been through a program of coordinating the services of our insurance carrier with what we think is the best way of getting the most effective values from them. The insurance carrier has had in existence for some time—and we're updating it—a set of instructions not nearly in as much detail as has been mentioned here, but only some basic procedures and the insurance company management—the manager of the Loss Control Division—is left the prerogative of controlling his own people.

We have had one problem that I think needs to be mentioned and that is the matter of establishing and maintaining a line of communication. We operate of course in all 50 states and our plant sizes go from 6,000 down to a single-man remote pipe line operation, so we do have a matter of control involved. The safety engineers for the insurance company may make a recommendation and it will be handled to conclusion, but the engineer himself will never be advised of what has happened, and he may come back and resubmit the same recommendation that has been turned for cause. Now, we have just recently established a line of communication where the insurance company engineer will be furnished advice as to why his recommendation was turned down. We have, for instance, in effect—and this opens up an entirely new area—that we won't pursue—but non-sparking tools—we don't use those at all in our pipe line operations and we are not emphasizing them in some of the other operations. If the safety engineer comes in and recommends non-sparking tools

for a particular operation, he can resubmit those recommendations until he is blue in the face and they will never be favorably considered. So, to remove the irritant of a resubmission of a recommendation that is doomed to be turned down helps out the relationship between the insurance carrier and his representative as they make the contacts in the field.

De Reamer: First of all, I think the responsibility of a Director of Safety in a multi-plant operation is to inform his organization, if they don't already know it, that there are some competent services available from the insurance company and it ought to be used. Rather than advocate all these controls and establish all these controls, I would say that we ought to say to each of our plant general managers and division general managers, this service is available to you and you may use it if you want to and if you don't want to, you don't have to. It's your responsibility—and then let them decide.

If I were to make the plant appraisal, my comments to any general manager would be, "These are the things that require correction. You decide for yourself whether or not you want to correct them, and if you want to, you can throw my recommendations in the wastebasket. If you prefer, you can do something about them; I don't necessarily need to know what you have done." Now, it's an amazing thing that when you operate like this, how frequently you do get letters back saying that "we have done all the things you recommended." Now, why does this work any differently than a control procedure? Well, again, it is a service that they want; they know that you are not in there to police them; they know that you are in there to help them; they know that they are not going to be hung because of the recommendations that are made or the unsafe conditions that are discovered. It is a service function, and they like it.

Bowen: There is one comment I would like to make. Quite a few of the companies represented here are self-insured. Because of this self-insurance factor, the local safety administrator, be he personnel man or otherwise, will be confronted with this particular problem. I agree with the gentleman here; it may not be our responsibility to answer it now, but we do have to have some guide lines as to how that personnel or safety manager should handle such situations.

He may feel that he must controvert disability, for the amount of disability claimed is not perhaps what his medical advice feels it is. This is a medical question that must be referred to the physician at the plant location and handled with the claims representative. But it is one that the local administrator will be concerned with and will find staring him in the face quite often. He must be conversant with the problem and its reasonable solutions, though he should not handle it directly or by himself.

Temple: Let me just make one comment, Gene. Part of our function is the assistance in the provision of good plant medical services and that goes for outside the plant in relation to services for which the insurance carrier is paying. If there is a good relation between the plant medical doctors and the outside medical field, your local medical association, you can influence the people who are injured to use the suggested list of doctors.

Let me preface that—or make this remark. In Texas the insurance carrier can furnish you medical services and can deny payment for any bills that are incurred outside the authorized services. This is part of the Texas law. But assuming there is no such law, if there are good relations between your plant medical people and the outside medical people, you can influence very greatly those people to use those recommended doctors. But this again must be predicated on those good relations, and good relations between your employees and your plant medical people are also necessary.

Question from the floor: I'm searching for ideas and recommendations as to methods for determining the amount of money which should be budgeted for safety in our various sized plants.

Harvey: This is going to take about half-a-minute. We do have functional control of our safety programs in all of our plants. I have called several locations concerning this question and they tell me that from 70 to 80 per cent of their budget is automatically controlled by the requirements set up in the Safety Program Guide. The other 20 per cent are the optional things that they have to work with, so that is the way their budget is handled to comply with the functional staff supervision.

