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FOOD & BEVERAGE;
MEAT & LEATHER
INDUSTRIES;
TRADES & SERVICES



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60th NATIONAL SAFETY CONGRESS

Papers Delivered in the

FOOD & BEVERAGE SESSIONS

A Management Look at the Occupational Safety & Health Act.... Robert L. Grover	1
Distillers' Roundtable	4
Poultry Roundtable	5

Papers Delivered in the

MEAT & LEATHER INDUSTRIES SESSIONS

Effect of OSHA on the Leather Industry.....	John D. Kennedy	6
OSHA and Meat Packing.....	Ralph Appell	11
Industry Feedback on OSHA.....	Donald S. Mackenzie	12
OSHA and the Meat Industry.....	John W. Dunning	14
How We Organized a Safety Program.....	Raymond F. Thill	16
How I Organized a Safety Program.....	Gary P. Fisher	17
The Impact of OSHA.....	Joe Watson	22
Work Surfaces and Ladders.....	Marshall E. Petersen	24
Knife Safety and You.....	Robert W. Thomas	29
Welding and Cutting in the Meat Industry.....	John W. Trolen	32
Design & Operation of Safe Ammonia Refrigerating Systems.....	Howard Rebholz	35
Hearing Audit.....	George C. Briley	38
Selling Safety to the 'Old Timer'.....	Lawrence Todesco	45
Safety By the Numbers.....	Michael Cavalier	49
	Howard Rebholz	51

Papers Delivered in the

TRADES & SERVICES SESSIONS

Sears Tower — Life Safety and Fire Protection Systems..... C. W. Schirmer	54
Emergency Planning and Evacuation..... Henry H. Brockhagen	60
Patron Injuries and Statistics..... Raymond C. Ellis, Jr.	64
A Safety Self-Inspection Program for a Food Service Establishment.....	
..... Vernon E. Cordell	66
Fire Safety Kenneth E. Ritenour	69
Customer, Patron and Product Losses and Statistics..... Thomas J. Reilly	73
Fire Protection A. M. Lowmsbury	77
Officers of the Food and Beverage Section 1972-73.....	82
Officers of the Meat and Leather Industries Section 1972-73.....	84

Officers of the Trades and Services Section 1972-73	86
Future Dates of the National Safety Congress	89
Other Volumes in 1972 National Safety Congress Transactions	Back Cover

A MANAGEMENT LOOK AT THE OCCUPATIONAL SAFETY & HEALTH ACT

By ROBERT L. GROVER
President, Snap-On-Tools Corp., Kenosha, Wis.

As I commenced to draw together these comments, it struck me that they had actually been in course of preparation for a longer period of time than most luncheon speeches. The federal Occupational Safety and Health Act of 1970 became law on December 29, 1970. It was the culmination of almost three years of extensive and controversial committee hearings and floor debate in the Congress of the United States. The testimony and the exhibits presented in those committee hearings fill many volumes. Incorporated in that small specialized library are the views, opinions, biases, ambitions, dreams, and schemes of many organizations and individuals with many different objectives, some noble and unselfish, some destructive and self-serving, and a lot in between.

I speak of this background with familiarity because I was involved in the controversy as an interested and, I hope, well-informed citizen, attempting to influence the legislative procedure with my experiences. More importantly, I am now still in the thick of it, as the chief executive officer of a business whose present and future are and will continue to be very significantly affected by the provisions of OSHA as it is now and as it will be through the ever-changing and modifying processes of interpretation and enforcement. The positions to be taken and the changes to be accomplished in compliance with this new law, which everybody now refers to as OSHA, merit, I think, a little stage arrangement and scene painting.

OSHA involves a simple, basic principle. It is the duty of each employer, in a broad sort of way, to furnish his employees with work in places of employment which are free from hazards causing or likely to cause death or physical harm. From that point forward, the complications develop.

But OSHA as a code of business responsibility does not stand alone, and any management thinking which approaches it as a single problem area is very likely to be badly off the target. A review of the background from which OSHA sprang, the basic political philosophy which it represents, and the basic social patterns of which it is only a part must all be considered in formulating an approach.

For example, those federal enactments dealing with the newly-imposed responsibilities of business in the area of minority employment, the employment rights of women, the handicapped, and, more recently, the aging (my peer group), constituted a part of the pattern. If you were to devote some time to studying the testimony and the showings before the legislative committees which have considered the various acts in this field, you would see a similarity of pattern and direction. The same startling similarity in underlying philosophy, social direction, and actual identification of antagonists and protagonists recurs in the environmental management field.

Once again there is a parallel course of action and a similarity of direction, plus the overlay of philosophical similarity when we consider the general field of products liability, the ongoing manufacturer and distributor responsibility for product, as well as immensely increased demands to shift the burden for either the mischances of life or the improvement of society.

I have pointed out these broader involvements because in my job classification it's my responsibility to set a corporate course which takes into account all of the shoals and known dangers, not just the hazards of the day or the dangers that lie immediately ahead at any given moment. This explanation

tion will, I hope, tend to give some additional credibility to the decisions which emanate from the presidential perch for many of you who are in line management jobs. To some of you, it may also explain why the turnover in presidents is pretty high these days.

In the last several months I have read, among the many magazine articles upon various phases of OSHA, a couple to which I wish to draw particular attention. One appeared in the *Journal of the Wisconsin State Bar*, the other appeared in the *Journal of the American Bar Association*. Although they were both exceedingly well written, in keeping with the high editorial standards of both of these publications, they did leave the impression that this new law was going to provide a lot of work for lawyers. There are areas of business life in which legal departments and legal counsel can and must take the prime responsibility for handling the problems. Immensely complex regulations, tedious hearings, motions, counter-motions, briefs, and appeals—these are a way of life if you're dealing with some government agencies. But, OSHA is not such an area, and it cannot be handled in such a manner. This is an area in which a memo to the legal department is not adequate disposition.

If you remember nothing else in these remarks—and that may be a fitting request for them—remember this: compliance with OSHA from beginning to end is an operating man's responsibility. No one can do it for him; no one can excuse his delinquencies; no one can insulate him from the realities of the regulations and their enforcement. OSHA is for real, and it is for keeps.

Two years ago, I sat down with the Board of Directors of the company which I serve with a program for capital expenditures in the factories which we operate in Massachusetts, Illinois, Wisconsin, Iowa, Canada, and Mexico. There was some apprehension, and perhaps even mild shock, at the expenditures which were proposed for environmental improvement and protection devices and structures, none of which contributed anything to the manufacture of our product. At that time, I pointed out what I believe to be indisputably true, that in this area the standards of performance and courses of action which

were ten years ago technologically acceptable, legally adequate, and socially proper no longer meet any of these measurements. The rules of the game have been changed, and we must change with them.

Now we turn to compliance with OSHA, the full impact of which is just starting to dawn on the vast majority of American employers, as the 400-plus compliance officers and industrial hygienists apply the newly-developed federal standards and national consensus standards. Incidentally, it's anticipated there will be about 1,150 persons on the staff of the Department of Labor by the end of 1972 in this area. OSHA compliance officers are being added daily to the staff and undergoing a comprehensive training program in Washington before they are sent out to make inspections under the Act.

Between May and November of 1971, the first six months the Act was in effect, OSHA compliance officers conducted 9,800 inspections, cited some 19,600 violations of job safety and health standards, and gave about 5,600 citations to employers.

Between June and October of 1971, inspections more than doubled, from 1,135 to 2,800, and as more compliance officers came on duty the number of alleged violations increased considerably, according to the statistics issued by the Department of Labor.

Like many of you, Snap-on Tools Corporation has historically been a little proud of its housekeeping, its safety, and its general attention to good principles of health and safety of employee health and welfare. After all, we are headquartered in Wisconsin, a state which has pioneered in these matters. Nevertheless, when we went through the new Federal Standards and the National Consensus Standards as a part of a dry run on compliance, we encountered some rather surprising things in many areas of our plants. We encountered a complacency that had been engendered by many years of passable safety records, uneventful factory inspections by state inspectors, and acceptable solutions of local problems vis-a-vis shop union safety committees. Had I not been personally involved to a considerable extent during the gestation period of OSHA, I am sure we would have universally felt quite comfortable

about the whole matter of compliance.

To communicate my justifiable uneasiness throughout the organization has involved a whole series of steps with which I shall not bore you. After a considerable period of experience with some very genuine efforts to bring about a change in emphasis and improved attentiveness to some of the details of safety and house-cleaning which assume much greater importance under OSHA than they have ever had before, my colleague in charge of manufacturing and I have come up with a theme which has the merit of complete truth: "The drive for complete and continuing compliance with the standards of OSHA cannot be shared by the President; it must be led by the President." This theme, I believe, must be emphasized by personal attention, by physical visits, by plant walkthroughs, alone and at unexpected times; and by any other activity recommended by ingenuity which demonstrate that this is a serious piece of business, not just another one of those passing fancies in the corner office or a one-time gimmick.

This is a period of our industrial history in which immense and sweeping changes are

coming with a rapidity which tests not only the ability of management in the historically accepted sense of the word but the emotional stability, the intellectual depth, and the physical strength of management. The changes of direction are great; the rapidity of change is immense; the innovations are numerous.

I suggest to you, as I keep suggesting to myself when I am tempted to cut out and run, that this generation of management will be judged by its ability to *manage* change, not to *resist* it. We will be judged by our record of ingenuity in developing new techniques and new answers for the new challenges which have been thrust at business and industry in a changing society.

This kind of conference, this type of interchange of information and its counterpart, recent the management of change in a very effective way, and I am happy to have the opportunity to tell you that this awareness of the need for change and of the demands to manage it adequately is a top priority among the senior executives of our industrial society.

DISTILLERS' ROUNDTABLE

The quarterly meeting of the Distillery Safety Directors was held during the National Safety Congress on November 1, 1972. There were seventeen members and nine guests present. Wilbur L. Graff of Brown-Forman Distillers Corporation, Louisville, Kentucky presided.

Norman Paige of the Distilled Spirits Institute gave a report on legislation during the 92nd Congress. In discussing the next session of Congress, Mr. Paige said that there will likely be changes such as four-year terms for House members and committee elections of chairmen in lieu of present seniority and mandatory retirement.

The Occupational Safety and Health Law was discussed, and it was pointed out that it is important that safety directors be realistic in keeping their managements fully informed.

Wilbur Graff reported on a recent three-alarm fire at one of the distilleries in the Louisville, Kentucky area. The building being used to store whiskey ready for shipment was completely destroyed as well as 5,000 cases of whiskey. The cause of the fire was undetermined.

Several members reported on action being taken in their plants to reduce noise levels. One has ordered acoustical paneling and another has used a spray-on acoustical mate-

rial. The spray-on material resulted in some noise reduction.

Members of the Risk Management Technical Sub-Committee of the Distilled Spirits Institute had been invited to attend the meeting and join in a discussion of OSHA standards. The discussion centered on the need for variances of the standards that are not related to employee safety and how action should be taken to secure variances.

Wilbur Graff reported on the Distillers Division's project of sharing information concerning members' experience of OSHA inspections. Mr. Graff said the project had been completed with good results, with a number of mailings of information. No new project was selected and Mr. Graff offered to handle the same project for another year and distribute any information sent to him.

It was announced to the Group that Robert Kittinger is the new chairman of the Distillers Division of the Food and Beverage Section, National Safety Council. He will make the arrangements for the program and chair the Distillers Division Roundtable next year in Chicago.

The next meeting of the Distillery Safety Directors will be in Louisville, Kentucky in the Spring of 1973.

POULTRY ROUNDTABLE

INSTITUTE SAFETY COMMITTEE

Minutes of November 1, 1972 Meeting.

Chairman Brooks called the meeting to order at 2:00 pm. The Institute's Safety Committee meeting was held in conjunction with the Poultry Processing Round Table of the Food & Beverage Section of the National Safety Council.

The first item on the agenda was a report of the local safety program survey conducted by the Institute's Safety Committee. In its final form it will be transmitted to co-operating companies. It was noted that there is much room for improvement in local compliance programs.

The next item was a report and discussion of the Poultry Industry Advisory Committee on noise abatement. The committee received a report about the Institute-generated luncheon for Assistant Secretary of Labor George C. Guenther. Mr. Guenther was presented the All Industry Advisory Committee's "Affirmative Action Plan." The secretary complemented the industry on meeting its obligations voluntarily.

Chairman Brooks then asked for a report on "Self Inspection Check Lists." Four have been distributed thus far, the remainder will be sent to members as peoplepower permits.

It was suggested that a bulletin be developed which lists all available safety material developed by the Institute. Such a flyer would include "How To Prevent Accidents," the Institute slide presentation, the "Self Inspection Check Lists on Safety," etc.

The committee then discussed its plans for a presentation at Fact Finding 1973. The committee determined it would like to have panelists, with audience participation, discuss: OSHA Compliance Programs, How to handle an Inspection, Noise Study Report (with specific solutions), Medical Department, Pre-Employment Examinations, Slips and Falls, and People and Attitudes.

The committee also recommended OSHA, USDA, and industry leaders be involved. For example, if Secretary Guenther accepts an invitation, then a chairman of the board or president should join him.

The Committee/Round Table then heard a report from Wood Jenkins, USDA on the departments Ad Hoc Committee on Safety. Mr. Jenkins described its composition and objectives.

The meeting adjourned at 4:30 p.m.

EFFECT OF OSHA ON THE LEATHER INDUSTRY

By JOHN D. KENNEDY

Coordinator, Occupational Safety & Health, Genesco, Nashville, Tennessee.

The Occupational Safety and Health Act of 1970 is the toughest piece of legislation business has had to cope with in a decade. The objectives of the Act are very simple and straightforward: to guarantee that every worker be able to work in an environment which is "safe and healthful" and "free from any recognized hazards."

Stated this way, the Act seems relatively easy to comply with; however, when you take a good long look at the actual implications of this Act you will find that business will definitely feel the effect of the law. In some cases, the effect either has been, or will be, quite severe.

Most companies have always had some type of safety program, usually administered by someone with safety as only a part of his total responsibility. The Occupational Safety and Health Act requires by law that companies have not only an effective safety program, but also an effective health program as well. The Act requires a "safe and healthful work place", which has caused many plants and locations to be found substandard according to the standards published in the Federal Register regarding the Occupational Safety and Health Act. This law requires us, as employers, to get our houses in order under the threat of possible citations and dollar fines.

Under the law, employers are required to make self-inspections and set up fairly voluminous record keeping on such matters as employee exposure to toxic materials or other harmful physical agents, as well as keep detailed logs of lost-time accidents. We, as employers, must also implement a program for keeping employees and supervisors informed of safety and health regulations currently in force, and revisions as they occur.

This Act allows for on-site inspection of plants, factories and retail establishments by Labor Department inspectors, without prior

warning and at any reasonable time. In addition to this, employees may request inspection of what they believe are violations, and may accompany inspectors on their tour.

Each company will have a different approach to complying with OSHA. In some companies, compliance will involve one location; in others, it may involve several hundred to several thousand locations, and a completely new approach to Occupational Safety and Health for their employees.

Genesco, The Apparel Company, consists of a great many operating companies, each of which is made up of several locations. In the past, implementation of a safety program has been the responsibility of each individual operating company, with the corporation giving the operating company a basic guideline to use in setting up a safety program.

With passage of the Occupational Safety and Health Act, Genesco has taken a new and more direct approach in order to comply with OSHA. The initial Genesco approach has been implemented in five basic steps:

1. A steering committee for OSHA has been set up, and consists of top management in the corporation. This committee originally decided what steps the corporation would take in order to comply with the Act.

2. A corporate Coordinator - OSHA, was appointed with responsibility to coordinate safety and health compliance efforts for the entire corporation by working with the operating companies.

3. Each operating company president was asked to appoint an OSHA compliance representative for his company. This was accomplished, and there are presently some 88 compliance representatives. This individual's function is to coordinate safety and health programs for all locations within his operating company.

4. The operating company compliance representative was furnished a copy of the

Act and a copy of the Inspection Survey Guide Bulletin 326. He was instructed to use the index to determine which parts of the bulletin applied to his locations, and to then start a self-inspection program. In areas where he found locations not in compliance with the bulletin, he was instructed immediately to instigate programs to correct as many of these areas as possible.

5. When the federal government set up record-keeping requirements, the government instruction booklet and necessary forms were sent to the operating companies for use in all of their locations. When the Federal Register dated Saturday, May 29, 1971, became available, outlining the OSHA standards, each operating company compliance representative was instructed where to obtain copies for all of his locations.

With these basic steps accomplished, early in 1972 the corporate Coordinator - OSHA updated and rewrote a Recommended Safety and Health Program which was sent to all operating companies to use as a guideline for setting up their programs. This program gives a corporate statement on safety and health, and includes material which can be used by any type operation for setting up a good safety and health program.

Continuing information regarding new standards, and changes in any existing standards, is sent from the corporate compliance office to the operating company compliance representatives on a monthly basis. Personal inspections are made of operating company locations by the corporate Coordinator - OSHA, and recommendations for compliance are given to the operating company. A regular report by the operating company to the corporate compliance office is requested in order to evaluate overall progress toward compliance. Follow-up facility inspections will also be used by the corporate coordinator to evaluate progress being made toward OSHA compliance by the operating companies.

Citations

If a federal inspector makes an inspection of an employer's premises, citations will be

MEAT AND LEATHER INDUSTRIES SESSIONS

issued for alleged violations of OSHA standards contained in Title 29 CFR Part 1910, which sets forth safety and health standards promulgated under the Act. Any citation received must be posted for three days at or near each place that the specific alleged violation occurred, or until the violation is abated, whichever is longer.

The employer has 15 working days from the receipt of a citation to contest. If the citation is contested, the employer should contest (a) the citation, (b) the abatement period, and (c) the dollar fine. If all three are not contested, the part not contested will remain a responsibility of the employer.

In addition to the previously mentioned authority for issuance of citations, there is another section of the Act which allows for issuance of citations. This part of the Act is called the General Duty Clause, Section 5 (a) (1). This clause covers a very wide and general area. It applies to every work place, and states that each employer "shall furnish to each of his employees employment and a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees." The General Duty provisions are used in inspections only where there are no specific standards applicable to the particular hazard involved. Citations under this part of the Act are limited to serious, willful, or repeated violations.

All instances of the same violation of a single standard that are disclosed during an inspection of a single establishment will constitute one alleged violation. This applies to both serious violations and other violations.

As an example of this, if a shoe plant has 200 sewing machines in its fitting room, and 100 of these machines are grounded and the other 100 machines are not grounded, the ungrounded machines would be in violation of the Act. This situation would not result in 100 citations, but instead only one citation with a dollar fine, based on how serious the inspector felt the violation was.

When inspections are conducted either at the same time or different times at two separate establishments of the same employer, and instances of the same violation are disclosed during each inspection, the employer

will be cited for two alleged violations and separate citations issued.

Penalties

When a citation is issued due to a violation of the Act, there is a civil penalty proposed. In proposing penalties, there is a distinction made between serious violations and all others. There is no requirement that a penalty be proposed when the violation is not a serious one; however, a penalty must be proposed when the violation is serious in nature. In either case, the maximum penalty which may be proposed for either a non-serious or serious violation is \$1000.00. When there is a willful or repeated violation involved, a penalty of up to \$10,000.00 may be proposed.

Penalties are proposed on the basis of three factors. These are used to determine the "gravity of violations":

1. The probability of likelihood of the injury or disease occurring as a result of the alleged violation.
2. The severity of the injury or disease most likely to result.
3. The extent to which the applicable provision of the Act is violated.

Each one of these gravity factors is assigned a letter rating of "A" through "C", depending on the severity of each factor. The "A" rating is the least severe and the "C" rating is the most severe. An "X" rating is used only when the employer clearly demonstrates a blatant disregard for the violation in question, and can only then be given after consultation with the OSHA Area Director.

The letter ratings previously mentioned have been assigned the following dollar ranges:

- "A" None
- "B" \$100 - \$200
- "C" \$201 - \$500
- "X" \$501 - \$1,000

These dollar figures represent an "unadjusted penalty" based on the gravity of the violation. An unadjusted penalty may be adjusted downward by up to 50 per cent, depending on the employer's "good faith," "size" of business, and "history" of previous violations. These adjustments are made on

the following percentage basis:

- Good Faith - 0 - 20
- Size - 0 - 10
- History - 0 - 20

Good faith is judged on awareness of the Act, and visible indications of the employer's desire to comply with the Act. The percentage of adjustment with reference to size allows 10 per cent for firms employing less than 20 employees. A 5 per cent reduction is allowed for firms employing 20 to 100 employees, and no reduction is allowed for firms employing over 100 employees. The reduction allowed for past history of previous violations is based on the employer's past experience under OSHA; however, there can be special circumstances when past history under other federal or state safety and health statutes may be taken into consideration.

There are certain violations which carry with them standard penalties that are non-adjustable. Standard penalties have been set for violations of the posting and record-keeping section of the Act:

1. Failure to comply with the requirement for posting OSHA notices carries a \$50 fine that cannot be adjusted.
2. Failure to post a citation for an alleged violation at or near the place of violation subjects employers to a non-adjustable penalty of \$500.
3. Failure to post OSHA Form 102 "Summary of Occupational Injuries and Illnesses" calls for a penalty of \$100 that cannot be reduced. Failure to keep the form at all is a separate violation that also carries a fine of \$100.
4. Failure to report any accident which causes a fatality or which results in the hospitalization of five or more employees within 48 hours of its occurrence carries a fine of \$200 which cannot be reduced.
5. Failure to maintain OSHA Forms 100 and 101, or to keep comparable data, carries a penalty of \$100 with no adjustment.

After citations have been issued and penalties assessed, the employer is subject to a follow-up inspection by a federal inspector. If the alleged violation(s) indicated in the citation have been abated, the inspector, after consulting with the Area Director, will mark the file regarding that citation closed. On the

other hand, if violations are found not to have been abated, a notice of failure to abate, and proposed additional penalties, can be issued. Penalties for non-abatement can be very severe.

Self-inspection for Compliance

Since the Occupational Safety and Health Act became law, OSHA officials have stressed the fact that they hope for self-compliance in industry. Compliance with OSHA regulations is a legal requirement, as discussed earlier; however, the question that comes to most employers' minds is how to get in compliance with the law before a federal inspector shows up to inspect the plant. A good approach to self-compliance is the implementation of a safety and health program which includes self-inspection.

The first step which an employer should take is to inaugurate a plant safety and health program. The employer should:

1. Set up a Safety & Health Committee involving both supervisors and employees.
2. Appoint a Plant Safety Coordinator to become familiar with OSHA regulations and to coordinate the Safety and Health Program.
3. Make known to all supervisory personnel their responsibility in regards to safety and compliance with OSHA regulations.
4. Set up a Plant Inspection Committee.

The plant safety and health committee should consist of the plant manager, plant safety coordinator, two department supervisors, and two non-management safety representatives.

Among other responsibilities of this committee, it should review reports of the plant inspection committee, and take prompt action where necessary.

The plant inspection committee should consist of the safety coordinator, maintenance supervisor and, in each department, the department supervisor and one non-management safety representative to assist with the inspection of that department.

Inspections should be made at least monthly for obvious safety and health violations and for direct violations of OSHA safety

and health standards. The results of each plant inspection should be given to the plant safety and health committee for action as soon as possible.

The key to a good self-inspection program is good follow-up by management to correct the violations found by the inspection committee. The follow-up should be spearheaded by the plant safety committee.

Target Health Hazards

Since OSHA came into being, in addition to employee safety, employee health has become very important. On January 4, 1972, a new "Target Health Hazards" program aimed at improving five major factors in work place conditions was announced by OSHA.

Five toxic substances became at that time the focus of an accelerated thrust by OSHA and the National Institute for Occupational Safety and Health. These initial substances were: (1) Asbestos, (2) Cotton Dust, (3) Silica, (4) Lead, and (5) Carbon Monoxide.

Since these five Target Health Hazards were announced by OSHA there has been one added which could directly affect the leather industry. This is heat stress.

Heat will be a major concern to many tanners and leather goods manufacturers. A good number of leather goods plants and tanneries are not air conditioned and afford a hot working environment for employees, particularly during the summer months.

A heat stress criteria package has been submitted to the Labor Department by the National Institute for Occupational Safety and Health. This package sets out heat control practices to insure that any employee's body core temperature does not exceed 100.4° Fahrenheit. This criteria document is not a standard, but triggers Labor Department action to set a standard.

NIOSH defined a hot environmental condition as any combination of air temperature, humidity, radiation and wind speed that exceeds a Wet Bulb Globe Temperature (WBGT) of 79° Fahrenheit.

When exposure of an employee is continuous for one hour or intermittent for a period

of two hours and the time weighted average WBGT exceeds 79° for men and 76° for women, measures would have to be taken to insure that the employee's body care temperature does not exceed 100.4°.

Regular breaks would have to be prescribed for employees to attain water and replacement salt. Appropriate protective clothing and engineering controls would have to be utilized. All employees under 45 years of age assigned to hot jobs would be

required to have a physical exam every two years and all employees over 45 would have a physical yearly.

The ultimate goal of environmental heat control would be to create a climate of work in which true thermal comfort prevails.

It is a certainty that a number of other health standards of various types directly affecting the leather industry will be developed in the future.

OSHA-EFFECT ON LEATHER INDUSTRY

By RALPH APPELL

Employee Services and Safety, Wolverine World Wide, Inc., Rockford, Mich.

We have just reviewed the procedure used under OSHA in issuing citations and the proposed penalties as well as the fixed penalties.

As we get into the standards of the Act, the many interpretations begin to enter into the picture. The state in which you are located, the compliance officer making the inspection, the previous training of the industrial hygienist who may accompany the compliance officer, all make a difference in the outcome of the inspection.

I would like to direct our thinking to the area of citations, and as a group we might participate in sharing the information as to what citations have been issued in the shoe industry, to tanneries, and to other leather products companies.

Let's ask a few questions and note a few answers:

1. How many companies represented at this meeting have had an OSHA inspection?
2. Why was the inspection made? (Scheduled; OSHA visit, catastrophe investigation—five or more employees hospitalized as a result of any single incident in the plant, fatality investigation, complaint).
3. How many companies received citations which resulted in a fine?

The slight presentation has shown us something about self-inspection and has

brought our attention to a number of items that we should be looking for in our own plant. Some of the OSHA citations we have had dangling on our bulletin boards in various locations may also give us a strong sense of direction. Let's take the time right now, to share our experience with OSHA. The citations are like bitter pills to swallow, but the lessons to be learned can be valuable. (Some of the citations were noted from the speaker and the citations were noted that were mentioned by various companies represented at the meeting.)

A few weeks ago, I had the opportunity to attend a Personnel Seminar sponsored by the American Footwear Industries Association. Many of the people who attended that session began to realize that sharing our problems and the solutions to these problems may help all of us to learn.

I hope that after the topics are covered we can realize that sharing the experiences, the programs developed for improved safety in our plant operations, and the sincere effort to comply under the Act as well as to see the enforcement of the far reaching OSHA can help all of us, and "participation" through the National Safety Council can provide meaningful results to all of us.

OSHA AND MEAT PACKING

By DONALD S. MACKENZIE

Dir., Packaginghouse Practices & Research, American Meat Institute, Chicago

We estimate that there have been from 200 to 300 OSHA inspections of meat plants in the last year. As far as we can tell, the citations that packers have received from such inspections follow a pattern somewhat similar to those issued in 18 plant inspection reports received and analyzed by our office early last year.

A study of the citation pattern showed 37 per cent of the citations were given for violations of sub part D, walking and working surfaces; 24 per cent for violation of sub part S, electrical; 8.3 per cent for sub part O, machine and machine guarding; 7.8 per cent for sub part M, compressed gas equipment; and 6.2 per cent for sub part I, personal protective equipment. The balance of the citations, 20 per cent, were given for violations of sections dealing with fire protection, means of egress, medical and first-aid facilities, etc.

The Meat Industry Safety Committee, a consensus group made up of representatives from the meat industry associations, the National Safety Council, machinery manufacturers and others interested in meat industry safety, has acted in two OSHA matters this year. First, the Missouri Beef Packers dressing platform railing matter, and second, a proposed new section on the guarding of circular saws.

In the first matter, the committee proposed that a new standard for platforms used for the dressing of livestock be added to sub part D of the standards to permit operations without railings where adequate carcass barriers are present.

In the second matter, the committee requested that circular saws used by the meat industry for meat cutting purposes be exempted from the proposed new circular saw standard on the basis that those writing the standards had not considered meat saws

when writing the standard. The outcome of both of these matters is still pending.

From time to time we have had questions arise as to just what the role of the Meat Industry Safety Committee is. We hope the following information will help to answer such questions.

In a meeting on September 14, 1972 at the OSHA Office of Standards in Washington, D.C., D.A. Lyon reviewed the objectives of the Meat Industry Safety Committee and indicated that the committee would be available to help OSHA in connection with the meat industry's "target industry" problems. He asked whether or not OSHA would like to see our committee become a standards-making organization recognized by OSHA, and asked what position OSHA was taking with respect to the formal appointment of advisory committees for certain industries.

Representatives of OSHA replied that the Labor Department was hoping not to have to appoint advisory committees except as a last resort, because these involved formal appointments and payments to the committee members.

They said also that section 6A of the Occupational Safety and Health Act will not be used after April 1973. This section provides for automatic recognition of standards promulgated by recognized standards-making bodies. After April 1973 OSHA may promulgate its own standards by following the rule making procedures under 6B. This being the case, they suggested the meat industry operate as it is now organized, proposing standards changes and new standards where necessary. The Meat Industry Safety Committee would have to thoroughly document its proposals in order to be sure the secretary would publish them, and this would give the proposals a better chance of surviving the

rule-making procedures leading to final approval and publication by OSHA.

The question of whether or not it would be desirable to work with a presently recognized standards-making body was raised. We were told that this would be up to us to decide. They saw no reason why we couldn't work through such an organization but indicated it might slow down relief should we be delayed. In any case, they felt that cooperation with the National Safety Council would be helpful.

The OSHA representatives at the meeting were appraised of the general problems faced by packers with respect to various mechanical tools including saws. They suggested that

where we could furnish adequate data that certain standards were producing citations due to apparent misinterpretations of standards, or where the standards are inappropriate to operations for technical reasons, they might be able to arrange relief by administration at least until appropriate standards could be put into effect.

It was stated that variances would be difficult to get and this route would be troublesome for us. We agreed that joint meetings of our technical people would be helpful in improving the application of the standards so as to avoid clogging the hearing and review commission machinery with unnecessary and expensive litigation.

INDUSTRY FEEDBACK ON OSHA

By JOHN W. DUNNING
Director of Government Relations, The National Independent Meat Packers Association, Washington, D.C.

Over the years at industry meetings, in the trade press, and from our insurance companies, we've learned of the importance of an effective employee safety program. We have given lip service to the idea and we listen politely in the meetings, but after a little while boredom sets in and we get very glassy-eyed. Without a doubt there is acceptance of the idea, but the subject has never ranked very high in management's priorities.

Now, two years after the passage of the Occupational Safety and Health Act, there has been a change in these attitudes. The inspections already carried out, some of which resulted in citations and fines for violations, requests for variances and appeals of OSHA rulings, have made everyone aware that OSHA means business and that the matter of employee safety is worth management's attention. What meetings have failed to accomplish in the past by voluntary effort, OSHA will accomplish in the future by the regulatory process.

Of course we're used to dealing with regulatory agencies of the government, and at the moment OSHA may seem somewhat ineffectual, but don't be fooled. The budget for OSHA in the last fiscal year was \$36.5 million. The current fiscal year's allocation is \$64.5 million, and although the budget of the Labor Department was vetoed because it was too high, you can be sure that OSHA's allocation won't be any smaller.

These increased funds will not only provide for more inspections, but there will be tougher inspections. The inspectors now on the job are gaining a real education in your business. They have the sophisticated design modifications of the newer plants that increase efficiency and at the same time provide more effective protection for employee safety. When these inspectors come back to

the older plants they're going to insist on the same degree of employee protection. There is nothing in the law that allows for any suspension of the rules for the smaller plants or the older plants.

We also need to keep in mind that so far OSHA has been involved in the physical protection of the employee. The list of "most cited" violations recently published covered such things as walking-working surfaces, guarding floor and wall openings, electrical grounding, portable power tools (which includes our meat saws), and so on down to respiratory protection. But sooner or later OSHA will get to the "health hazard" targets—*asbestos*, cotton dust, silica, lead and carbon monoxide—is a welcome move to some critics of OSHA who believe these and other health hazards responsible for occupational diseases are of more importance than the physical hazards. We in the meat packing industry cannot be complacent.

Saying there is no one in this industry now who does not subscribe to the principle of employee safety and health does not mean that we endorse everything about OSHA. We disagree, for instance, with the promulgation of horizontal standards for all industry. Our plants are designed to comply with the requirements of the Department of Agriculture, and the design must be approved by them. The same applies to the equipment we use. A 42-inch high railing in our beef kills interferes with the performance of some jobs and conflicts with USDA requirements for sanitation. Our meat saws require a separate standards because the job requirements do not allow the use of carpenter type portable saws that are described in the horizontal standards. The administrators of OSHA should be realistic in this area. They adopted horizontal standards because that's all they

could accomplish in the time allowed. If they prepared standards for every industry they'd still be at it. We know it, and they know it. When we protest the standard, they say "That's the law and you must go through this procedure to appeal it and then write your own standard for us to consider." In the meantime, the industry is subject to fines for anything the inspector decides doesn't conform to their horizontal standards. This attitude will not gain the type of voluntary compliance that the top administrators of OSHA Administration know is necessary. What it does do is discourage those unable to comply or to determine any means of compliance with the Act. And from discouragement to resistance is a small step.

The Meat Industry Safety Committee is now involved in such an appeal of a standard, and will undertake the writing of a new standard that fits our conditions. This committee needs the cooperation of everyone in the industry.

Another aspect of regulatory control that concerns us is the ability of the small operator to cope with the increasing number of regulatory agencies including OSHA. By small, I mean those employing less than 500 people, and especially those employing less than 100. If they belong to an industry association they will be informed, but that won't eliminate the need for the administrative overhead to follow the rules and handle the paperwork,

and it won't pay the costs. When the administrative costs become too great in such a low profit industry as meat packing, many of the smaller operators close down. An example of this may be going on right now in California. A recent survey of some 500 meat plants in that state taken by the Pacific Coast Meat Jobbers Association showed that about 40 per cent of the firms responding said they would seriously consider going out of business if there was a federal takeover of meat inspection in California. As the financial burdens of compliance with meat inspection, OSHA, and water pollution control become greater to small businesses, the credit risks of their suppliers will become strained and the whole matter will become one of vital concern to even the largest firms in the industry, as well as to the banks and other lending agencies.

The threat is real and relief is not to be found in circumventing the Wholesome Meat Act or The Occupational Safety and Health Act or the Water Pollution Control Act. The burden is on the regulatory agencies of government to find administrative solutions that allow *all* business—small as well as large—to meet the requirements of these regulations.

It's industry's job to know what is required and where to get the information, but it is government's job to tell us clearly what is required and where it is available.

OSHA AND THE MEAT INDUSTRY

By RAYMOND F. THILL
Secretary, National Association of Meat Purveyors
Chicago, Ill.

Long before the days of OSHA, the National Association of Meat Purveyors, established a Sanitation and Safety Committee to enlighten the membership regarding the many problems involved in the proper handling, storage and shipment of meat and meat products.

This involved the programming of professional people at the NAMP meetings, as well as technical personnel who could impart practical knowledge regarding the proper operation of coolers, freezers, cooking equipment and cleaning procedures.

For example, in 1969, our convention program featured a professional biochemist who spoke on ways and means of preventing contamination of food products. Other program topics ranged from simple sanitation practices to sophisticated analytical testing techniques to determine the presence of bacteria. Films depicting actual test procedures were shown.

We have also constantly emphasized the subject of safety. A year before OSHA became effective, we increased communications

with the membership on this subject in our weekly newsletters, mentioning specific areas for improvement in plants and offices. Our educational program has "paid off" because only one member was cited for a violation, and it was of a minor nature.

We plan to sponsor a special sanitation and safety film designed especially to emphasize the problems inherent in a meat purveying plant. The film will demonstrate how those problems may be solved. This film should be available early next year.

We believe that our concentrated program and weekly communication with the membership has resulted in a dissemination of useful knowledge which can be utilized by the members in their day-to-day work. Only last March, we featured an OSHA technical speaker on the NAMP Management Conference program.

We shall continue to alert our members so that they may be aware of their responsibilities to their employees and to their customers in both fields of safety and sanitation.

HOW WE ORGANIZED A SAFETY PROGRAM

By GARY P. FISHER
Corporate Safety Director, Cudahy Company, Phoenix, Arizona

Since OSHA has come on the scene and made meat packing a "target industry," there has been a lot of interest in forming safety programs within our industry. The National Safety Council and the American Meat Institute have received many calls concerning the subject of how to set up a safety program.

About three years ago, the company I work for decided that they were having too many accidents and the cost of these accidents should be curtailed. As you probably know, the cost of Workmen's Compensation spirals upward about 8 percent a year, and if you aren't doing much to control the hazards on the job, these costs are going to climb at an astronomical rate. The president of our company decided that it was about time to do something and formed a committee consisting of the corporate personnel director; industrial engineer; labor relations director; insurance manager; and a few others. They met for several months and came to one conclusion—to hire a safety director and set up a formal safety program for the company. I was the one selected for this job. I'm also pleased to say that this was sometime prior to OSHA. I was hired by Cudahy Company on November 1, 1969, and OSHA, of course, did not come into being until December 1970.

Since this presentation is directed to the guy who wants to set up a program, I want to set the stage by using Heinrich's dominos. Heinrich is considered by some to be the "Father of Safety" and wrote his book on accident prevention in 1931. We have learned a lot about safety since 1931, but I think that, generally speaking, the sequence of an accident as Heinrich described it has not changed and probably won't ever change. But, before I get into this demonstration using Heinrich's Dominos, I'd like to ask, "What is the definition of safety?" We could say that "safety is the prevention of injuries"

or the "prevention of accidents," but the definition that I have learned and adopted from Homer K. Lambie of Kaiser Aluminum is that "safety is the control of hazards." Since OSHA has come into being, I have added another word to that definition—"recognized." "Safety is the control of recognized hazards." Mr. Lambie used to point out that a good safety program should be designed to teach your employees to recognize, understand and control the hazards of their job. Generally speaking, hazards can be grouped into two categories: unsafe acts and unsafe conditions. Of course, under these two categories are many, many hazards.

Now, for our dominos. The first domino is social environment and ancestry. Everyone of us in this world is basically a product of these two things. Our ancestry determines the genes that we're made of, such as whether we have a strong or weak back or have brown or blue eyes; are tall or short; whether we are below average in intelligence or just average, or perhaps a genius. Our environment also has quite an influence in our makeup. If you were born on the other side of the tracks, such as I was, in a steel town where the store was owned and operated by the company and the homes were rented from the company, it was a pretty rough environment. In that environment we learned a lot of unsafe things. We thought it was brave to take a chance, to show off. It was fun to hook a ride on the back of a car on a sled in the wintertime or to dive off high places into the river or to camp out in the woods without supervision and handle knives and hatchets and such, without any training or to play football without wearing any equipment, except maybe an old, beat-up football helmet without face piece. And, remember the old rubber guns you used to make when you were a kid? You'd see how many knots you could put into the rubber so that when it hit, it hurt. You'd really see the

stars when you got hit in the eye.