Stuffing: I should point out that in Ford Motor Company they are not as decentralized as some companies. So that would partially answer the question.

Huntington: The question of budgets for safety has always stumped me. Setting up a budget for any given plant varies, of course, with the needs of that plant and its size, and what the plant's goals are. I don't think I can give you the answer you are looking for; however, I toss this out for what it is worth.

1. We know that mechanical guarding of machines and equipment will always be a continuing process because of variances in plant physical changes and new lines of machines to produce parts. Therefore it is most difficult to set up a budget for such guarding. Such things are essential, and if we had money set up for such a budget and it was overdrawn, would you eliminate making a guard because of the cost element? I'd say you would not.

Best thing to do here is that when machines and equipment are purchased you have some estimate made of such guarding costs in the purchase price. Likewise, when it is expected that machines will be moved to new locations or a guard will have to be revamped, or the like, some estimate should be made of that cost also.

2. Perhaps we can be a little more specific in one area of budgeting, and that is in safety promotion activities. Speaking from my own personal experience, many of our plants submit a budget each year to the division manager for approval. These vary from a few hundred to several thousand dollars, depending on the size of the plant and the scope of their safety promotion program. Such things budgeted are for plaques, good housekeeping awards in the form of merchandise, dinners, free coffee, posters, etc. One way could be to decide on a set sum per employe for promotion activities, say $2, $3, $4 or $5.

Bowen: We do not recommend a budget for safety. Safety is an integral part of the over-all industrial management function and responsibility. There is no separate safety function, so to determine what our budget is would be almost impossible, in my opinion. These men—the manufacturing superintendent, the foremen in the particular department—have to run a plant and get the product out at the least cost and with the highest quality possible. To do this, he has got to have a method of, let's say, waste control. He's got to have proper inspection and quality control techniques. If he finds through any of these various procedures that something has gone wrong on the line, what is he going to do? He's got to get it fixed. And how can you prepare a specific budget to cover something like this? And safety is the same way.

If there is something wrong—if there is a need for machine guarding, or a better material handling procedure, or some industrial health control, this has to be taken care of and be worked into the over-all budget of that particular plant for a given year. So therefore we have attempted no statement or idea as to how to develop or provide a safety budget for any of our plants. Now, granted, many of our plants don't have a specific safety budget, but through training and education of our supervision and our plant management staff, the importance of safety in relation to their net profits is becoming more and more evident, and therefore when items come along that impair their particular profit, they take steps to correct it. Eventually provisions are made in the budgets, but we feel no need for specific safety budgets.

Question from the floor: How do you perform the staff functions of appraisal without field data?

De Reamer: If a plant felt they needed an appraisal and would like to have me come out to make the appraisal, I would go there and I'd go through the plant and I'd sit down and obviously I would review their accident statistics and see how they stood as compared with our other plants. But you have to get this in the proper climate or atmosphere. I want to first emphasize that we have frequency rates that in most cases are less than 1, and when you look at a frequency rate of less than 1 for 8 or 9 years, it becomes very uninteresting because it is not telling you anything.

Question from the floor: How do you know that?

De Reamer: How do I know what?

Question: That the frequency rate is less than 1.

De Reamer: Our plants prepare them.

Question: So you do get field data?

De Reamer: No, I don't. You see, the point I was trying to make—I told you that probably we would all have a corporate safety report that would indicate the relative safety performance of each plant. At the moment we are not using one because I don't think that this corporate report would tell us what the relative standing of our plants was, or how well or how poorly they were doing. Let me just show you what I mean. The characteristic way of reporting accident statistics is to collect all the facts—a, b, c, d, e and so forth—and then after the plant you indicate the frequency rate—and you list them in order with the plant with the worst frequency rate at the bottom and the plant with the best frequency rate at the top. Right? Isn't that the way? Well, how do you do it?