Well, when you get this kind of a person out of high school, and put him in an industrial environment with different types of hazards, there is no way you can logically expect him to know how to control these hazards. No way. That's just like giving a child a gun and expecting him to know the safe way of handling it without any training.

The second domino is the faults of people. Such faults include poor attitude, recklessness, the belief that wearing protective equipment is sufficient and resentment of authority. This domino leads to the third and middle domino, the unsafe act or the unsafe condition, the hazard. Hazards are actions such as lifting improperly; running when you should be walking; grinding without safety glasses; unguarded holes; improperly stacking material, etc. Hazards lead to the next domino, the accident. The grinding wheel shatters or a person slips and falls. The accident domino then leads to our last and fifth domino, the injury. Invariably, this is the sequence of practically all accidents, although some of them do not end in an injury. However, now we're talking about the injury-producing accident.

If you look backwards at this sequence, I think you can see that you cannot have an injury unless you have an accident; you cannot have an accident unless you have hazards (unsafe acts or unsafe conditions) which are in turn caused by faults of people. Therefore, when you're setting up your safety program, you should aim your efforts at the middle domino, the control of hazards. And, if you remember that "Safety is the control of recognized hazards, unsafe acts or unsafe conditions," your program should be more effective than one that is unguided. If you are forming a safety program for the first time just to comply with OSHA, you are missing the boat. You could comply with OSHA and still not have a complete safety program. OSHA is primarily concerned with the unsafe conditions of your plant, and not so much with the unsafe acts of your people. Even though unsafe conditions are usually the result of the acts of people, there is no getting around the fact that your safety program must comply with OSHA rules and

regulations.

Another thing to consider in the establishment of a safety program is the historical three E's of safety, engineering, education and enforcement. You may want to throw a fourth E in there, enthusiasm. This is certainly not new to the safety pros, but for anyone beginning to set up a program: it is important to keep these three E's in mind.

Engineering comes first, even though some say 85 percent of all accidents are caused by unsafe acts. We place engineering first because you should do all you can to engineer your plant as safe as possible. We know it's impossible to design our plants like a pencil sharpener that has all gears completely enclosed so that when you turn the crank, it's almost impossible to come in to contact with those gears. There is no reason why we should not try to engineer our plants to control as many hazards as we can. For the most part, compliance with good engineering standards in the past was voluntary; now, of course, with OSHA it's mandatory.

The second E in our three E's is education. Where we cannot engineer the hazard out, we have to control it through education. We have to teach our employees how to work with these hazards so that they are not hurt by them. Molten metal, for example, is a hazard in itself. You cannot eliminate the heat, but you can control it by keeping it in a well-designed crucible, maintaining the level of the molten metal at a given height from the top of the crucible to control splashing and by having a good p.m. system on your overhead cables. A sharp knife in a meat packing plant is another hazard. Because for the most part you cannot engineer the sharp edge of the knife out. We can enclose some of our cutting machinery, such as a bacon slicer, but the hand knife is always a hazard. Therefore, we have to teach our employees how to use that knife so that he is not injured by the sharp edge. The employee should wear personal protective equipment, such as mesh gloves and arm guards, and use a knife with a good grip and guard on it. He has to learn how to sharpen his knife. Once you have established good engineering and a good training program, then you move to the third E, enforcement. Rules and regulations

are no good unless they are enforced. OSHA and your union's can help in this area; however, the primary responsibility for enforcing the safety rules lies with management. Now, with the stage set, we are ready to start our safety program.

At the very beginning, you have to involve corporate level people so that people will pay attention to the program. I sometimes think that with top management's endorsement your record will improve in spite of a program. Start with a corporate safety policy signed by the highest executive in your company. This statement of policy should be disseminated throughout your company to let your management people know that the president of the company backs the program. We have put this safety policy on a plaque, and a copy of it is hung in each manager's office. We also have this policy in printed form in our safety manuals, and it is used in whatever way the plant wants to use it. At the same time that you establish a company safety policy, publish a company safety manual. This should be an important phase of your program. The manual should spell out all procedures expected to be followed by the management.

Now that you have set up the procedures, you should make inspections of various locations in your plant. Get an idea of what kinds of hazards you're involved with, the unsafe acts and the unsafe conditions. It doesn't matter whether your plant is involved in meat packing, making aluminum or bricks, mining salt or manufacturing leather goods. Generally speaking, you will find some of the same unsafe acts and conditions in any of these industries.

If your company does not now have a safety program, then you probably do not have adequate investigations of accidents that you could review before making a plant inspection. However, you could check with your insurance department or carrier to review your Workmen's Compensation claim records. From these sources, you could get an idea of what kinds of hazards are causing injuries to your employees. As you make your inspections, check to see if these hazards still exist. You can also talk to the supervisors or foremen during your inspections and ask

them what things they think are causing the injuries in their departments. I ask a lot of questions when I make my plant inspections, not only because I want to find out what kinds of hazards the employees are exposed to, but also to learn more about the meat packing industry itself.

A key point in these inspections is that a lot of the existing unsafe conditions were caused by people. The question is, why did these people, allow these uncontrolled hazards to exist? Why was the equipment abused? Why was the ground plug cut off from the extension cord? Why aren't the employees wearing the proper equipment? And why isn't the foreman doing anything about it?

The establishment of regular inspections of facilities by plant personnel is important and a must for a good housekeeping program. Safety is everyone's responsibility, but usually one individual has to be designated as safety coordinator at each of your facilities. Someone has to be responsible to the manager for coordinating the safety program. In very small establishments, the plant manager is sometimes designated the safety coordinator. In most of our locations, the safety coordinator is the personnel manager. However, sometimes he is the quality control manager, or the industrial engineer. Whenever you visit the locations and make inspections, this individual should accompany you on this inspection. The plant manager and the master mechanic should accompany you on this tour. If the manager does not accompany you on your inspection, be sure to sit down with him after you've made your inspection and let him know what you found in the plant so that when he receives the written report, he is not surprised by it.

There are two ways of looking at these reports. You can include everything you can possibly find wrong in the plant in your report—and perhaps be criticized for nit-picking. Or, you could make note of everything, but only report the salient points to management, picking out the most important things that have to be controlled and thus making your report more concise.

It goes without saying that in setting up your safety program you have to become thoroughly knowledgeable of the Occupa-

Safety and Health Act and gain a **working knowledge** of all the rules, regulations and standards that this law refers to. Therefore, you will need to establish a reference library. It should include copies of the standards of the American National Standards Institute and the National Fire Protection Association. These are the two primary standard-setting bodies that OSHA uses. You also should join the National Safety Council and take advantage of their reference material. You will need reference material on industrial hygiene and should have a copy of the National Safety Council's Meat Industry Safety Guidelines. A lot of material is available through your insurance carrier.

Next, set up a good accident investigation procedure. And remember, there is a difference between an insurance report and an investigation. Insurance reports are often filled out by a secretary or a nurse and do not usually dig into causes. On the other hand, a good accident investigation digs into how the accident happened. You should be more concerned with "how" it happened than "why" it happened, because if the "how" can be prevented, there is no need for concern about the "why." The investigation should be made by the accident victim's supervisor, the first-line foreman. Ninety-nine per cent of accidents occur at the first-line foreman or level. The foreman is the guy on the scene; he is the one who observes the daily working of the employees. He is the one who should certainly become sensitive to how accidents occur and should be the guy to control the hazards.

The only good thing about an accident is that it might teach us how to prevent a recurrence. If we do not learn that lesson, we are wasting a lot of time. Therefore, the foreman need training in accident investigation techniques. After you have developed a good accident investigation program, you should set up a statistical reporting procedure, whereby all locations report their accident experience to a central source. The recording of the accidents, of course, is required by OSHA. Therefore, it should not be too difficult for the units to translate this information into a form and send it to you for a monthly company report. Plus, a report of this nature tends

to lend a little bit of competitiveness to the safety program. And, of course, it's important to know how you're doing in comparison with last year. This helps to set objectives for improvement for the following year.

Safety meetings should be an important part of your program, even though it is sometimes difficult to have all employees meet once a month. Since our employees are like those in an assembly plant, you cannot have a meeting with them a few here and a few there. So, most of the safety meetings, by necessity, have to be a personal contact type between the supervisor and the employee on the job. However, management personnel should be able to meet at least monthly or semi-monthly to discuss hazard control ideas. This should be the manager's safety meeting, not the safety director's or the safety coordinator's. Safety has to come from the Manager. The safety coordinator should be the catalyst of the program, but the manager has to put the emphasis on the need for safety before supervisors will pay attention to the program. The appointment of a safety coordinator and the budgeting of the money to carry out the program is not enough. Management must be persuaded to exercise its leadership, and only the plant manager can persuade the first-line foreman to do this.

So far, we have talked about establishing a company safety policy, appointing someone responsible for safety, making plant inspections, setting up a good accident investigation program and reporting statistics. This is just the beginning. We can also establish a company safety manual which incorporates the policies and procedures for the guidance of the plants. You can set up training programs; a job safety analysis program that analyzes all the jobs in the plants and points out the hazards and how to overcome them; a safety recommendation, or "suggestion," program; and compulsory personal protective equipment program.

Involve all of your staff when setting up your program. Purchasing directors can be a big help in purchasing the proper safety equipment at the best price. The corporate engineer should certainly be involved and should have a good working knowledge of OSHA standards. The industrial engineers

who study the jobs can also study the unsafe acts committed by people. You could make them safety observers. The involvement of your master mechanics in the program is a must. The traffic manager should be aware of the Department of Transportation safety rules and regulations. The data processing manager could help feed your accident statistics into computers, and the internal auditing staff can help uncover and highlight violations. There is a lot of help available; you just have to seek it.

To sum up, here are the things you should do to start a safety program:

1. Appoint a safety director.
2. Establish a company safety policy and safety manual.
3. Designate an individual at each location

to coordinate the program.

4. Establish a minimum of a monthly housekeeping and hazard detection inspection.

5. Establish a minimum of a monthly management safety meeting or make it a definite part of an existing meeting. Review progress and set objectives. Deal with problems and zero in on answers to them.

6. Establish a good accident investigation and statistical reporting program.

7. Involve all members of management and all members of the work force in the program.

There are many other things you can do, but I believe if you get these things going, you will be off to a good start.

HOW I ORGANIZED A SAFETY PROGRAM

By JOE WATSON

Safety Director, Frosty Morn Meats, Inc., Kingston, N. C.

There are probably several different outlooks regarding setting up a good, stable safety program in a small plant. I would like to relate how we initiated our program at Frosty Morn Meats; what we set out to accomplish; our results, and what we will try to do in the future.

During the summer of 1967, our fairly young company of about 15 years found itself in trouble, safety-wise. I think probably this trouble was due to several factors, or it may have been that all of a sudden the seriousness of it all became boldly evident.

After winding up the month of August, 1967, with seven lost-time accidents and twenty-five medical cases, it was decided that something had to be done very quickly. First of all, someone had to head up our "B.O." Safety Program (B.O. meaning before OSHA). Being a small plant meant that probably someone would have to handle the duties of a safety director along with, possibly, one or more other jobs.

Management approached me on working out a basic, workable safety program and I agreed to give it a try. They agreed to give me their full support. Regardless of what phase of your plant you are involved in, no plan will work without your top management's support. This is one of the main reasons that our program has enjoyed the success that it has. After receiving management's support and accepting their assignment of responsibility, I really had my work cut out for me. I began to try to work up a plan of operation.

September 6, 1967, was to be our target date for a formal announcement to our employees relative to our program, and we had very little time to waste. A safety committee was selected which consisted of our supervisors, management and employee representatives. A meeting was held with the committee, plans were made, safety rules list-

ed, a slogan selected for our first year, and plans initiated to convey our enthusiasm to our fellow employees. Various employee meetings were held throughout the plant to tell them what we were going to do and to solicit each individual's help in carrying out a successful program.

The next few weeks were geared to the familiar phrase, "first things first." It was determined that we should take a look at our previous accident reports and find out just what type of accidents we were having. It was immediately evident that cutting accidents and back injuries were to be our prime targets. Then the slow, tedious task of finding out the causes of these particular accidents, and ways to prevent them, began. With our safety committee's help, we began to make progress.

Safety training for our supervisors was our next order of business, and this was accomplished primarily through a Step Safety Course offered by the Du Pont Company. With this segment of safety training accomplished, the supervisors began to train their employees, both old and new alike, on what they were expected to do safety-wise, and how to do it.

An accident investigation program and periodic plant inspections were started. These two items were, I think, the turning point in our accident prevention program. Accident investigations were handled jointly by the supervisor involved and me. Plant inspections were made monthly, without advance notice, by the maintenance supervisor, employee representatives and me. Discrepancies were listed by department and copies were made for the plant manager, maintenance supervisor, and the department supervisor involved. If the discrepancy was a maintenance item, the maintenance supervisor was responsible, and if it was a safety item, the supervisor was responsible for the

correction.

Our final plan of action was to create, in everyone, a desire for our plant to have a good housekeeping program. This desire, in part, was created by typing on three-by-five index cards the phrase, "If found, take this to your supervisor for a small reward for your part in helping to keep our plant clean." These cards were distributed throughout the plant while the employees were out for lunch. They were placed under discarded boxes, under hoses lying on the floor, in corners where trash had accumulated, and any place where our housekeeping was bad. About 4:00 P.M. that afternoon a maintenance man accidentally kicked an empty box and spied the card. Having read it, he took it to his supervisor, where he was presented with a crisp dollar bill. Needless to say, in fifteen minutes we had the cleanest plant anywhere, and this good beginning is still being carried over today in our operations.

Reviewing briefly some important points:

1. *Top management support:* Possibly the most important step.
2. *Assignment of responsibility:* Select someone who is interested in his company and the well-being of his fellow employees.
3. *Plan of Operation:* Decide on a workable plan and don't delay.

4. *Safety committee:* Very vital to your safety program. Involve plant employees.

5. *First things first:* Decide what has top priority.

6. *Safety training:* Train your supervisors and your old and new employees.

7. *Accident investigation:* Involve your supervisor. A good way to prevent future accidents.

8. *Plant inspections:* Periodic checks for safety violations and poor housekeeping.

9. *Good housekeeping:* Another very good way to prevent accidents.

I feel that this is a good, basic, workable plan, as our frequency rate in 1967 was 66.6 per cent and by 1971 it was down to 3.23 per cent. We have been pleased with our progress; however, we know that we must put forth an even greater effort in the future, in our never-ending avenues of accident prevention.

Our company has won several national and state safety awards. We think this speaks well for our program. Everyone likes to win awards, and appreciates a pat on the back for a job well done.

The reward to me is the satisfaction of knowing that we have played a part in the prevention of human suffering by our fellow workers.

THE IMPACT OF OSHA

By MARSHALL E. PETERSEN

Mgr., Loss Prevention Services, Rolf Jensen & Associates, Inc., Northfield, Ill.

Personal injuries and illnesses arising from the employee's work environment are costing U.S. industry billions of dollars annually, both in direct and hidden costs—for, hidden behind these losses are loss of production, wage losses, medical expenses and compensation payments. The Federal Government's concern over the effect on the GNP in the annual cost of loss of production due to injury, the ever-increasing number of injuries in industry, and insufficient capability of the states to enforce safety and health standards, led to the passage of OSHA.

Under OSHA every employer is required to furnish "each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or physical harm to his employee." He must also comply with standards promulgated under OSHA. Where safety has been a voluntary effort by management in the past, today it has become a legal requirement.

Having geared up to reduced injury rates in industry by use of compliance inspections, the Department of Labor intends, through OSHA, to encourage employers and employees to institute new programs and to perfect existing ones that provide safe and healthful work environments.

The natural tendency for many managers will be to do only what is absolutely necessary to comply with OSHA requirements and hope that they will never be inspected. In such cases, management will have missed the intent of the OSHA Act and can expect to be faced with the continual problem of compliance and the economic losses associated with accidents.

Probably the most disturbing feature of the attenuation that management has given OSHA is the false assumption that compliance with OSHA requirements will produce a successful program of loss prevention. This

is not to suggest that OSHA does not and cannot serve a useful purpose. The effective control of the physical environment in a plant is and should be an essential part of every safety program. However, by itself, the long-range objectives of accident prevention will not be achieved. In other words, by requiring every employer to eliminate and prevent physical hazards (unsafe conditions), OSHA expects that management will initiate and maintain a comprehensive accident prevention program.

It is important to note that OSHA does not require or make any provisions for management to establish and maintain an accident prevention program, promote off-the-job safety, educate or train employees in job safety, or establish a program to minimize or control unsafe acts.

All of these items are essential to a program of total accident prevention. When management concentrates its safety efforts on the control of physical hazards, accidents and injuries will continue to occur and instances of noncompliance will be a constant problem. Fundamentally, safety is good business. Through a program of total accident prevention, management can expect increased profits. The direct and indirect losses which result from accidents must be paid out of profits.

Where management purchases insurance and expects that losses will be covered, in-depth study of a single accident will generally reveal a considerable amount of "hidden costs" which are not covered. A few small mistakes, a little waste and inefficiency, or several injuries all add up and cost your company money every year. The same basic cause of an hour of downtime can also bring about a work stoppage for a month or more. The same thing that loses an order from a regular customer can cause the loss of that customer forever. And the same mistake that leads to a cut finger can cause a man to lose his hand.

The ultimate objective of management is to operate a profitable business. When accidents occur, profits are reduced. Personnel with a wide variation of background and personal traits are employed to do the work.

There are five factors in accident sequence: (1) Employee background (education, training, experience), (2) Personal factors (mental attitude or physical condition), (3) Unsafe conditions and/or unsafe acts, (4) Accident, and (5) Injury, property damage and/or production losses.

The first two factors, employee background and personal factors, are the initial contributing causes in the accident sequence. Their significance can be greatly reduced through job placement (fitting the man to the job), job instruction training, and effective supervision.

The immediate cause of virtually all accidents is unsafe acts and unsafe conditions. The focal point of attention created by OSHA is on unsafe conditions. For years safety experts have estimated that the basic contributing factor in 85 per cent of all disabling injuries is unsafe acts. Since there is seldom a clear-cut single cause, engineering for safety should have as its objective both the elimination of unsafe conditions and the reduction of unsafe acts.

All work accidents can be expected to result in delays in production and in spoilage or waste. Some accidents cause minor injuries and, in a small percentage of cases, the injury is disabling. It is the direct and indirect costs that are associated with accidents which must be paid out of a firm's profits.

The popular impetus that is causing many managers to look hard at safety is the pressure of compliance required under OSHA. But the truly cost-conscious manager who has set-up a total accident prevention program, using principles of risk management and loss control, will have already achieved compliance with the bulk of OSHA because it is usually the most economic path. Important to such a program is a basic knowledge of how, most effectively, to use your in-house talent and to know when your people are technically or physically overwhelmed so they can be properly supported by outside aid. Only when you have evaluated your ca-

pabilities and found them wanting should you begin to look elsewhere. While this is basic to all good management planning, it is often ignored where safety or fire protection are concerned. Recognize that, before you evaluate your capabilities, you must wholly assign the safety responsibility at management, supervisory, and technical levels.

When the need for help arises, there are several forms of outside aid available. Listed in order of rank, according to the increasing tendency to use outside people for this help, these are: (1) Literature sources, (2) Education, (3) Supporting surveys and inspection, (4) Ongoing program evaluation, (5) Technical specialists, (6) Program planning and (7) Facility planning.

First

There are many sources of literature, standards, and support material for employee education. This material is easy to acquire, usually inexpensive, and some times free. Its value is gradual improvement of technical competency, better problem solving, and better management. You must start some minimal internal knowledge in order to take maximum advantage of available information. The National Safety Council is the world's largest producer of literature and technical data on safety. The National Fire Protection Association is noted for the technical data and codes that they produce in the field of fire protection. And of course, in the area of standards we have the American National Standards Institute. In addition to these three principle sources there are many other companies or organizations that distribute literature and technical information on accident prevention.

Second

Formal education is available in a number of forms. There are short courses, seminars and meetings held by many safety-related organizations such as the training courses offered by the National Safety Council's Safety Training Institute. There are a number of formal college courses ranging from non-credit courses to degree programs. Illinois Institute of Technology, for example, is re-in-

auguring college credit courses in industrial safety which may be applied toward a degree in Fire Protection and Safety Engineering.

The remaining items on the list all involve procurement of actual outside services in some form. Some are free, some are expensive, and the trick is to evaluate them on a cost-benefit basis.

Let's look at a typical problem and how you might go about finding help in evaluating it. For the purposes of this discussion we are going to assume that your in-house accident prevention manual and standards have already been searched and that you either don't have the internal expertise or that you need more man power to get this particular problem solved.

Your first check is with business associates to see if they have experienced a similar problem and solved it. This is usually free service. Your risk is that your friend actually solved the problem properly and that his conditions and yours are actually the same.

Next and usually also free is your insurance company engineering department or your insurance broker. The degree of help offered may be in proportion to the premium dollar returned by you to the insurance company. Most insurance companies will do some survey work. Generally this is directed to their analysis of you as an insurable risk rather than to your needs for loss prevention. Recognize that the insurance company has a liability problem in that, if they inspect you and make recommendations, they may be held responsible for negligent errors and omissions.

The insurance broker is in a slightly different position because he is supposed to be your representative. The hitch here is that his interest is better served when he sells you more insurance because he is paid on a percentage of the premium dollar. This means that the insurance broker may not be too anxious to spend a great deal of effort trying to accomplish improvements in your property that will reduce your insurance cost because he is working to produce less income for himself.

Another problem is that many of the field inspectors used by insurance companies, insurance associations and insurance brokers

have only technician training and lack the depth to solve many technical problems. The few really good people are usually overwhelmed with work and kept back at the main office to review the work of the people who actually get to your plant. You usually only get very good technical help from insurance companies when you are a very big company with very big premiums. Recognize also that there are a few insurance brokers who will provide you with adequate technical help for the payment of the consulting fees. This puts them in the same category as an outside consultant, but remember, they still may have a conflict of interest because they also make their money from brokerage commissions.

Insurance companies are an excellent source of materials training aids and literature which usually can be obtained free or for a nominal cost. Don't forget that, from a survivability and cost standpoint, the insurance company is more interested in reducing their overall loss record than your individual loss record. So long as they can maintain an overall satisfactory loss ratio within a broad group of risks of similar character, they make money, and that is their principal business.

State and Federal agencies and similar outside inspectors can be taken as a group. They have great value in providing you with literature, codes, standards and educational materials. More often this is paid for by you. The cost is usually nominal. Some of these organizations will respond to telephone requests, but if you want an accurate or in-depth answer, they will want to send out an inspector. This exposes you to the risk of that inspector finding a code violation. This kind of assistance is generally avoided.

Manufacturers of products, their sales engineering staff and manufacturer's representatives will also provide you with information and problem solutions. The danger here is that they are usually trying to sell you their product whether or not its application is totally correct. If you use this kind of information, you should get two or three opinions from people who have competing products. Besides, you have a better chance of getting confused this way. Another danger is that most sales-oriented people have a habit of

bending facts and it is difficult if not impossible to reach the very qualified engineering knowledge that may be vested in the home office.

Next is your trade association. The value here is somewhat variable. Most trade associations are only beginning to initiate effort in safety and loss-prevention areas. A few, such as AMI and NIMPA have safety committees comprised of safety specialists from some of their principal member companies. While safety services of an association are sometimes available in the form of literature, technical back-up is usually related to the participation and financial contributions of their member companies. In my judgement, it would be advantageous for most companies to strengthen their trade association groups in order to be in a better position to voice your opinions on safety problems and to obtain the necessary expertise to work on specific safety problems of the industry. Your needs as an industry "come through" stronger than your needs as individual companies. It is important to recognize that future changes in OSHA are going to occur through public hearings, and lobbying by trade organizations may have a very profound effect.

Next, there are a number of professional societies and organizations which may provide you with literature or sometimes set up special committees or groups for problem-solving where the problem has a broad industry base. Examples of these are the American Society of Safety Engineers and the Society of Fire Protection Engineers.

The next grouping refers to the services available through safety organizations such as the National Safety Council, local safety councils and the National Fire Protection Association. For the most part the local safety councils are an extension of the National Safety Council. The services they offer vary widely from the distribution of general safety literature and posters to extensive libraries, safety literature and visual aids, regularly-held safety meetings, safety seminars, and technical assistance to their members.

The National Safety Council is the world's largest safety center. The safety library they maintain and the safety literature and technical publications they publish cover all as-

ppects in the field of accident prevention. In the area of education the Council offers a wide range of courses through their Safety Training Institute. Throughout most of the year they offer a number of short, five-day courses covering subjects such as fundamentals of occupational safety, safety training methods, safety management techniques, fundamentals of industrial hygiene, and basics of industrial noise.

The Council also offers a number of other educational services such as the Home Study Course, OSHA seminars, supervisory training courses, safety training slides, and the Key Man series. Of specific importance and benefit are the training courses offered by some of the industrial sections. A number of years ago the Meat Packing Section offered a 12-hour Supervisory Training Course which was quite successful. It is my understanding that plans are underway to once again offer this course and I strongly recommend that full support be given this endeavor.

Services available from the National Fire Protection Association are quite similar to those offered by the National Safety Council. The principal difference is in the area of technical activities. The Council produces technical data sheets and actively participates in the standard-making process by serving as members on the committees sponsored by standard-making organizations. On the other hand, most of the activities of the NFPA are concentrated in the technical area, with committee work and publication of the National Fire Codes. Many of these codes have been adopted by OSHA as standards which they enforce. For the most part safety organizations provide technical assistance through the materials they publish and distribute and by telephone and letter communication with people seeking assistance. Frequently they maintain lists of qualified consultants and when a problem cannot be solved in a telephone or letter inquiry, they will refer you to these people.

The last group is the outside consultant. I have left him until last primarily because he is usually the one who costs. If you are going to spend money for an outside consultant, you need to have some yardstick for evaluat-

ing what he can do for you and whether he is worth what you are spending. Consultants offer a wide array of services related to both safety and fire protection. Some may be potential literature and training sources. More often their value is in solving a specific problem, in good management planning, or in providing additional manpower. It is always possible to find a consultant for any problem and a problem for any consultant.

If and when you hire a consultant, start with a meeting to clearly define the problem and his understanding of it, as well as his capability to solve it. Don't hire a high priced specialist to solve a routine survey problem because you will both end up unhappy. You will be asking him to do work which is below his level of technical competence and he has to charge based on that competence because that is the price he pays to his employees.

Start with a contract that clearly defines what work will be done and what the anticipated results are to be, and get a firm price. Recognize that some problems can't be precisely defined and that the consultant, as a business man, sets his price based on how much risk he is taking. Ask your consultant to give you his analysis of the benefits that might accrue in using him. Some of these may be intangible, such as preventing a citation under OSHA or obtaining an insurance market, but more often they are also tangible and will have a direct effect on your profits by reducing production costs, cost of injuries, and the cost of insurance.

One advantage in the use of consultants is that they are easy to hire and fire. As consequence, are not a continuing factor in your overhead. They should be used only where you don't have the capability or the staff to solve a problem. Another advantage is their objectivity. They are not subject to special

interest pressures by any of your employees. They will "tell it" as they see it.

Outside consultants are especially attractive to small firms that rarely have enough work in specialty areas to assign a full-time employee to the task, or that justify the cost of employing a full time specialist. Consultants generally provide more technical depth and timeliness in a survey and in the design phase of a safety program at far less cost.

In large companies the consultant may bring you the objectivity that is difficult to get within your own capability. He may also be used effectively to support your staff by objective appraisal of their efforts or to provide you with deep technical strength when you run into a particular problem. Remember, the consultant is going to avail himself of all of the information sources you use, so don't go to him if those sources have not been exhausted. At the same time, recognize that it is his broader experience or special knowledge that he applies to the interpretation and application of these information sources. He has probably solved similar problems for other people. Finally, beware of the consultant who is eager to give you the solution he thinks you want or who pushes for a solution totally incompatible with your functional needs.

To summarize, it should be obvious that there is no single blueprint that can be used to provide OSHA compliance or better yet, a program of *total accident prevention*. Each plant's needs and problems differ even though the basic fundamentals remain the same.

The most important point is to recognize the direct-ratio relationship between profits and accidents, and then to select the literature, material, educational and consulting services that are needed to fulfill your loss prevention needs.

WORK SURFACES AND LADDERS

By ROBERT W. THOMAS
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After being assigned this topic, "Working Surfaces and Ladders," I turned to Page 10469 of my well-used OSHA standards and started to read, *really* read, Subpart "D." I wish I hadn't.

After just reading Section 1910.21-Definitions, I was as confused as the priest drinking Mogen David wine out of a mason jar. There are three definitions of ladders, three definitions for handrails, two for railings, two for guardrails, one for stair railing and one for midrail.

There's stepladders, single ladders, extension ladders, sectional ladders, trestle ladders, extension trestle ladders, special purpose ladders, trolley ladders, side-rolling ladders, platform ladders, fixed ladders, individual rung ladders, rail ladders, through ladders, side-step ladders, crawling board or chicken ladders, climbing ladders and ladder-stands.

Let's not forget scaffolds, either. There's boatswain chairs, bricklayer's square scaffold, carpenter's bracket scaffold, heavy duty scaffold, horse scaffold, interior-hung scaffold, ladderjack scaffold, light duty scaffold, manually propelled mobile scaffolds, mason's adjustable multiple-point suspension scaffold, (they left out one for the Knights of Columbus), medium duty scaffold, needle-beam scaffold, outrigger scaffold, single-point adjustable suspension scaffold, single pole scaffold, stone setter's adjustable multiple-point suspension scaffold, tube-and-coupler scaffold, tubular welded frame scaffold, windowjack scaffold, mobile scaffold or tower and tubular welded sectional folding scaffold.

Mr. Guenther, wherever you are, here's one section of the standards that can really be cleaned up.

We, in the meat industry, don't have to know too much about all these different types of ladders and scaffolds. But one thing you *had* better know is that the ladders and scaffolds you *do* have and use in your plants are in good repair and in safe condition. I don't know about your experience but no matter how hard we try, we find ladders in a shape they shouldn't be, and we find these usually when accompanied by an OSHA compliance officer.

Make sure your ladders are in good shape: that straight-type ladders are equipped with safety shoes (stepladders do not require them); that top halves of extension ladders are not used as single, straight ladders; that your wood ladders are not painted, although Section 1910.25(d)(1X) states: "Ladders should be kept coated with a suitable protective material. The painting of ladders is satisfactory providing the ladders are carefully inspected prior to painting by competent and experienced inspectors acting for, and responsible to, the purchaser; and providing the ladders are not for resale." We in the safety profession have always recommended that ladders not be painted. If you are going to coat them, use clear shellac or varnish so defects can be seen.

Section 1910.25(d)(1) covers the care of ladders and 1910.25(d)(2) covers their use. I am sure you have read and understand these rules, and I am not going to repeat them here.

For fixed ladders, I don't think it was the intent of the law to change every ladder that was installed up until the time the law went into effect. If your ladders are in good shape and have the cage guards or safety devices required, I don't think you will get into too much difficulty. We have found this to be true so far to date. We must take the practi-

cal approach to this portion of the standards as well as to others which we will cover.

Section 1910.22 covers the general requirements for walking and working surfaces. So far as housekeeping is concerned, we live with the USDA, MID, FDA, "XYZ," etc., as to sanitation requirements, and these requirements have to be met. However, this is an area where we can come into conflict between the two government agencies, USDA and OSHA. Paragraph (a) (2) under this section states: "The floor of every workroom shall be maintained in a clean, and, so far as possible, a dry condition. Where wet processes are used, drainage shall be maintained, and false floors, platforms, mats or other dry standing places should be provided where practicable." We are never going to have dry conditions in our meat processing areas, especially in packing plants. And I would say our defense for not having false floors, mats or other dry standing places would be they are not practicable.

This is one more reason we need verticle standards for our industry.

Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways, and wherever turns or passage must be made. Section 20.4.4.2 of the inspection survey guide provides us with further guidance on this, stating: "Aisles and passageways for one-way traffic shall be not less than the width of the widest vehicle or load plus 3 feet. For two-way traffic the minimum width of aisles shall be not less than twice the width of the widest vehicles or loads plus 3 feet." If my arithmetic serves me correctly, and if your widest load is 4 feet, then you need a 7 foot aisle for one-way traffic and 11 foot aisles for two-way traffic.

Section 20.4.4.3 of the guide also says: "Lanes for aisles and passageways shall be painted on the floor, or a similar method employed to mark such areas." Again, we come into conflict with USDA, not saying anything about keeping the paint or tape on the floors. We need such marking in dry storage, and are using either paint or tape there. The previous requirement for white, black, or a combination of these two, has been changed so that any contrasting color may be

used. Sorry about that—for those who changed from the old standby yellow to black, white or black and white. If you wonder where the yellow went, come visit some of our plants; we didn't change where we had yellow lines already down.

Covers and/or guardrails have to be provided to protect personnel from the hazards of open pits, tanks, vats, ditches, etc. There are many of these areas in our plants. Some where covers or guardrails won't work, such as the hide-pulling area.

The law states (1910.23(a)(b) and (c))—(c) especially—that every open-sided floor or platform four feet or more above adjacent floor or ground level shall be guarded by a standard railing (or the equivalent as specified in paragraph (E)(3) of this section) on all open sides, except where there is entrance to a ramp, stairway, or fixed ladder. The railing shall be provided with a toeboard wherever, beneath the open sides,

- (i) Persons can pass
- (ii) There is moving machinery, or
- (iii) There is equipment with which falling materials could create a hazard.

Most of us know that the Missouri Beef Packers appealed for a variance of this requirement along the open side of a pit area and along work platforms on the "kill" floor, and along the process areas. The industry committee went to the pre-hearing conference and submitted a paper in behalf of the Missouri Beef Packers and the industry. Missouri Beef Packers was granted an interim order, before this pre-hearing conference, which allowed for an 18-inch railing to be installed. Gentlemen, an 18-inch railing is more of a hazard than no railing at all. We haven't heard the last of this as yet, as the formal hearing has not been scheduled.

Again, in the area of railings I suggest taking the practical approach. If railings exist 36 inches in height, which was the old standard for years, we at Swift are not changing them now. If railings are in need of repair we replace them with 42-inch standard railings. We have set priorities, with the first priority being where we do not have any railings at all. The second priority is to replace any railings that are not adequate, and the third priority is to raise all railings to the

standard 42 inches. We haven't got to priority three as yet.

Stair railings are something else. These are to be not more than 34 inches in vertical height nor less than 30 inches from the upper surface of the top rail to surface of tread in line with face of riser at forward edge of tread.

And let's not forget those midrails either. Toe boards are required on all platforms

or landings as defined earlier, four feet above floor or working surface. Toe boards are to be four inches nominal in verticle height, with not more than 1/4-inch clearance. The four inch vertical height appears adequate, but the 1/4-inch clearance, where some of our grating platforms have one-inch openings or more, appears superfluous, as anything 1/4-inch or up to the opening size can fall through anyway.

KNIFE SAFETY AND YOU

By JOHN W. TROLLEN
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Austin, Minn.

"Reports show that knife accidents are the most predominant cause of disabling injuries in the meat industry."

"A survey made by the U. S. Department of Labor, Bureau of Labor Statistics, showed that hand knife injuries cause more than 15 per cent of all disabling injuries in the meat packing industry."

These two facts were excerpted from Chapter 4 of the book, *Meat Industry Safety Guide Lines*. The book was put together by the executive committee of the Meat and Leather Products section, and is still available at the National Safety Council. Facts such as these made the meat industry a "target industry" for OSHA. In this book 18 pages are devoted to training and safety of the knife worker. This is an excellent reference guide, and I urge you to get a copy for your supervisors to help promote safety and, more specifically, knife safety in your organization.

Now let's get to the problem at hand, which is knives—sharp, sharp knives! The knife, as you already know, is made primarily to cut flesh. And, unfortunately, this is exactly what the butcher is made of. Keeping these two elements safely separated is our problem.

A recent article in *Meat and Meat Products* magazine states, "It appears that the only way we can prevent knife cuts is to wear protective gear." Actually, I don't believe this statement to be 100 per cent true. There are too many other elements involved, and things that can be done to prevent knife injuries.

I believe the first consideration regarding knife safety is the training of the employee. I personally believe that this is true regarding all phases of a safety program. However, all guards in the world will not correct all of the problems. Let's take the subject that we

are talking about today. Many of our butchers, and I wish I knew the percentage because it is high, cut themselves before starting the butchering job, and then very frequently cut themselves after the actual butchering is completed. The \$20 mesh glove, the wrist guard, etc., lie neglected on the butchering bench and/or on the knife box, and the butcher starts touching up the edge of his knife and cuts himself. Why?

Actually, it's probably because you didn't instruct him properly by insisting that he put on his safety gear first and then leave it on until he puts this weapon, known as a knife, away for the day. Let me give you a few examples.

Before you hand him a knife, you must help him get rid of the inborn instinct to grab a falling object before it falls out of reach. Most new men, and even some old timers, will inadvertently drop a knife on occasion. It is instinct to grab for it as it falls, and this act usually results in a nasty cut or a punctured foot.

Now, there are ways to prevent a knife from falling, but at this time let's just assume that it does fall. Get your feet out of the way and let it fall! Implant this instruction indelibly. You can repair a knife, or even replace it, a lot easier and with less expense than you can repair a severed artery, nerve or tendon.

Using a new butcher as an example, and especially the young ones, it is of paramount importance that they be instructed properly. If you do not do this, things will happen that are unbelievable. A butcher will point with his knife, for example, saying, "they want that-a-way"—and stab a coworker next to him.

I have personally observed a butcher tossing a ham into a vat or to a position on the table, with his knife-hand doing the tossing.

Time after time this employee will come close to cutting a coworker, or even himself, and not realize the danger without being told. The line foreman, the man on the job of course, is the key man. But early primary training, telling him, showing him and telling him again, is the most important in getting him to work safely with this formidable tool; teach him to respect the tool.

Recently, when I was inspecting a plant, I asked about a man who had lost his eye while positioning a ham with his knife blade. I was told this man was back on the job and doing well. I asked to be taken to the boning room, where he worked, to observe the "knife safety" on the table. Before the employee in question discovered that he was being watched, I saw him position a ham with the blade of his knife. *This man still had not learned his lesson!* I mention this incident only to emphasize to you the importance of training and follow-up. You can't just tell him or show him once, and feel that your job is done. In a case like this one, I actually feel that the man should be removed from his job, at least on a temporary basis, for insubordination. This reprimand might indelibly imply to the balance of the butchers that safety in knife-handling is of paramount importance in this industry.

The care of the knife is another area of training that will promote knife safety. A dull knife, for example, is definitely detrimental and a hazard to the butcher. It is primarily well established that some employees will never attain the mechanical skill necessary to keep a knife working for them 100 per cent. The shape of the blade, the bevel of the blade, and the final edge require skill with a grinder, a stone, and finally a steel, in most instances. The kind of grinding wheel or grindstone, the wet stone grit size, and finally the kind of steel, are all relative to what the butcher must cut. Unless all these things fall in place and in proper sequence, the result is usually a dull knife. The dull knife creates fatigue, which is definitely a safety hazard. The dull knife will also create downgrading in the quality of work and even the quality of product produced.