De Reamer: Well, this is the way we used to do it, too, and when you look at the report from year to year, you realize that a manager wasn't told anything; all he was being told was that his plant had a frequency rate of 2.03 and plant B had a frequency rate of 3, and plant C had a frequency rate of 4, and so on. Nothing was said as to whether they were doing any better safety job. All they were told was that for every million manhours worked they had X number accidents that they counted.

What I'm doing—and all of our plant safety people are doing it, because I think we're together on this—we're first trying to educate management as to what the specific statistics mean, and we are experimenting with other kinds of statistics, like total injury experience and doctor's cases. I'm not necessarily saying that these statistics are meaningful, either, but we're looking at them to see whether or not there is a possibility of finding some kind of criteria that would at least tell in numbers what kind of a job is being done.

I've said to our management that accident statistics as far as I'm personally concerned are like litmus paper. Litmus paper tells you whether you are acid or base. Accident statistics if they are properly used can tell you whether or not your plant is getting better, is getting worse or is remaining the same.

Some of you are disagreeing a little bit and your disagreement is good. Instead of selecting plants in order of their frequency rates, we're listing plants in order of the improvement. Now here is what we've experimented with. We've taken the total injury experience, doctor's cases, and disabling injuries in 1958 and comparing with 1959, indicated the per cent of improvement. You find that the plant that has done the best job, you can list up at the top; the plant that has done the worst job, you can list at the bottom. You can definitely say that Plant A is doing a good job because they have improved in all areas.

I think we first must educate our management to want these statistics. This is the way it works with everything else—cost, production—the general manager of the plant isn't getting the cost report because some cost manager told him that he should have it; he's getting it because he asked some cost manager to prepare reports for him, because he wanted them. And I think that accident statistics have to come through the same kind of metamorphosis—or generation.

Question from the floor: In other words, while you don't require field data, you obviously are getting it.

De Reamer: Well, yes, I'm getting it because I'm experimenting. But I'm not using it yet.

Question from the floor: You use field data in your work—it isn't completely disregarded as a central staff function.

De Reamer: Let me just give you a little bit more insight on what I'm trying to get at—the point I'm trying to make is that I did, two months ago, request from all of our plants accident statistics. And I prepared reports something like the report I prepared here—and I sent it out to the general managers and I said, "Does this look like anything you'd like to have?" And one manager said, Yes, it was something he'd like to have. And another manager said he thought so, too. Now, if all the managers will come through and say yes, we'd like to have this—we'd like to have it on a quarterly basis, on a semi-annual—we'll prepare it for him. And it then becomes their responsibility to determine how far down the line they want to send those statistics. This is a very small fraction of a corporate safety man's job—this occurs once a month, and with modern IBM equipment it takes just a moment to get it out.

Harvey: The real trouble with our A.S.A. codes on accident frequency and severity is that they were made by a group of safety engineers without any mathematicians or statisticians to help them. Statistics can be very misleading. For example, you have two departments. This department is running at 90 per cent efficiency; this department at 60 per cent. Which department supervisor is doing the best job? Why, the one at 90 per cent, sure—but let's go back behind that. The one at 90 per cent was runing 100 per cent up to 6 months ago; while the one at 60 per cent was only running 30 per cent. We took that supervisor out of that 100 per cent one and put him down in the 30 per cent one. He's brought that up to 60 per cent, while the other one has gone down to 90 per cent. You see, these things can't be arbitrarily listed.

Now, in our statistical set-up in Ford Motor Company, we take frequency and severity and give them equal weights by a mathematical formula—frequency divided by the frequency of the company and severity divided by the severity of the company, the two quotients added to make an index. Then we position all of our plants and we judge our plant performance by whether they are moving upward or downward in their listing. Now it's true that a plant can move upward or downward with situations beyond the control of the safety program.

I reviewed the safety program of a plant recently which has shown a marked improvement. I say a plant—it's an activity—and the main reason for their better record is that they built a new plant and moved into it. The new plant is much easier to operate safely. These things are extremely complicated—you have to figure them out. As far as management not knowing about injury rates, I can tell you that Ford Motor Company up until 1946, when the new management came in, was operating on the basis that the plant managers just want to know who gets hurt—you can send a report out but they don't care about any ratios.