I know of one answer to this problem. It is being tried in a few places in the industry. The answer is a knife-sharpening center.

Here the basic sharpening of the knife is done for the butcher by a trained, skilled employee with all of the right tools at his disposal. Actually, this kind of center has a twofold function: one is the safety factor and the other is sanitation—a clean knife. At this center, the mechanical work is done by a mechanic, leaving the butcher to cut meat. Now, that really is the gist of the whole thing anyway, isn't it?

So let's try it out. At the end of the day the butcher leaves his numbered knife in a corresponding slot in the "knives to be sharpened" rack. By having him do this, we eliminate the problem of having the knife carried into the personnel locker area or some other uncontrolled area for overnight storage. The sharpening is done by the expert, the knife is cleaned and sanitized and returned to the butcher's slot. When the butcher returns to work in the morning he picks up his knife and returns to his work-station. The only training he really needs *there* is to be taught the proper method of steeling and the proper steel to use for his particular job.

I am sure I can almost hear the objections and questions that I have aroused in readers' minds regarding this center. However, let me add that I think it can work and could be a great safety factor. So frequently a butcher starts out with a good knife edge and, because the tool dulls slowly, he gets used to using a knife that is less than 100 per cent sharp. Soon he is butchering with a knife that is only half sharp.

Let me reiterate: each butcher is different, and many of them will never accomplish the mechanical art of developing a good cutting edge. If the mechanical employee selected to sharpen a knife knows his job, *every* butcher will start out with a good edge. After a time this mechanic will also learn to recognize the peculiarities and some of the specific requirements of the butchers and, in a very short time, I think a knife sharpening center could be very beneficial.

I would like to point out another "sharp knife" angle. This angle involves the purchase of knives that are *already* sharp. Many of the knives produced today are not sharpened or shaped to the keen edge necessary for butchering. So again, the butcher becomes a

mechanic and must sharpen and shape his own knife. This, again, exposes him to the hazards of the blade. I am not familiar with all of the knives manufactured, so I hope you will understand that I am not trying to sell knives, but to sell safety. So I'll mention the name of one company that "finishes-off" the knife, making it ready for use when purchased. This puts the knife in the same category that it's in when it leaves the knife sharpening center, and the only requirement necessary is that the foreman select the proper steel for the employee and give him the proper instructions for "setting up" the knife edge for the kind of meat to be cut. This company also provides a jig that can be attached to the knife blade for "ruling up" the edge that cannot be set up with the steel. Without going into every detail, this is another safety angle which can help your employee keep a sharp knife without being exposed to the mechanical difficulties of literally "making" a knife-edge. The company I refer to is the Chicago Cutlery Company.

Protective equipment is a very necessary part of the knife safety program in your plant. Let's go over these basic requirements, item by item:

1. *The mesh glove.* For maximum protection, this should be a full five-finger glove. The employee should have access to a selection of sizes to assure proper fit. An ill-fitting glove can be a safety hazard in itself.

2. *Arm or wrist protection.* This guard must fit. It should be properly engineered for the job: not too loose, not too tight, not too short, not too long, etc. For example, if the arm guard inches up on the arm and exposes even a small section of the wrist periodically, the employee exposes the wrist to injury. This is serious, because the employee is depending on the equipment to protect him. The guard should always rest over the strap of the mesh glove, for example.

3. *Abdominal protectors.* This guard must always be worn when a butcher pulls the cutting edge of his knife toward the body. Even the size is important. For example, a few years ago I found that, because of thigh cuts

in a beef operation, a special size guard had to be ordered. Let me point out, here and now, that to get maximum protection from all your protective equipment you must study every injury report and record it systematically so that you can determine what the problem is and what is necessary to cope with the problem.

4. *Knife guards.* "Stubbing" the knife, which causes the hand to slide down over the blade, will cut the vulnerable joint area of the index finger and usually cause a serious injury. Sanitation requirements today have changed the handle of the knife from wood, which is deemed unacceptable, to plastic. With this change have come many changes in handle design and shape. Actually, I believe that today we can select handles which will reduce the stubbing injury substantially; if not completely. So, before you select your knife, look at the many available handles designed primarily to prevent injury. There are many good ones on the market.

5. *Knife pouches or scabbards.* This is the place to store a knife that is not actually in use! Here again, much has been accomplished in design and the material used to produce a good scabbard. Take the time to look them over. I am sure you will find one that will fit your need. Again let me reiterate, the knife should be in the scabbard or in the man's hand! If you follow this simple rule, knife cuts can be reduced by approximately 25 per cent, according to a recent survey.

In conclusion, let me again refer you to the *Meat Industry Safety Guide Lines* book. The four points in the knife safety paragraph are: (1) Protective equipment engineered for the job, (2) Proper selection, shaping, and sharpening of knives, (3) Proper disposal of knives, and (4) Knife safety habit training. Where these principles are followed, knife accidents represent less than five per cent of the serious injuries in plants having classified injury causes based on millions of hours of exposure. In plants which have not followed these principles, knife accidents represents 47 per cent of the serious injuries.

WELDING AND CUTTING IN THE MEAT INDUSTRY

By HOWARD REBHOLZ
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In the meat industry we are concerned with both the safety of welding procedures and of welding operations. Welding procedures concern themselves with both the methods and degree of skill required to insure the integrity of welds. In this industry we are concerned with a variety of utilities that include refrigeration, gas, steam, and water. All or parts of such utilities in which liquid or gaseous materials are pressurized are governed by codes. The appropriate codes are based on many years of experience and are normally updated annually. We think particularly of the ASME boiler and pressure vessel codes, the refrigeration code, and pressure piping code.

Most new installations are made by contractors who are under obligation to perform welding according to operator and procedure qualifications. Unfortunately, much follow-up repair work is not performed within the purview of these code requirements. Repair work on steam utilities is normally governed by state and local ordinances. However, all states do not have the same requirements. The majority of state laws are structured toward enforcement through the engineering division of an insurance carrier who certifies that the work is properly performed. This certification is necessary to obtain operating certificates for fired and unfired steam pressure vessels. Some carriers have been quite lax about following through fully in this respect because of lack of manpower to police the work performed at an establishment by the regular maintenance force. Within the past few years, insurance companies have stiffened their requirements in this respect and taken a rather tough stand on issuing operating certificates unless they are thoroughly satisfied that welding workmanship is performed according to code requirements.

The code requirements dictate that welding must be performed by a qualified opera-

tor. The term "certified welder" is often used to define a person who has passed the necessary tests under supervision to insure his skills. The term "certified welder" really means "qualified welder." Code welding procedures are also required, involving the welding up of test specimens and submitting them to a testing laboratory for analysis.

It is recommended that at least one maintenance mechanical welder in each establishment of any size be "qualified" and that a procedure be established and tested.

Welders may be qualified to weld four positions: flat, vertical, horizontal, and overhead. They may be qualified for either plate or pipe. In order to develop true versatility for making qualified welds, it is recommended that the welder be qualified in all positions and the qualification test be performed on pipe. If he can pass the four position requirements on pipe, he is also qualified for plate. The procedure is spelled out in the code, but briefly it consists of making a V-groove weld on five-inch diameter pipe. It should not be necessary to qualify on pipe or more than 1/2-inch thickness. He will also be qualified for fillet welds if qualified as noted. He will perform two tests using five-inch pipe in which a V-groove butt weld is made in the 2G position as noted in Section IX of the ASME code. The pipe is placed on its vertical axis and the weld performed on the specimen without moving it. In other words, the welder must walk around the pipe as he makes the weld.

He must perform a test in the 5G position in which the pipe is on its horizontal axis and clamped into position, and he will perform the weld without moving the pipe. The pipe must be stamped or marked to show the top, which would represent the portion that is performed in the horizontal. The bottom side of the pipe would naturally be the overhead position.

These specimens are then sent to a testing laboratory and cut into representative sections. Two sections are removed from the specimen welded in the 2G position. Five sections are removed from the specimen welded in the 5G position. The laboratory machines these bars to a particular orientation and makes a number of tests. The sectioned welds are visually examined to determine the number and size of any pits or slag inclusions in the weld. Machine tests essentially consist of bending the test specimen at the weld to see if it breaks or if there are pits that enlarge or elongate beyond a tolerable size. Other specimens are tested under tension until the metal breaks. If the weld is good, the break will occur not in the weld but in the parent metal. The proper welding rod must be selected in making these tests. AWS designations for welding rod are four digits. The first two will represent the tensile strength of the rod which normally would be 5,000 or 10,000 higher than the parent metal. The third digit represents the position or positions that the rod may be used and the fourth digit is the flux, which has an influence on the compatibility of the metals for good penetration.

Procedure tests may be made by a qualified welder using metals as designated in the code that are relatively common to our type of equipment. It is normally satisfactory to make the procedure tests with plate. The procedure tests merely identify the compatibility of the metals and welding rods used in making repairs.

There are very few performance and procedure qualifications for structural welding. Where qualifications are spelled out in various codes, they merely make reference to "good workmanship welding" or similar language. Qualifications of welders and procedures have these advantages: (1) employees and property are better protected by insuring that pressure vessel and pressure piping repairs are properly performed; (2) the quality of workmanship required to pass the qualifying tests will insure better training and more interest on the part of the maintenance welder. This training and interest will carry over to better workmanship on the welding of non-code structures.

At this time there are only limited proce-

dures requirements in the Occupational Safety and Health Act for welding. Sub-part Q of the *Federal Register* deals with this subject and concerns itself primarily with fire protection, storage of fuel gases, maintenance of equipment, and construction of facilities for production welding. The latter is of little importance to the meat industry because even the larger plants have no need for acetylene generators or liquid oxygen storage.

Compliance officers have frequently issued citations for improper storage and handling of fuel gas and oxygen cylinders. The cylinders must be readily identified, must be separated 20 feet from combustibles. Fuel and oxygen cylinders must be separated 20 feet or separated by a five-foot high barrier having a one-hour fire resistance rating. There are further restrictions as to where fuel gas and oxygen cylinders can be stored. All of the precautions in sub-part Q make good sense.

We must recognize certain health hazards in this industry as they pertain to welding and cutting. A lot of our equipment is galvanized; lead and zinc fumes volatilized when this material is heated, present a real hazard not only to the welder but also to those in the immediate vicinity of such operations. Protection can be afforded by respiratory protective masks or by ventilation. Many welding operators resist ventilation, because the air velocity required to keep the fumes within threshold limits tends to cool the work to the extent that good welds cannot be performed. Some food processing equipment is cadmium plated. This substance is extremely toxic when volatilized. Cadmium plated equipment should never be heated to temperatures required for welding and cutting. It is therefore recommended that this type of equipment not be used in meat processing operations.

Some welding is performed inside vessels such as rendering tanks, boilers, etc. Even though volatilized metal fumes in ordinary carbon steel materials are less hazardous than galvanized or other types of metals, adequate ventilation should be provided.

Sub-part Q contains a lot of language dealing with work rules, such as maintenance of equipment, testing of gauges, condition of torches, hoses, electrode holders, electrical

conductors, etc. All of these make good sense.

Fire and personnel hazards are well covered in the cutting and welding permit procedure outlined in "Meat Industry Safety Guidelines." By using the welding permit procedure, many of the precautions and work rules in sub-part Q of the *Federal Register* are covered. Elements of the work permit include general precautions against fire such as covering combustible materials, moving such materials, assigning helpers to watch for sparks, locating the nearest fire fighting equipment, and checking work areas carefully after work is completed. The welding and cutting permit gives an explanation of the proper use of fire extinguishers.

The permit specifies additional precautions to be taken in dusty areas or where flammable liquids or combustible grease may be present. Meat industry welders seldom regard animal fats as being a combustible liquid. Under the newer concept of "flammable" and "combustible" we can regard combustible materials as less hazardous than flammable; however, in welding operations, fat becomes a flammable liquid when heated to temperatures at which vapors are readily ignited. I can recall one serious fire where

incedible grease was ignited during a welding repair in an incedible grease interceptor. Location in the sub-basement of the plant made it difficult for fire fighters to gain access to this large undivided area, and a great deal of damage was done before the fire was brought under control.

Welding permit procedures, of course, are useless if management controls are not exercised to see that welders and other maintenance people perform according to the rules specified in the permit.

We conclude that a welding safety program will have these advantages:

1. Better workmanship, thereby insuring the safety of pressurized equipment structures and personnel.
2. Qualification and training of welders will develop a greater awareness of health hazards because employees will have a better understanding of the materials being worked on.
3. The welding permit procedure as a part of operator training will not only insure better compliance with the Occupational Safety and Health Act but aid immeasurably in the prevention of fires.

DESIGN & OPERATION OF SAFE AMMONIA REFRIGERATION SYSTEMS

By GEORGE C. BRILEY
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"The solar system," says Ralph Waldo Emerson, "has no anxiety about its reputation." This is nice for the solar system, but the meat industry, which is now desperately worried about its "image," can ill afford to hide its head in the sand.

For some time we have had the optical illusion of the uproar over meat prices. Prices are described as "exorbitant" and in general it's insinuated that consumers could not buy all the beef they wanted, but how many of the news media gave all the facts in these messages? The U.S. population is buying 115 pounds of beef per person per year - 30 percent more than 10 years ago. Maybe in specific instances meat is "too high in price," but it's one thing to think that these prices were "manipulated" by unscrupulous butchers and meat packers and another to know that the prices have increased because of rising demands. Beef production has increased over two times in 20 years, yet production has not kept up with demands. Thus the meat industry can ill afford bad publicity of any kind, be it high prices or a catastrophe within a plant. The meat plant must be a "safe" place to work and a "safe" place to produce a product that is in constant demand.

Webster defines "safe" as free from danger, not hazardous; and if you never really considered safety in your ammonia refrigeration plant design, if you depended on Lady Luck to take care of your plant and your personnel, now's the time to mend your ways. The Occupational Safety & Health Act (OSHA) Inspector may be looking over your shoulder or possibly down your throat. In order to put this presentation in the right perspective, let's consider ammonia as a refrigerant. Is it safe? If you read the newspapers as the OSHA Inspector and the environ-

mentalists do, you may have read, "Two hurt, one fatally, in ammonia accident."

And, "Plant officials said 'Mr. Blank,' 64, who would have retired November 1, was draining oil from the oil separation tank when there was a small explosion." This is poor publicity for ammonia because the article went on to describe "Mr. Blank" as an experienced operator and said that he had installed the oil separator himself some 30 years ago. This type of publicity points an accusing finger at ammonia.

Let's look at the true facts. Mr. Blank, who had many years experience, made a fatal mistake. While trying to drain oil from the oil separator, he found the drain valve would not open. Either the "button" was loose from the stem, or dirt and junk had stopped up the port. Mr. Blank then tried to dislodge the button or dirt with a blast of "oxygen." Oxygen and oil cause explosions, and this *baton error in judgment* was the cause of the accident. There was no ammonia explosion—it was an oxygen/oil explosion. Why did this accident happen? Besides the "poor judgment" on the part of the operator, he could have used nitrogen. And he may have thought that was what he was using, but the oil drain should have been *automatic or semi-automatic*. Had it been properly installed, junk and debris would have been removed from a strainer and not blown back into the system to plug up the same valve again. Incidentally, this accident would have happened with *any refrigerant* that had oil in it; ammonia was not a factor, but the damage was done. Ammonia had another black eye that it did not deserve. Another example of our industry's problems with credibility and the press occurred not long ago. The sight glass on an ammonia receiver started to leak. The ammonia system

was used to chill water for airconditioning a building. This is a "no-no" today, but the system was probably 40 years old or older. Naturally, the check valves at the gauge glass (if indeed there were any) did not hold. When the leak started to occur, the building was evacuated as ammonia lived up to one of its advantages: it is *self-alarming*. Now comes the fire department, and here is where *poor judgment* on their part caused a possible ammonia explosion. Possibly the fire department did not know how to handle an ammonia accident. From all reports, the firemen began spraying water all over the equipment room *before* the electricity was disconnected. Water on the motor-starters caused an electrical arc and the ammonia reportedly exploded. Obviously, this accident was caused by *poor judgment*. It should never have happened.

These two examples are relevant. Both teach us lessons in what *to do* and what *not to do*. As the immortal Pogo of comic strip fame once said, "We have found the enemy and it is us." Our industry has been lethargic. It has offered no defense. Our public relations leaves much to be desired.

But that is changing. The International Institute of Ammonia Refrigeration was formed specifically to help remedy this situation. Its purpose is to promote education, information and standards for proper and safe use of ammonia as a refrigerant.

Ammonia refrigeration systems are safe provided they are properly *engineered, properly installed and properly managed*.

A safe ammonia refrigeration system is only as good as the engineer or engineering group that conceived it. Ammonia systems have been employed in plants that date back to the 1800's. These plants were, and still are, operated manually. Today's ammonia refrigeration equipment is designed for automatic or semi-automatic operation. Obviously, this is substituting "capital" for "labor." However, with modern V-type, rotary-vane and rotary-screw compressors, an automated equipment room is readily available. And if you compare the total operating cost of an automated ammonia refrigeration system to a manually-operated one, you'll find an appreciable savings. In fact, many manually-op-

erated systems are being replaced *now* with safer automatic equipment—and the savings in operator time, electrical costs and maintenance costs will pay for the conversion over a short period.

Several types of automatic defrosting systems are also available for evaporators, again saving manpower. However, we do not want to indicate that ammonia refrigeration equipment in the meat plant can be *totally* automated. Most refrigeration systems will require a certain amount of supervision or "operation." An example of this is the beef or pork chill room where the variable nature of the processing system demands that there be "operators" to adjust the refrigeration system to provide the quality products that the consumer demands. Thus, when we discuss automatic refrigeration systems, we might compare them to the automatic transmission in your automobile. It provides for effortless driving, saves wear and tear on the engine, clutch, etc. However, it still requires some manipulation if you are to have total control of your car.

In designing an automatic refrigeration system, you should endeavor to provide "fail-safe" features in all critical areas. What are the key items that make a system safe? Here are some guidelines.

First, the compression system:

1. Are the compressors designed for manual and automatic start-stop operation?
2. Are the compressors designed for automatic capacity reduction? Automatic capacity reduction down to 10 per cent on individual machines is available with proportional control—something not possible four years ago.
3. Are the compressors fitted with high-pressure, low-pressure, oil-pressure, high-discharge temperature and high oil-temperature protection?
4. Are the compressors protected from "slugs" by a fool-proof suction trap or accumulator with high-level alarm, high-level shutdown, and low-level alarm?
5. Are the compressors protected from discharge gas condensing during "off" cycle and draining into the compressor?

6. Are proper service gauges installed for high-pressure refrigerant, low-pressure refrigerant, oil pressure and oil filter?
7. Remember, stop valves in pressure-actuated safety controls are not acceptable unless they are *locked open*.
8. Are the compressors equipped with internal or external safety relief valve or dual valves that meet or exceed the requirements of the American National Standards Institute (ANSI) B.9.1-1971 code?
9. Are the compressors properly installed on a level foundation (preferably grouted) and properly aligned by a competent millwright?
10. Are the couplings or V-belt drives protected with OSHA guards?
11. Are the electrical system, motors, starters and disconnects designed in accord with the National Electric Code (NEC)? Is the electrical system properly grounded?
12. Are the controls 110-volt? This provides a "safer" control system.
13. Do the compressor control panel(s) have running-time meters, current-limiting relays, and a timing relay for limiting the compressor starts to the electrical components limitations?
14. If the system is two-stage, does the inter-cooler have a high refrigerant-level alarm, a low-refrigerant alarm and a high refrigerant-level shutdown? Does the inter-cooler have a modulating refrigerant-level control? Is the inter-cooler large enough to prevent liquid "slugging?"
15. If the system is two-stage, have the designers properly analyzed the intermediate pressure with regard to system requirements vs compressor limitations, as defined by the manufacturer?
16. Are compressor and other component sections within the guidelines of the manufacturer (limitations) and the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) guide?
17. Are the automatic controls for high-stage and low-stage compatible for a two-stage system?
18. Have you checked potential noise-level of the equipment? OSHA has a published standard which all industrial plants must meet.