When the new management team took over control, one of the first things asked was, "What is your Safety Program? Where are your frequency and severity reports?" Today management receives these reports regularly.

Stuffing: That's the whole point, incidentally.

Bowen: Two and a half years ago we established a statistical recording requirement from our plants through their divisions to the New York corporate office. This has worked fairly well—we've had to modify it some. I agree wholeheartedly with this business of the lost time accident frequency and severity not being worth much. However it is traditional—we are still continuing to use them, for I suppose it is nice to know how you are stacking up with somebody else in your particular industry. But this is about as it is, as far as I am concerned. Perhaps I can describe our particular report—I have it here and anybody that would like to take a look at it afterwards is most welcome to do so.

We list our plant, by divisions. We show the injuries by type—whether or not permanent total or partial or temporary total—lost time accident frequency and severity. We also show the manhours and total accident costs. Cost is reported regardless of whether the location is self-insured, commercially or state fund insured. Then we develop a cost per $100 of payroll. Next to this we show a manual classification, picked arbitrarily as the major classification for that particular plant location; we don't bother with their clerical office workers or any of the rest, just the major classification—if it is a sheetmetal classification mainly, and ¾ of their manufacturing payroll is in this, then this is it. We compare their actual rate with the manual rate, for a guide to how well they are doing. Now, this is really a progress report. We are interested mainly in what they are doing from year to year or from quarter to quarter, as the case may be. This report is quarterly now, but will become semi-annual. We show the per cent of increase or decrease over the previous year's record. This gives us a cumulative, running figure year after year as to actual progress. This year starting January 1 we are adding to this, total accident frequency. Our greatest weight is to be placed on that total accident frequency and improvement. Now, as to the use that these statistics are put to—they are sent to our personnel or safety administrators—I keep saying personnel for the simple fact is that almost all of our safety administrators are also our personnel administrators too. It is their job to educate their local management on the importance of these statistics—what is an accident frequency, what does it mean and how is he using it to help the plant manager improve his safety record.

The cost picture is important, for responsibilities are basic and have been well covered elsewhere. When it comes to good business operation, a manager is greatly interested in what accidents are costing him, and how much can he save? He's got to do this—he has no choice. Therefore we have to educate, at the local level, in the use of these statistics and present what is the most usable to that man. This is the job of our safety man at the plant level, with his plant manager. Anything short of that is useless—we do not ask for any statistics in New York that are not going to be useful to our plant people; we do not collect statistics just to have a record system going. We have three forms that come from the field—two of them are solely because of self-insurance requirements for consolidation of reporting to the individual states; one is a listing of disability claims and the amounts of money reserved, paid and outstanding on them; the second is classification information which the state requires. The third is the safety statistics report, on one sheet of paper.

George Steel, Ralston Purina, St. Louis, Mo.: I asked the question about the doctors. I feel quite strongly about this problem because I feel that unless the matter is properly handled, the particular plant which has a problem would be spending unnecessarily large sums of money for compensation claims. I would like Mr. De Reamer to discuss this matter a little more fully.

De Reamer: I don't think there is a pat answer to this question. And having had experience years ago in handling compensation, I know what a serious problem it is. The only time that I think you might have a solution to the problem is when the problem is being created by a lack of understanding on the part of the doctor who is treating your people. This does sometimes exist. Many companies report quite a bit of success with having meetings arranged between community doctors and the plant management to explain what the philosophy of the company is, what the benefit plans are, something about the compensation law and how these diagnoses will have effect on the kind of award that a person gets.

Harvey: I certainly agree with what Russ said—the only thing I want to point out is that this is a very real problem—it comes up all the time. Now what do we do? We go back to our ASA Code and read the introduction to it. "The methods outlined in this standard for classifying work injuries are independent of workmen's compensation laws and rulings of workmen's compensation agencies." Therefore, if your doctor wishes to send in a report to your compensation department to the effect that this broken bone should be reported to the state as a 10 per cent disability, but is not chargeable under the ASA code, he can do so.