40

station halocarbon system R-12, or R-22 or R-502, you would find the check-list even longer and the cost even higher. With the halocarbons you would have more complicated oil-return problems to cope with, among other items. And this holds true for all other guidelines that we will present. These guidelines are just good design practice and many people have followed these recommendations for years.

Now, the ammonia condensing system:

1. Most ammonia refrigeration systems use evaporative condenser today because of first cost. Is the condensing system sized for the maximum wet-bulb temperature? Wet-bulb temperatures tend to rise in many areas due to irrigation, population shifts, etc. Be sure this is checked.
2. If outdoor temperature falls below 32°F, an indoor sump is recommended with water pumps indoors. Is a thermostat used to stop the water pumps at low water temperatures?
3. Are the fans selected for the evaporative condenser with the lowest HP and noise level?
4. Are the evaporative condensers protected with dual relief valves?
5. Are the evaporative condensers located so that they do not recirculate air?
6. Are the evaporative condensers piped properly per the manufacturer and ASHRAE guide to provide proper liquid-refrigerant drainage to the receiver?
7. Is proper water treatment available? Be sure to use it on a continuing basis.
8. If you have water-cooled shell and tube condensers in parallel with evaporative condensers, the piping arrangement is critical. Are condensers properly equalized?
9. If shell and tube condensers are used, are they built, stamped in accord with the American Society of Mechanical Engineers (ASME) code for boilers and pressure vessels, Section VIII?

While we're on the roof, let's talk about "rooftop" refrigeration systems, of which there are many kinds and shapes. For a small installation of 4000 or 5000 SF these units or through-the-wall type units, are good applications. On larger systems where we have

compared rooftop systems to central ammonia systems, we have found that the installed costs are comparable. As the size increases and the refrigeration load increases, the ammonia central system becomes much less expensive than the rooftops. One factor seldom noted is that in most cases the rooftop's operating cost is much higher than a central system. Maintenance costs are much higher too, because of minimum protection from weather: summer heat, winter cold and snow, and the electrical hazards of a wet roof that the service man is standing on.

Refrigerant losses are excessive and very expensive on many rooftop installations. Most rooftop or through-the-wall units are not designed for 30 years of operation; generally they are five to seven-year designs. We know of a particular meat plant that is abandoning rooftop units (some 450 to 500-HP total) and installing a central ammonia system after about 15 years of fighting high refrigerant replacement, operating and maintenance costs.

And now, the high-pressure receiver:

1. Will the receiver hold the entire plant charge? If it doesn't, then the suction trap/low-pressure receiver should be designed to do so.
2. Is the receiver going to be inside or outside? Skin temperatures on uninsulated and unshaded objects have been recorded at 150°F and above, in direct sunlight. The receiver design should be analyzed with respect to its location.
3. Does it have dual relief valves of the proper setting and size?
4. Does the level gauge have proper protection such as armored glass and automatic check valves to fail-safe in case the glass breaks?
5. Does the receiver have an oil drain? The receiver should slope toward this drain, 1/8 inch per foot.
6. Is the receiver ASME code-designed, inspected and stamped?
7. Is a good, non-condensable purge system installed? Should it be on large systems?

Meat and Leather Plants

And now, the refrigerant pumping system:

1. Is the pumping system receiver *capable of* holding the refrigerant charge of the evaporators and piping? If not, a liquid return system should be installed.
2. Is the pumping system protected by dual relief valves size for the proper volume?
3. Is there an oil-drain and return system installed? Is it arranged for semi-automatic or automatic operation?
4. Is the piping and pumping system designed and installed in accord with ASHRAE guide and United States of America Standards Institute (USASI) B31.5-1966 (Now ANSI) piping code and ANSI B.91-1971?
5. Is the receiver ASME code-designed, inspected and stamped?
6. Is there a spare refrigerant pump or pumping unit? A spare pump is a "must" in most plants.

Now, the ammonia evaporators:

1. Are the evaporators selected with your exact requirements in mind? Remember, air unit ratings are based on a partially-frosted coil for low-temperature applications, and good design dictates liberal sizing practices. The ASHRAE guide has good recommendations along these lines.
2. Are the evaporators to be defrosted with hot gas? If so, a down-feed liquid recirculation system provides the optimum efficiency. Be sure the hot gas defrost system is self-reliant so excessive pressures cannot build up.
3. Are the refrigerant return lines sloped to the pumping unit? *They should be.*
4. Are the refrigerant return lines trapped? *They should not be.* At -40°F suction each 12 inches of trap penalizes the system approximately 1°F at 20°F suction, each 12 inches of trap penalizes the system 0.25°F. Besides, traps tend to release liquid in "slugs" which are not good for the piping system, pumping system or compressors.
5. Is the piping designed and installed in accord with the USASI code for refrigerant piping, B31.5? It should be.
6. Is the piping and equipment to be color-coded in accord with OSHA standards? It

should be.

7. Are you considering installing ammonia leak-detectors in critical areas? Good ones are available.
8. Are refrigerant lines and evaporators protected from the errant fork-lift?
9. Are the drain pans on the evaporators insulated? They should be.
10. Are refrigerant lines insulated properly with a covering that will meet the Meat Inspection Division rules?
11. Are evaporators selected with the proper "split" or temperature difference? High-temperature "splits" in most meat storage and chill rooms mean excessive shrinkage of product and higher operation costs.
12. Are the shell and tube brine chillers ASME code-inspected and stamped? Do they have adequate vapor-disengaging space to prevent "slugging" the compressors? High-level alarm? High-level shutdown?

Not to mention the ammonia equipment room:

1. Is it properly ventilated? Use the ASH-RAE guide and the ANSI B9.1-1971.
 2. Does it have adequate space for operation and maintenance?
 3. Do you have proper emergency exits? OSHA defines this requirement in detail.
 4. Does each set of relief valves discharge terminate outside the building in a safe place?
 5. Does the vent piping terminate at a good diffuser?
 6. Are an adequate number of fire extinguishers installed?
- These guidelines are not totally inclusive, but they do give you some vital check-points. The International Institute of Ammonia Refrigeration plans to have a comprehensive guide or standard available by March 1973 covering the "safe" design and installation of ammonia refrigeration systems.
- Your design can be the best in the world; however, the next (and just as important) item is the installation. Whether you use in-plant engineering and construction, a consultant engineer-contractor arrangement, or a design-and-build engineering contractor, each should:
1. Be experienced in ammonia system de-

sign, installation and operation.

2. Have a qualified professional engineer on the staff.
3. Be financially sound.
4. Be capable of providing proper and adequate insurance.
5. Be capable of providing a performance bond.
6. Have an adequate organization to provide future service.
7. Provide complete and definitive "as built" drawings as well as a flow diagram or process and instrumentation diagrams.
8. Provide a complete and definitive set of operating and maintenance instructions supported by manufacturer's data.
9. Provide training for operating and maintenance personnel.

Besides the above items, the installer should have experienced installation supervision from their crews. Many areas have codes that require certified welders for refrigerant piping. The USASI B31.5 code also requires certified welders.

While the plant is in the final stage of completion and the startup phase, operators should be trained. The first and most important item is a good operations and maintenance manual and as-built drawings covering every aspect of the operation. Operators should be taught:

1. To handle ammonia with *respect*, not *fear*.
 2. How to handle a fire in the area of ammonia.
 3. How to handle a disaster such as a broken ammonia line.
 4. How to use gas masks, Air Paks, protective clothing and fire extinguishers.
 5. How to set up periodic gas mask practice drills. Everyone in the plant should be involved in periodical (1) fire drills and (2) disaster drills.
- Fire drills are rather common, but what is a disaster drill? Here is a recommendation—If a major leak occurs in an ammonia system, the personnel trained for and designated to act in such emergencies shall:
- A. See that persons not required to deal with an emergency are evacuated from the contaminated area.
 - B. Put on a suitable gas mask, gauntlet-

type plastic or rubber gloves, plastic or rubber suits.

- C. Simulate shutting off the electrical supply in the area.
- D. Simulate shutting off the appropriate valves.

E. Simulate repairing the broken refrigerant line. There can be many variables in disaster drill arrangements. However, every industrial plant should have such drills and they should be comprehensive. A good disaster plan can save lives and property.

Each refrigeration equipment room should have the following safety equipment:

- A. One full-face gas mask with anhydrous ammonia refill canisters for each person normally in the area. An ammonia canister is effective for short periods of time in light concentrations of ammonia vapor, generally 15 minutes in concentrations of 3 per cent or less, and will not protect breathing in heavier concentrations. *If ammonia vapors are detected when mask is applied, the concentration is too high for safety.* The life of a canister in service is controlled by the percentage of vapors to which it is exposed. Canisters must not be opened until ready for use and should be discarded after use. Unopened canisters may be guaranteed for as long as three years. Because of this limited life, all should be dated when received. In addition to this protection, an independently-supplied air mask or Air Pak of the type used by fire departments may be used for severe emergencies, and each equipment room should have at least one of these.
- B. One pair of protective rubber gloves.
- C. One pair of protective rubber boots.
- D. One protective rubber slicker and/or protective rubber pants and jacket.
- E. Easily-accessible shower and/or at least 50 gallons of clean water in an open-top container.

F. Tight-fitting vented goggles or one full face shield.

Here are some other areas relating to safety that plant engineers should recognize and prevent happening. These are the 12 items where OSHA inspectors have found the most violations:

1. Improper grounding of hand-held electric tools.

2. Lack of standard railing around floor openings.

3. Unguarded floor openings (trap door without temporary railing, for example).

4. Improper storage of flammables in a work area.

5. Excessive noise in the work area.

6. Lack of personal protection programs for eyes, ears and face.

7. Lack of record-keeping.

8. Lack of point-of-operation guarding (protection from "pinch points" in moving machinery).

9. Blocking access to fire extinguishers.

10. Blocked aisles or lack of permanently-marked aisles.

11. Color-code violations.

12. Unmarked exits.

There can never be a plant that is too safe. Safety should be a way of life. But no matter how many safety meetings, fire drills or disaster drills you have, *people under pressure make mistakes in judgement* and many times these mistakes are costly. Automatic refrigeration systems, *properly* engineered, installed, operated and maintained, will certainly reduce the probability of mistakes in judgement and should certainly enhance your plant's safety record.

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HEARING AUDIT

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Webster defines noise as "any loud, discordant, or disagreeable sound or sounds."

It is amazing, the number of people who are more understanding and tolerant of failing sight than they are of hearing loss. As we grow older, we realize our vision will diminish, and consequently we make adjustments by the use of eye glasses, contact lenses, and eye exercises. But when our hearing gradually decreases with age, we tend to blame others for not speaking clearly. Hearing, like vision, deteriorates with age. The question is, "Will your hearing grow old before you do?"

In southeast Sudan a primitive tribe, the Mabaans, were subjected to audiometric tests. It was found that they enjoy extremely acute hearing at the age of 75—their hearing is as good as the average American of 25 years. The loudest sound a Mabaan hears on an average is a bird call, where as somewhere between six and 16 million American workers are exposed to noise levels severe enough to cause permanent hearing damage.

When noise levels exceed 80 decibels, some of us are well on our way to being subjected to possible ear damage if the noise is frequent or sustained. Loud noises, in most cases, do not harm us simply because they are infrequent or of short duration. Many of us think loss of hearing is caused by a single, explosively loud noise; this is only partially true. Most hearing damage occurs gradually, like the wearing down of a tire tread. Frankly, we tend to respect the loud blast of a shotgun which can cause ear discomfort, but because we feel no pain, we reject the sustained sounds of a motorcycle, lawnmower, powerboat, or snowmobile.

It's easy to test your hearing. The next time you use your lawnmower or your son's amplified guitar is twanging, if you're talking to someone at arm's length and either of you has to shout to be heard, you are in a danger zone. Another warning is ringing in the ears

after exposure to loud noise. If speech becomes muffled after leaving an area, it is a good indication that excessive noise levels were present in that area.

Many authorities consider the 90 decibel level as being too high and are recommending 85 decibels—the limit in many European countries. One problem with the 90 decibel level is the fact that we assume that the worker enters into "quiet surroundings for auditory recovery during off-job hours." This can be an erroneous assumption.

The May 29, 1971 issue of the *Federal Register*, which contains the initial standards of OSHA, also contains a very small column on noise standards. The regulations are brief but far-reaching. There are basically two sections: The first sets the maximum levels of industrial noise to which an employee may be exposed; the second details what action the employer must take if noise levels are exceeded.

The key part of the OSHA standard is Table G-16, a chart outlining the permissible noise exposures an employee may be subjected to in amount of time to the various sound levels measured in decibels, or dbA.

Where the sound intensity exceeds the levels in the standard, the law is clear as to what must be done to protect the employee. The action involves three steps: (1) reducing the noise at its source through engineering controls; (2) providing hearing protection; (3) carrying out and implementing a program of hearing conservation. Let's examine each of the steps separately:

The standard states, "When employees are subjected to sounds exceeding those listed in Table G-16, feasible administrative or engineering controls shall be utilized." Administrative controls would mean reducing the amount of time the employee is subjected to excessive noise. This may involve dividing the time between several employees, or per-

forming high intensity noise operations at night when fewer employees are exposed.

Engineering controls are more complex. The Act requires the employer to first find means of reducing the noise level at its source through engineering design and equipment modifications or innovations. These means may include: (1) preventative maintenance of equipment to insure that equipment is properly lubricated, good repair, all worn or unbalanced parts replaced; (2) use of rubber or plastic machine mounts to reduce vibration; (3) installation of silencers or mufflers on noisy parts; (4) instituting quiet practices to replace noisy ones or enclosing noisy machines with an acoustical enclosure; (5) isolating operators away from the machine or placing them in an enclosure.

However, engineering controls are not always feasible, and the company may not be in a position to place controls in effect immediately. In this case, the standard states: "If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used."

The law requires both the provision and the use of protective equipment. The responsibility of getting the employee to use the equipment rests primarily with the employer. OSHA recommends that each employer conduct an educational training program on the importance of using the protective hearing equipment. The program should continue until there is 100 per cent acceptance by employees. In companies where employees are required but do not use their protective devices, OSHA officials would consider this as a lack of training and promotional program and therefore a violation of the Act.

Hearing conservation program as established by the company is covered under the Act, which states: "In all cases where the sound levels exceed the values in Table G-16, a continuing effective hearing conservation program shall be administered." "Continuing" means that the program will be in effect as long as the noise level exceeds those permitted by the Act. "Effective" means that employees exposed to excessive noise levels will not suffer continuing deterioration of hearing; incipient loss of hearing will be de-

tected and necessary steps taken to prevent further deterioration. The latter can be detected through the Company's audiometric testing program.

Briefly, the term "hearing conservation program" refers to audiometry, periodic checks on the hearing ability of individual employees, and to noise surveys, periodic checks on the noise level in the areas in which employees work.

Since audiometric tests are not specifically mentioned in the regulations, they are not specifically required. However, they are strongly recommended as a check on control measures. This part of the Act has generated considerable comment and controversy, and a recent OSHA bulletin indicated the standard is being examined for possible change.

Unions are becoming increasingly aware of noise to the extent that many locals are buying their own equipment to measure noise in plants. Unions have been quick to bring complaints under the new OSHA regulations.

Recent cases suggest that companies are spending a lot of money for noise-reductions, and that handing out ear protective devices does not necessarily satisfy the union or government inspectors. Ford Motor Company states that they can add two to 10 per cent to the cost of machinery; the company expects to spend as much as \$20 million for noise control over the next few years.

A federal citation against the St. Joseph, Michigan Laundry Division of Whirlpool Corporation conceded that the company provided ear plugs and tested employees hearing periodically. But the firm failed to have "a plan summarizing specific efforts and completion dates for the abatement of the noise hazard using engineering and administrative controls," the citation said. Whirlpool eventually reached an agreement with the Labor Department and Machinist Union to begin a long range noise-abatement program. Under the plan, Whirlpool must begin an engineering feasibility study to determine exactly how it's going to cut noise levels. In the meantime, it must continue to provide ear protection to workers in high level noise areas and must submit progress reports to the government and the union every

30 days.

The United Auto Workers recently persuaded Ford Motor Company to install noise-dedensing equipment at its Nashville glass plant. A complaint to the government wasn't necessary. Last winter a Ford worker caught his arm in a machine. Nobody could hear his yells, he said, and he escaped with minor injuries only because a fellow employee chanced to see him. The accident raised tensions at the plant and union members threatened to walk out in 61 days unless Ford took action. The walkout was averted because Ford promised to cut down on the noise.

Union muscle also persuaded Mead Corporation's Georgia Kraft subsidiary to plan a noise-reduction program at its Macon, Georgia plant. The company had ordered its employees, represented by the Papermakers and Paperworkers Union, to wear ear plugs and muffs on the job. The union didn't buy that at all, said an international representative. It was the company's responsibility, the union said, to quiet the plant. When one employee showed up without ear plugs, the company sent him home. The next day, nobody reported with plugs. Rather than close down, the company agreed to discuss noise-control methods with the union.

Some employers fear that implementing a hearing conservation program might complicate industrial relations and start medical suits. This appears to be groundless. A recent article in *Environmental Control and Safety Management* reports: "Union leaders have been extremely cooperative and appreciative of management's interest... if properly instituted, a hearing conservation program in every instance has brought labor and management closer together in the employees' interest."

Instituting a hearing conservation program involves the following steps:

1. What shall be our policy in implementing a hearing conservation program? Outline, define, and carefully discuss the objectives with top management and plant representatives. Do we include all employees? Only those employees subjected to working in noise areas of 90 decibels? Should it include employee exposure at home?
2. Assign overall responsibility for the pro-

gram, i.e., medical director, medical department head, etc., with appropriate advice and consultation from the departments of manufacturing and labor relations.

3. Discuss with union representatives the objective of the program; place notice on bulletin boards advising employees of the program and its benefits to them; indoctrinate personnel performing the tests, keeping accurate records of such tests.

4. Test employees.

5. Education and promotion of the wearing of hearing protective devices.

A good hearing program is not expensive. All that is required is a quiet room or testing booth, an audiometer to test the hearing, a qualified audiometric technician or person to perform the testing, and about ten minutes of the employee's time. The cost of a complete testing booth and audiometer amounts to approximately \$4,000. The qualifying of personnel to administer audiometric tests involves approximately \$250. To this must be added the cost of an otologist or physician to review the tests and perhaps counsel the overall objectives of the program, and allowing employees time off from their jobs to be tested.

For employers, the expense of a hearing conservation program is minimal compared with the cost of paying for employee loss of hearing. Since 1948, when the Court of Appeals of the State of New York held that hearing damage due to prolonged noise exposure was an industrial disease for which an employee could receive compensation, other states have followed suit. In 1965, California had 206 cases in which hearing loss was claimed. By 1970, the most recent year for which figures are available, the number had increased to 620 cases. Today, 35 states and the District of Columbia recognize hearing damage as legal grounds for compensation. I recently spoke to a vice president of industrial relations of a large Milwaukee foundry. He remarked that his company instituted a hearing conservation program in 1952. Since then, approximately 700 hearing loss claims have been paid. Individual claim payments started at \$1,000 in 1952 and presently are averaging \$1,400 to \$1,500 a claim.

Hearing loss claims cost American indus-

try about \$2 million a year, which represents only a fraction of the total cost to industry. The World Health Organization estimates that approximately \$4 million a year results from lowered efficiency and increased errors caused by noisy working environments.