CHEMICAL SAFETY IN LABORATORIES AND SMALL INDUSTRIES

PERSONNEL TRAINING METHODS

By ELLIS STOUT
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Most injuries that occur in laboratories and pilot plants can be considered to have been caused by one or more of the following reasons: failure to realize the hazards of the work; the presence of unsuspected impurities or weaknesses in materials; failure of mechanical and safeguarding equipment; failure to follow the correct procedure, that is, taking a short-cut—often referred to as human error; inattention on the part of the employee to the job; or failure to use safety equipment.

Proper safety training can correct four out of six of these reasons for injuries.

A safety engineer in an industrial plant usually thinks of safety training as a combination of general safety meetings, safety posters and booklets, films, newsletters, and

an occasional contact with workers. In most scientific laboratories, this sort of safety training will not be adequate. Such very general and rudimentary types of safety training can only be expected to develop some sort of safety awareness. The hope of safety people who use this sort of training program is that employee exposure to it will develop an awareness to unsafe practices and unsafe conditions and will avoid them voluntarily. Experience has shown that this is not the case, however. Such mass training methods have many weaknesses. The training material must of necessity be general in nature, and the hoped for carry-over from the general to specific conditions does not usually follow, since the specific interpretation is left to the worker.

In place of mass safety education methods, a more personalized safety training is recommended. Such personalized training requires a great deal more work on the part of the safety specialist and the supervisor. A safety engineer who feels that is is doing his job if he investigates accidents and fills out the necessary forms; holds an occasional safety meeting for various groups, where he shows stereotyped safety films, many times having little or nothing to do with the work being performed, and also perhaps, designed for an audience of grade school level; puts up colorful safety posters on bulletin boards, keeps up a conspicuous chart showing the number of days since the last disabling injury; etc. will probably find that his work has been drastically changed if he undertakes personalized safety training. In many cases, he will have to learn considerably more about what goes on in his plant than he has felt necessary before.

A training program in a laboratory performing scientific research work by skilled workers, mostly with high academic degrees, must of necessity be basically different in character from a program for routine industrial workers. Such a program must be more inclusive in scope, more detailed, and more explanatory than the usual training work. Training for scientific people usually goes better if it is carried out in a subtle, person to person way, than if it is attempted through formalized lectures and meetings. A major part of a training program can consist of inclusion, on a rotating basis, of scientists on safety committees in the laboratories and allied areas. In many cases a well grounded training program can be carried out without any formal lecturing at all, and personnel become trained in spite of, perhaps, an initial belligerent feeling toward safe practices and safety personnel. If there is a lack of respect for safe practices by scientists, it may be that such feeling has been brought about by the safety personnel themselves, due to a tendency to treat scientists as ordinary workers.

In designing a safety training program for laboratory employees, the following fundamentals should be kept in mind:

1. When safety rules are formulated, considerable thought should be given to whether the rule is sound, and to providing logical and correct explanations for the rule.

2. Safety rules should not be arbitrary, but should be capable of logical substantiation. To illustrate this point, the following example is given: A laboratory needed to use some liquid hydrogen in its work, and this material had to be transported some distance to the laboratory, passing through a residential area on the way. After consulting the literature on the subject of liquid hydrogen, the safety people went to elaborate precautions including large warning signs, red flags, no smoking signs, and a police escort for the truck carrying the dewar of hydrogen. When it was pointed out, however, that the energy available from an explosion of the hydrogen was less than was possible from the gasoline of the truck, it became obvious that such precautions were not necessary.

3. A great aid in safety work with scientific people is gained if the safety engineers are also scientifically trained, and understand the scientists' point of view. Safety people should discard ideas that all scientists are crackpots, and make an effort to learn from the logical mind.

4. Many times actual scientific research must be carried out in order to solve a safety problem in the research field.

5. Cooperation with laboratory personnel on a safety program can be started most successfully by seeking aid and advice from scientists, particularly on questions clearly within their field of specialization. Work in a research laboratory is so different from any routine operation that many times a research worker is the best person to assist the safety staff on aspects of safety in his work, and also can sometimes spot hazards