In our program, all new employees are given a pre-employment hearing test. The pre-employment test is very important, because it reveals which workers already have hearing damage. Recently, we tested an employee returning from Viet Nam which disclosed a slight hearing loss. Our program was placed into effect after this employee had left for military service. Had he been tested prior to his leaving for military service, we could have ascertained whether the hearing loss was due to working in our plant or as a result of noise exposure while in military service. Among those already working, only those employees working in areas of 90 decibels or more are tested. Each employee is counseled the day prior to the hearing test to insure his being in a non-exposure noise environment prior to the actual testing. A history card is completed by the employee listing his hobbies, medical history, previous work history, and military service. If his hobby is trap shooting or playing in a rock and roll band, perhaps not all of his hearing loss can be attributed to his occupation.

Periodic follow-up hearing tests are performed at six to 12 month intervals. If an

employee shows changes of 15 decibels or more at any frequency on a follow-up test, the test is repeated. Tests are performed, insofar as possible, after at least 16 hours of non-exposure to loud noise. If this cannot be done, the employee is instructed to wear his hearing protection device before he enters his work area up to the time he is tested.

At the time of retesting an employee who shows changes, we inquire as to whether the employee has been wearing his protective devices properly and inspect them to determine if they are worn or defective. We also inquire as to outside exposure, i.e., farm tractor, motorcycles, lawn mowers, and power tools, and encourage employees to wear their protective hearing devices while at home.

Smaller plants may not find it economical to purchase equipment and do the tests themselves. We suggest these plants get the help of their insurance carrier, doctor and nurse (if they have one), and an audiologist in developing a program suited to their needs.

What can never be judged in terms of dollars is the price paid by the worker who has suffered permanent ear damage because of his occupation. We have the responsibility to provide employees with the necessary protective hearing devices, controlled noise programs, and an effective hearing conservation program.

SELLING SAFETY TO THE "OLD TIMER"

By MICHAEL CAVALIER
Personnel Director, Tobin Packing Co., Rochester, New York

Selling safety to the "Old Timer" can be a very frustrating and thankless job. However, if the right approach is used by the safety director or supervisor, it can also be very rewarding. Here are some things to consider:

1. Gain his confidence by having a private discussion about safety in general, and about his job in particular. Ask the "Old Timer" for suggestions on how he can help you make his job safer. By asking him, you call on his best judgment. Most workers are proud of their judgment and will put forth their best efforts, if called upon. Asking for his opinion also implies that he is considered intelligent and trustworthy, and that you need his help. You, of course, as safety director or supervisor, must always take full responsibility. First, however, let him make a choice on how best to work safely. I am sure, if he has made a bad choice, that he will be the first to admit it. If he should fail to admit his error, it then becomes your responsibility to convince him, in a friendly manner, just how the job should be done.

2. Suggest to the "Old Timer" that you want him to teach safety to newer employees by suggesting to them safety pointers relating to his work, in order that they may be better informed, and on the alert.

3. Work on his pride. Tell him that, if he will cooperate and follow all of the safety rules religiously, he not only will set a good example but may also avoid personal injury.

4. In no event treat him like a new employee, or let him feel like one. Remember, you have only one goal in mind: to teach safety and not to ridicule.

Your job will be much more difficult if the "Old Timer" has developed some bad patterns. It is your job, as safety director or supervisor, to convince him that his method may get the job done, but may also cause him, or his fellow worker, to suffer an injury. Injuries cause pain, not only to the flesh,

but also to the employees' standard of living. For example: compensation in New York State starts after seven days of lost time. Payment from then on is up to \$95 per week. If an employee loses two weeks' work he receives \$95 as against approximately \$160 for each of the two weeks, or at least \$320 if the injury had never occurred.

Don't depend on safety rules in written form only. Have short, informal talks as often as possible. Remember, practice makes perfect. This is fine, if it is a safe practice. The only way an "Old Timer" can be convinced to change from a bad practice to a good one is through constant supervision.

Remember, you are not really starting from scratch. An older employee has seen many good and bad methods of performing the job. It is to your advantage to separate the good safety practices from the bad. Don't be discouraged; you are bound to get some "flack," just keep at it. You don't have to be a professional to teach safety. Just be patient, understanding, and use good, common sense.

Bishop James Kearney (Bishop Emeritus of Rochester, N.Y. Diocese) once told me the thing that's wrong about so-called "common sense" is that it is not common. I repeat, you don't have to be a professional to teach safety. This may surprise some of you, but let me relate something I saw on the "Today" show. Joe Garagiola was interviewing a running coach whose job was to teach professional ball players how to set their feet for a quicker start that could make the difference between being called "out" or "safe". The coach had never played baseball.

So, I say again, you don't have to be a pro, but you at least ought to use the material which is available from our Safety Council. I, personally, am sold on the "Accident Prevention Manual for Industrial Operations" published by National Safety Council. Each edition gives me more up-to-date ideas on

how to improve our safety program. There is something in this manual for all persons interested in safety. In addition to the manual just mentioned, I've made good use of the monthly "Industrial Supervisor", another excellent booklet published by the Safety Council. The many fine, up-to-date articles on safety help to drive the story home. This booklet also suggests current methods on how best to set up and conduct safety meetings. I was impressed with this sentence in an issue dated July, 1972: "Those who dare to teach

or lead must never cease to learn." How true! I hope you will take advantage of these informative manuals.

Now, let's get back to selling safety to the "Old Timer". What is the definition of "selling"? Webster describes it as "making a business of selling." If you know your product or service, selling it should not be difficult. Selling safety is a service. If selling safety to your "Old Timers" can reduce accidents, you have performed a most worthwhile service.

SAFETY BY THE NUMBERS

By HOWARD REBHOLZ
Safety director, The Rath Packing Co., Waterloo, Iowa

The accident frequency rate in the meat industry has more than doubled in the past 25 years. It now stands in the plus 40 injuries per million hours of exposure. The industry employs 356,000 workers, which does not represent a significant increase in the worker population of this industry over the past several years. We are in the "target" industry classification as viewed by the Occupational Safety & Health Administration because of our chronically high frequency rate as well as this phenomenal increase over the years.

The reasons for this increase have been speculative for lack of good sound research into the cause. Although the industry has changed its character in the past 10 or 15 years, primarily towards the decentralization of plants as well as functions within larger companies, this is not necessarily a prime cause of injury frequency rate increases. Some of the newer, smaller plants who have start-up problems with new equipment and new employees may naturally be viewed as culprits in this area. However, we find that many of the larger plants that formerly had good records have experienced increases pretty much in line with the rest of the industry, so there is no fundamental degree of correlation here.

When meat industry rates were at their lowest, approximately 20 years ago, we were never in the ball park with rates reported by motor vehicle, industrial chemicals, basic steel, or textile industries where the basic physical hazards are no doubt equal.

The President's report on Occupational Health & Safety published in May, 1972 shows a degree of correlation between average weekly earnings and frequency rates. This correlation shows that some industries with higher rates of earnings tend to have higher injury frequency rates, and those with lower weekly earnings have lower rates. However, where 10 of the highest and 10 of

the lowest rate industries are compared, average weekly earning rates are about the same. There is a closer degree of correlation, perhaps, in the production worker—management ratio that seems to make sense. About 75 per cent of the persons employed in the meat industry are involved in production operations and are thereby exposed to a greater degree of hazards, whereas only 25 per cent involve themselves in managerial and staff functions. Compare this with the rate of the grain-milling or industrial chemicals. The ratio of production to management is completely reversed, because these industries are highly automated and the percentage of workers exposed to production and process hazards is extremely low.

Our problem may partially stem from tradition. Automotive, steel, and metal working operations can be inherently dangerous to the point of producing catastrophic-type injuries because of the highly hazardous nature of many of their operations. These companies have responded magnificently to the accident prevention challenge of hazards such as handling hot metal, stamping, forging, machining, etc. with a high degree of sophistication in making their processes safe. They naturally use the Z-16 formula for measuring progress or lack of same. A great deal of organizational effort has been expended towards getting people back on the job so they did not become contributors to an increase in their rates. On the other hand, the meat industry is one in which injuries are quite frequent but less severe. In other words, most disabling injuries are of relatively short duration and, of necessity, food handlers can't perform the normal duties of their jobs with even minor disabilities because of possibilities of infection or contamination. Therefore, we might conclude that the management of our accident rates has not measured up to that of other industries. This, however, does not ex-

plain the phenomenal increase in our rates over the past few years, because I don't think we're managing this area fundamentally any different than we ever did, and the other high hazard industries mentioned earlier have not had increases and in many cases have improved their rates substantially.

A rather freakish trend in accident rates deals with economics of the industry. The meat industry prospers inversely with the general economy. In other words, when the economy is booming, the meat industry has a hard time making substantial profits because product demand increases beyond the capability of the agricultural industry to supply raw material in the form of live animals. Consequently, the prices of raw material which represent a big percentage of the ultimate selling price tends to depress profit margins. Curiously enough, accident frequency rates go up when profits go down. This does not necessarily mean that meat packers trim their safety budgets to the bone in rough times but there may be some psychological implications here. A very objective study by a large corporation in Illinois a few years ago showed close correlation between accident rates and plant layoffs or transfers. When things were going bad in this company, both accident frequency and severity skyrocketed. It was rather easy to measure by the researchers because of the nature of the company; it was quite oriented to contracts that were subject to unexpected terminations.

In August, 1971, a representative group of safety and operating people met at the American Meat Institute's headquarters in Chicago to discuss several aspects of meat plant safety. Each of participants provided a list of 200 injuries recordable under OSHA regulations. This list was subdivided by accident categories targeted to easily identifiable hazards and unsafe acts in the industry. Most of the respondents to this survey represented fully integrated meat plant operations. The results of this follows by injury categories:

Category	Per Cent
Knife.....	22
Struck by.....	15
Struck against.....	11
Strains from exertion.....	9
Strains from repeated motion.....	8

Caught in or between.....	8
Falls from same level.....	8
Slips with no fall.....	5
Miscellaneous.....	4
Falls from different levels.....	3
Eye injuries.....	2
Burns.....	2
Occupational illness.....	1

This list was expanded with another 400 cases reported later and added to the survey. There was essentially no difference in the injury profile. We have since received reports from a few non-integrated plants devoted primarily to single species slaughter and dressing. The profile is similar; however, the frequency of knife accidents exceeds 30 percent, which reflects the high percentage of knife usage in such operations.

From this report and other facts that were developed at the meeting at Meat Institute headquarters, a Meat Industry Safety Committee was appointed. The committee consists of meat industry associations, employee representatives, government representatives, the National Safety Council, insurance representatives, meat manufacturing company representatives, and meat industry personnel having safety responsibilities. There are three sub committees: one will deal with standards and variances; another is concerned with research and statistics; and the third is concerned with training and motivation.

As chairman of the Research and Statistics Committee, I currently have a number of studies underway and will continue to use the accident profile mentioned earlier periodically to measure improvement in the areas of greatest concern. Our Research Committee is currently studying the incidence of accident and injury involving meat saws in hopes of developing material for the Standards Committee to come up with something meaningful in that area.

At this time, the Research and Statistics Committee has no intention of measuring injury rates, because this would represent a duplication. I believe that the Z-16 formula, based on only lost-time injuries, will soon be a thing of the past. The government is currently studying the newer ANSI formula based on the number of recordable injuries per 100 employees per year. This type of for-

mula will, perhaps, put the meat industry in better perspective because we seem to take people off the job and throw them into the Z-16 measurement category at a rate of about 10 times higher than the average of industry in general. Thus, with the expanded

scope of the new formula covering all types of injuries regardless of loss of time, we think we may look better "by the numbers" in the future when compared with the broad cross section of industrial reports.

SEARS TOWER—LIFE SAFETY AND FIRE PROTECTION SYSTEMS

By C. W. SCHIRMER
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A city within a city is now under construction in downtown Chicago. It will rise 110 floors above the street, a total of 1,450 ft. and will contain an area of 4.5 million sq. ft., approximately 101 acres. It will be the tallest and largest privately owned office building in the world. Ultimately, it will house over 16,500 people, a population equivalent to many cities and towns across the country. It is, in fact, somewhat like a city turned on end.

Is it any wonder then, that in its early design stages, Sears' management decided that this building, a symbol of the American business system, should include the optimum in life safety protection considerations. Concern for life safety is a major foundation of Sears' loss prevention philosophy.

What are the major characteristics of the life safety system in this structure. How will it operate? We must remember that a major portion of the building is beyond the physical capabilities of one of the finest fire departments in the world. This consideration alone, makes it imperative that any fire not only be detected in its early stages, but that automatic action must be initiated to control and extinguish the fire.

The three lower levels of the building and the Franklin Street Concourse will contain areas of approximately 125 to 135,000 sq. ft. each. From the plaza through the 49th floor, the building changes in area to approximately 50,625 sq. ft. per floor. From the 50th through the 65th floor, the areas are cut back to 39,375 sq. ft. and from the 66th through the 89th floor, areas are approximately 28,125 sq. ft. The top of the building from the 90th floor up contains 11,250 sq. ft. per floor.

The primary life safety tool used in the Sears Tower is a total automatic sprinkler system. This will not be a partial system pro-

tecting only the "hazardous areas"—it will be a complete system covering all areas.

A review of the National Fire Protection Association Sprinkler Performance Tables 1970 Edition, gives an indication as to why sprinklers were chosen.

In the office category, automatic sprinklers have demonstrated a 97.4 percent satisfactory performance ratio. If we delete partial protection, inadequate water supply, faulty building construction, inadequate maintenance, and antiquated systems as causes of unsatisfactory performance, the effective ratio increases to 98.8 percent. Inasmuch as all of the control valves in this particular building are to be electronically supervised, we might also delete the closed valve problem which increases the effective ratio to 99.6 percent. In the fires in sprinklered office buildings reported by NFPA, an average of three sprinklers controlled or extinguished the fires. The Australian and New Zealand fire records from 1886-1968 in 122 sprinklered office fires indicated a 100 percent satisfactory performance ratio with an average of 1.4 sprinklers operating in each fire—neither in the United States nor in New Zealand is there any record of a fatality in a fully sprinklered office building.

In designing the automatic sprinkler protection for Sears Tower, it was necessary to consider a modular design concept. A 17' 3" deep band around the perimeter on all floors above the street with the exception of sky lobbies includes peripheral office space. Both the architect and the owner indicated a desire to be able to place a partition at any 5' point around this perimeter with a minimum amount of change necessary in the various building systems such as ceiling, lighting, air conditioning, and sprinklers. The original

ceiling pattern scheme provided for location of partitions at any of the 5' points with no change in sprinkler installation in the peripheral offices.

During the design stage on the Sears Tower, the National Fire Protection Association Sprinkler Committee had assigned a Subcommittee to the study of automatic sprinklers within high-rise buildings. This particular Subcommittee investigated the results of automatic sprinkler protection in various types of office structures and light occupancy classifications, sprinkler discharge patterns, water supplies, structural features and other items normally found in high-rise construction. The results of their study are found in new Chapter 8 of NFPA 13 which was presented to the National Fire Protection Association Annual Meeting in Philadelphia in May of 1972 for official adoption. The new Chapter 8 was studied and decision made that the provisions of this Chapter should be incorporated in Sears Tower if they were found acceptable to both the Chicago Fire Department and Sears Insurance Carrier. Both of these approving bodies agreed that the latest fire protection concepts as contained in Chapter 8 should be incorporated in the Tower.

The new standards allow sprinkler coverage at 225 sq. ft. per sprinkler as opposed to a former 200 sq. ft. per sprinkler requirement. With this change, it was possible to revise coverage in the general office areas from the 15' x 10' spacing formerly used to 15' x 15' or the full 225 sq. ft. This new configuration fits perfectly into the reflected ceiling pattern involving ceiling tile, lighting and air conditioning.

A review was then made of operating tests and data on automatic sprinklers with a 10 lb. operating pressure at the end sprinkler. It is interesting to note that the discharge pattern covers a 12 ft. radius circle at the floor and wets walls to a height of 5 ft. above the floor where sprinklers are 8'7-1/2" from a partition. These studies, as well as studies of various other discharge pattern tests from the sprinklers to be used in the Tower, led to a change in sprinkler configuration for the peripheral offices. With the new layout, the 86-25 sq. ft. per head coverage which was ob-

trained in 10' wide and 20' wide offices under the old pattern was increased to 172.5 sq. ft. per head. In 15' wide offices, the increase was from 86.25 sq. ft. per head to 128.4 sq. ft. per head. Within the general area as previously indicated, coverage was increased from 150 sq. ft. to 225 sq. ft.

The system is now being hydraulically designed based upon a discharge density of 0.1 gallon per minute per sq. ft., based on all sprinklers in the remote 1500 sq. ft. operating. This design criteria is, of course, in accordance with Chapter 8 of NFPA 13. Some interesting changes in pipe sizing occur under the new concept. Branch lines formerly included two lengths of 1 in. pipe, one length of 1-1/4 in. pipe and one length of 1-1/2 in. pipe. Branch lines under the new concept are all 1 in. pipe with some minor short starter pieces of 1-1/4 in. Cross mains were formerly all 2 in. and 2-1/2 in. whereas under the new system cross mains are all 2 in. Former 3 and 4 in. feed mains have been replaced by 2 in. feed mains with minor sections not exceeding 25 to 30 ft. of 3 in. pipe.

The cost saving in converting from the ordinary system under former sprinkler rules to the new system was approximately one-quarter million dollars.

The sprinklers are being supplied from two standpipes within the lower levels of the Tower where two systems are in order and are being supplied from one standpipe in the upper levels of the Tower. Control valves are provided on each floor located within the stair towers. The installation of these control valves allows alteration with a minimum amount of impairment to protection. Considering the modular concept of ceiling sprinkler patterns included in this design, it is anticipated that changes will be few and far between.

Basic water supplies to the sprinkler system are from two 8 in. connections to 16 in. and 24 in. major circulating city water mains in Jackson Boulevard and Wacker Drive. The normal city pressure is 35 psi.

A 1500 GPM 110 lb. net pressure booster pump, taking suction from these connections supplies Zone 1 which comprises the lower levels through the 16th floor (236 ft. elevation). (Fig. 4-A), the Zone 2 pump, which

supplies the 17th through the 29th floor (400 ft. elevation), is a 1500 GPM 105 psi net pressure pump and takes suction from the discharge of the Zone 1 pump.

A 10,000 gallon tank is located on the 31st floor (425 ft.) and provides suction to the Zone 3 fire pump. This pump is a 1500 GPM @ 150 lb. net pressure pump and serves the 29th through the 46th floors (634 ft. elevation). The Zone 4 pump takes suction from the discharge of the Zone 3 pump and is a 1000 GPM @ 90 psi rated pump. The Zone 4 pump serves the 47th through the 63rd floor (855 ft. elevation). A 5000 gallon tank is located on the 64th floor (855 ft. elevation) and provides a suction supply to the 1000 GPM @ 131 psi Zone 5 pump which serves the 64th through the 76th floor (1026 ft. elevation). A 1000 GPM @ 65 psi net pressure pump takes suction from the Zone 5 pump and serves Zone 6 which includes the 77th through the 87th floors (1160 ft. elevation). An additional 5000 gallon tank is located at the 88th floor and provides suction to a 500 GPM 180 lb. pump which serves Zone 7, the 88th through 110th floor (1452 ft. elevation).

The tanks described above are filled by 2 in. automatic float valve connections from the domestic pumping system and by 4 in. emergency connections from the domestic supply controlled by manual O.S. & Y. valves. This domestic system has a pumping capacity of 1400 GPM at the 10,000 gallon tank on the 31st floor, 1200 GPM at the 5,000 gallon tank at the 64th floor, and 1000 GPM at the 5,000 gallon tank on the 88th floor. The tanks are also capable of being filled automatically by the fire pump supplying the zone immediately below the tank involved through an automatic float valve control. The tanks, therefore, are essentially holding tanks, but still have capacities of 66 minutes for Zones 3 and 4, and 33 minutes for Zones 5, 6 and 7, assuming no makeup from any the available fill supplies.

Electrical power to the fire pumps is supplied both from connections to the normal public utility and from the building emergency generator system.

Considering the average number of sprinklers open in fires in office structures, both in

the United States and in Australia and New Zealand, it is quite doubtful that the operation would actually extend beyond the operation of the Zone 7 fire pump. Even considering operation of the full sprinkler hydraulic demand of 150 GPM (plus an approximately 15% design loss), the fill connection controlled by the automatic float valve from the domestic water supply should provide sufficient makeup water to handle any automatic sprinkler usage. As such, it is doubtful that the lower level fire pumps would be called upon for sequential filling operations unless hose stream demand was necessary.

To guard against a pump being out of service at the time of a fire emergency, it was decided during the design stage that redundant pumping facilities should be installed above the level to which fire department pumps could supply water (approximately 500 ft. within the City of Chicago). With this in mind, a 1500 GPM @ 150 lb. spare pump is provided for Zones 3 and 4, (Fig. 4-A) a 1000 GPM @ 131 lb. spare pump is provided for Zones 5 and 6, and a 500 GPM @ 180 lb. spare pump is provided for Zone 7. The operation of these spare pumps is explained in Figures 5, 6 and 7, with regard to the Zone 3 and 4 spare pumps. Similar arrangements are, of course, available for Zones 5 and 6 and for Zone 7.

In order to use the spare pump as a replacement for the Zone 3 pump, it is necessary that four normally closed valves be opened and that three normally open valves be closed. When the Zone 4 pump is being replaced by the spare pump, it is necessary that six normally closed valves be opened and that two normally open valves be closed.

The standpipe risers within the Sears Tower have valve capped 1-1/2 in. hose connections located in the stair towers. Additional 1-1/2 in. hose connections are not provided out in the general office area. The standpipes are capable of delivering a minimum of 250 GPM @ 50 psi at the top of any individual zone with cumulative capacities provided by the pumps of 1500 GPM on the 1st through 46th floors, 1000 GPM on the 47th through 87th floors, and 500 GPM on the 88th through 110th floors.

The overall water supply design at the request of the Chicago Fire Department is based on a 10 psi residual pressure at the street. Inasmuch as the normal residual pressure even during peak demand periods is estimated to be 35 psi, an appreciable safety factor is introduced.

In addition to the automatic sprinkler system, a highly sophisticated fire and security alarm system is contemplated. Waterflow annunciation will be provided by system by floor. All elements of the sprinkler water supply system will be supervised, including control valves, fire pump power, fire pump running, and tank water level. Products of combustion detectors are to be installed at the return air inlet on each floor and will be zoned within the fire alarm system so that it is possible to detect the floor involved if any products of combustion detector operates. Products of combustion detectors will also be installed in accordance with NFPA 90-A in the return air duct and downstream of the filters at the fan units. These signals will all be monitored by an Alpha 3000, 1000 point per second interrogate-response processor which will be located in the building security center. In the event that the fire and security processor is out of service, signals can also be monitored by the building control systems Delta 2000 processor. Figure 8 illustrates the sequence of signals expected upon operation of sprinkler head in the upper zone, in this case, the 103rd floor. As previously mentioned, it is highly doubtful that it would be necessary for the lower zone fire pumps to provide additional supply to the 88th floor tank and, as such, the fusing of a sprinkler head on the 103rd floor would most probably result only in a waterflow signal indicating the 103rd floor, plus a fire pump running signal from pump Zone 7. Signals which are printed out on the fire alarm receiving console in the building security center are also repeated on a printer in the building engineer's office. Receipt of an fire alarm signal results in the conversion of air conditioning fans to the fire mode. This is explained further, later on. The fire department is notified by security personnel immediately upon receipt of any fire signal (waterflow or products of combustion detector at floor return

air).

The security system components cannot be discussed here in detail for obvious reasons. Suffice it to say, that this system embodies the very latest in devices and methods.

Smoke has been indicated in all studies of high rise fires as a major problem. It is doubtful that it presents anywhere near the same problem in a fully sprinklered building that it does in a unsprinklered building. It cannot, however, be ignored even when the most sophisticated systems are installed.

The Sears Tower will be a full fire resistive Type I construction and will have 2-hour enclosures at all vertical openings with the exception of closed head sprinkler water curtains located at glass enclosures for any open escalators or monumental staircases which might be located in lobbies. Unfortunately, the decision to install automatic sprinklers within the Tower was made too late to be able to take advantage of major construction savings available in the fireproofing requirements of building components. Vertical opening enclosure would, of course, have been provided in any event.

Upon receipt of a sprinkler waterflow alarm, or the operation of one of the products of combustion detectors at return air inlets at any floor, the air conditioning system as previously mentioned converts to the fire mode. This involves closing the supply damper to the floor involved automatically. The return air system then converts to 100 percent exhaust and continues to operate. In the event that the return air fan system was not on at the time of a fire signal, it would automatically be turned on. The supply fan system is converted to 100 percent fresh air and continues to operate after receipt of the fire signal. In the event the supply fan system was not operating at the time of fire signal receipt, it would automatically be turned on. This sequence of operation results in a pressurization of floors other than the actual fire floor and assists in reducing the amount of smoke spread through the building. The return air system serves as a smoke and products of combustion exhaust system. Operation of the products of combustion detector in the return air duct at the fans, will result in conversion to 100 percent fresh air

and 100 percent exhaust. Both the supply and exhaust fans will continue to operate with no intermixing. In the event the fans are off at the time of such a signal, they will automatically be turned on. It is very unlikely that these detectors would operate prior to return air inlet units inasmuch as the return air inlets would normally detect products of combustion or smoke prior to the detector at the fan picking up this situation. The dilution of such products of combustion or smoke would probably preclude these detectors operating for some period of time.

In the event a detector downstream of the filters operates, the supply fan will immediately shut off automatically and fresh air dampers will close. At this point, the system is converted to 100 percent exhaust and the exhaust fan will continue to operate or will be turned on automatically in the event it is off at the time of this detection.

The fire department has capabilities for manually controlling all fan systems into any desired mode from the building control center.

Elevator control has also been indicated as a major high-rise fire consideration. It is, of course, essential that the fire department have available an elevator dedicated to their use for fire fighting operations. The Sears Tower will include a large freight elevator serving all floors. This particular elevator will be controlled by fire department recall from the concourse level. The elevator will not respond to other signals after the fire department key has been activated.

Upon receipt of a signal of fire at the security center, the security personnel will activate the fireman's return for all elevators serving the floor involved in the fire situation. Elevators within that zone will automatically return to their bottom terminal floor. If the fire has occurred at the terminal floor, the elevators will go to the nearest floor in the direction they were traveling, other than the terminal floor, and stop. From this point on, these elevators will no longer be operative. In the event the fire has not occurred on the terminal floor and the elevators have returned to the terminal floor, they will be available for fire department use. The fire department will be supplied with keys which

can be operated from the cab of these elevators. These keys will be the same as the master fireman's elevator key. When individual elevators, other than the main fireman's elevator, have been taken over through the use of keys within the cab, the light beams at the elevators which operate across the doors are rendered inoperative. The doors will not open at any floor unless the door open button is depressed and held within the elevator. This requires one man to stay in the cab while the remainder of the fire fighters leave the elevator for whatever activity they may be involved in.

Communications under fire conditions is a major concern in high-rise construction. A building communication system will be installed throughout Sears Tower. It will be possible for the fire department to give instructions to individual floors or groups of floors or to the entire building from the building security center. It will also be possible for the fire department to communicate to the security center through security telephones in the lobbies and have their messages retransmitted by the building security personnel over the communication system.

The employees' fire brigade within the Sears Tower or emergency organization will be knowledgeable in the pertinent building fire control systems. Pre-planned emergency procedures will be developed for partial evacuation, second phase evacuation, and under extreme circumstances, total evacuation. Security and maintenance personnel are to be included in the employees' fire brigade.

Visual slide displays will be made of appropriate emergency procedures at the security console when an alarm condition occurs. These displays will assist in assuring that proper procedures are followed.

Chicago Fire Department personnel have been helpful in review of all design considerations on all systems within Sears Tower. They are totally aware of what is being installed and how it will operate. The fire department will be a welcome part of the training and organization of the Sears private fire brigade.

The Sears Tower in its conceptual stages included all of the elements of the fire protec-

tion problems of the 70's and 80's - the possible "Great Chicago Fire" of the future. The top management of Sears recognized these problems and decided to solve them rather than ignore them. The best fire protection tools and concepts available have been integrated into the building design - complete

sprinkler protection, sophisticated alarm and security systems, smoke control systems, elevator control and personnel procedures. As a result, the tallest and largest privately owned office building in the world will also be a model of the fire protection systems' approach of the future.

EMERGENCY PLANNING AND EVACUATION

By HENRY H. BROCHHAGEN
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Almost four years ago a group of men decided that a need existed for emergency planning and the development of evacuation procedures for high rise and other high occupancy buildings. This need was identified by members of the Buildings and Offices Division of the Trades and Services Section at a time when we had not yet experienced the rash of disastrous fires which was still to come.

The ideas were formulated by the committee on the basis of their vast combined experience in insurance and fire and public safety. The foresight of this group laid the groundwork for developing a guideline on the subject. Subsequently it was my good fortune to become chairman of the division and thus I became involved in development of the guideline for programming evacuation of high rise buildings.

There are many buildings which require an emergency evacuation program, but for some reason or other do not have one. This is at least partially due to the fact that until only recently we were not aware of the extent of the hazard which existed in the so-called "fireproof" or fire-resistant buildings. Even in those cases where a building is so well constructed that there is very little in the structure which will burn, there are still the contents. Some recent fires have shown that furnishings and other contents present some very serious fire-exposure hazards. This, coupled with the fact that building management in general does not have the personnel with knowledge and experience in this area, highlights the need for help. The guidelines developed by our committee were intended to provide some of this needed assistance.

Since the need was universal, and since the conditions in each building vary so tremendously, it was very difficult to decide on the exact approach to take. Ideally it would have been great to be able to develop what I refer

to as a "cookbook solution." This would mean, listing each and every step in a program in such precise detail that it could then be followed just as you would follow the recipe in a cookbook. If each recommendation on the list were carefully followed then the building concerned would have the "perfect" emergency plan and program. Unfortunately, as you and I know, life is not that simple. There are always complicating factors which make it impossible or impractical to apply a given set of rules to all situations. The net result is that the best we can usually hope for is some form of guidance that includes some good workable operating principles.

It was decided that the latter approach would be followed by the committee. Our goal was to provide a type of well-developed outline which any building management could use to develop a comprehensive program tailored to its own very special set of conditions. This concept appeared relatively easy to accomplish until we actually started on it in detail. Then it quickly became apparent that every idea had to be carefully reconsidered many times in order to be reasonably certain that we had neither over-generalized to the point of severely limiting its usefulness nor become overly specific so that many buildings would be automatically excluded. For example, we could not specify a floor-by-floor telephone communication system for all buildings when some might already have an excellent public address system that would do the same job. Whenever possible, this meant recommending performance-type standards rather than design standards.

In order to achieve our goal, the proposed guidelines were broken down into four major divisions representing those program areas which, it was felt, logically appeared to go together to make up a coordinated whole. These divisions were: (1) *Coordination of*

movement, (2) *Communication to direct movement*, (3) *Education and training of control teams and building occupants*, and (4) *Inspection to evaluate and assess the program*.

While a number of varying divisions and approaches were considered, this one was selected because it appeared to best satisfy the requirements of a comprehensive program. The first element of concern in any emergency in a building is to move the people safely away from the danger area. This involves the coordination of many people and separate activities. Thus, it became the starting point for our recommended program.

The next logical step would be to set up and maintain a communications system capable of handling any demands placed upon it in the process of relaying vital information, directions and commands relative to the orderly movement and evacuation of people. This became the second major element of the program.

Having set up the means for accomplishing the task, it follows that the people involved, especially those playing a major directing or controlling roles, need to be prepared for their responsibilities. This involves education and training to varying degrees for different personnel. The more responsible individuals require greater knowledge of how and what to do in the emergency, and in addition need constant refresher training to keep up with the latest changes in procedures and physical plant. On the other hand, the average employee or tenant in the building requires much less knowledge. However, even these people need indoctrination and periodic refresher training in how and what they need to do to save themselves in an emergency situation. Thus, education and training became the third major element in the program.

When everything has been organized and put into operation it becomes important to "build in" a procedure to monitor its effectiveness. Thus, inspection became the last major element to be added. Evaluation and assessment on a regular, continuing basis can only be accomplished by some formal type of inspection procedure. The salient features for this were recommended in a questionnaire-type format designed to stimulate the user

into thinking and planning along the most productive lines.

A program was developed and after some revision was circulated for comments and evaluation to a number of knowledgeable people. Feedback of these comments enabled the committee to make additional improvements and to consider the means for promoting and distributing the final product, which was intended for ultimate development as a National Safety Council data sheet provided that it met with sufficient interest and approval from around the country.

As it developed, the guideline met with great approval from the many people who were kind enough to review it and to pass on their comments and suggestions for improvement. After the initial series of revisions, copies were sent to several magazines along with short articles on the subject. As a result, articles appeared in the November 1971 issue of *Skyraper Management* magazine and in the March 1972 issue of *Security World* magazine. Reference to the guideline also was made in the April 1972 issue of *Administrative Management*.

Readers wrote for copies from all over the United States and Canada. More than 125 guidelines were sent out in response to these requests. To date we are still receiving requests, some of which we have not been able to answer due to the fact that we are now out of print. At this point a final revision was made and the manuscript was sent to the Council for possible release as a data sheet. At present it is in the process of being reviewed, and we look forward to a positive decision in the near future.

This brings the history and development of the guideline up to date. Now I should like to go into some detail on the content.

Coordination

A section on program coordination deals mostly with the movement of people because this is the primary concern in any emergency situation. The type of building management as well as the type of tenant occupancy play a major role in determining the way in which a program will, or even can, be developed. It is readily apparent for example that a build-

ing with a single type of tenant occupancy will require a different kind of coordination than will one with multitudinous small-tenant occupancy. Procedures must be established for making important decisions in times of emergency: who will be responsible for what, and will his authority be recognized and accepted? It goes without saying that such things cannot work smoothly without extensive pre-planning. Guidance is provided for accomplishing all of the above.

Critical decisions on when, how, and what floors are to be evacuated must be made not only by persons with the authority to carry them out, but also by persons knowledgeable in areas related to the construction and operation of the building. No guidelines can provide the specifics of such planning for all possible cases; therefore it was done in a general manner by indicating the items which require attention, and suggesting people to do the planning. The emergency functions of various building officials such as the building manager and chief engineer were suggested. Whenever possible, correct procedures that apply universally were recommended.

Emergency-evacuation floor teams are recommended as an important means of coping with any emergency at the floor level. These teams should be prepared to help visitors and employees leave the floor safely by means of the fire stairs when directed and should check to see that no one is left behind. Their importance in the overall coordination of the program stems from the fact that they are the first-line, trained personnel, familiar with both the area and the people in it.

The use and control of elevators is self-evident in any emergency, and is a subject which is receiving a great deal of attention these days. The need for control is stressed and specific recommendations are made, with references, to the elevator code. The importance of not using elevators in any fire emergency except under the control and direction of fire officials is stressed. Since there have been cases of elevators stopping at floors where fire hazards exist, it is best that all necessary plans be made to preclude their use by the public under these conditions.

Traffic flow must be well-coordinated, and specific recommendations are made as to

handling this problem. Actual examples are cited to show how the flow of traffic should be regulated.

Communication

Communication during an emergency must be carefully pre-planned and tested in order to maximize its effectiveness. If means of communication breaks down and there is no effective back-up system, then orderly evacuation or other emergency action is severely jeopardized. The guideline specifies various emergency requirements for communication systems and suggests methods which might be used to meet such emergencies.

In addition to the communication requirements during an emergency, there is also the need for communication at times prior to the development of an emergency. This includes contact with the tenants or appointed members of their families in order to develop and implement the necessary program elements. Contact must also be maintained with local police and fire departments to keep them informed of any change in the established plan.

Methods for communicating information about evacuation procedures and priorities to people in all parts of the building are discussed. The value of two-way communication between the building control office and each separate floor is stressed, and suggestions are offered for achieving or approximating this ideal under emergency conditions.

Education and Training

The third major classification—education and training—concentrates on two phases, the initial education and the continuing education or re-training. This is further subdivided into the education of building occupants, which is rather superficial in extent, and the training of emergency-evacuation floor teams, which must of necessity be more comprehensive. The latter includes handling of the physically disabled, floor searching, messengers, traffic control, and similar duties.

To some extent, education and training may be considered an extension of communi-

cation, and therefore there may be some overlap of coverage. The distinction between the two is mainly a matter of time, the short-term, limited information transmittal falling under the heading of communication and the longer range, more extensive information-transmittal being the education and training phase. Both are extremely important and therefore merit separate coverage.

Inspection

Our final classification deals with inspection and evaluation. The first and most comprehensive inspection is that required prior to development of a program for a specific building, for only with the full information thus revealed can a meaningful evacuation program be developed. Subsequent inspections will serve to *evaluate* this program and call attention to necessary revisions.

For the evaluation-type inspection it is recommended that an "Emergency Plan Inspection Form" checklist be developed. This would have to be "tailor-made" for each building as part of the plan development.

The guideline suggests specific topics or items to be covered and recommends the frequency of inspections. Typical subjects for the checklist are indicated below. These are further developed by posing specific questions, the answers to which will constitute an evaluation of the program. An example of this would be:

Emergency Exit Doors

- (a) Are all emergency exit doors properly identified? Are the exit door location signs easily visible?
- (b) Do these doors open easily? Swing in proper direction?
- (c) Are any exit doors blocked, chained, locked, partially blocked, obstructed by file cabinets, coat racks, umbrella stands, packages, etc.?
- (d) Are all emergency exit doors self-closing? Is there complete closure of each door?
- (e) Are all emergency exit doors kept closed? Or are they "occasionally" propped open for convenience, or to allow for ventilation? (This practice is prohibited.)

PATRON INJURIES AND STATISTICS

By RAYMOND C. ELLIS, Jr.
Vice President, Hotel Safety Group, Inc., New York, N. Y.

As a member of the National Safety Council staff from 1955 through 1961, I recall the faithful few who considered how we might get our several managements concerned and effectively involved in accident prevention activities within the trades and services industries. It took the Williams-Steiger Occupational Safety and Health Act of 1970 to accomplish what we had tried to do.

As I review patron injuries and statistics, I wonder whether management will again wait for Uncle Sam to tell us what to do and how to do it in the prevention of patron injuries and in the recording and reporting of such injuries when they do occur. Will there be a Ralph Nader or some other consumer proponent who will motivate our managements to "get up and go" in the area of patron injuries control?

Many of you are aware that the Council, and specifically the Trades and Services Section, were involved in the development of the USAS Z108.1-1968 USA Standard Method of Measuring and Recording Patron and Non-Employee Injury Statistics; later to become an American National Standards Institute Standard. Its purpose and scope indicate the vision of industry safety leaders.

The purpose of this standard is to provide a practical and uniform method for recording and measuring frequency and cost of injuries involving patrons or persons not employed by the reporting facility.

The methods outlined in this standard for classifying patron injuries are independent of the reporting requirements of insurance carriers which may provide patron injury claim service to an establishment. Accidents resulting only in property damage without involving a chargeable injury are not included in the scope of this standard. The standard was revised in 1971 under the American National Standards Institute designation.

Unfortunately, the standard has had little

use. A few of the national trades and services associations have reviewed the possibility of utilizing the standard, but they have not received too much support to date.

Probably the most difficult problem confronting the committee was the necessity for establishing a base. Of course, this was developed prior to the advent of the OSHA 100 Log with its abandonment of the manhour concept, and we thought in terms of relating patron injuries to some factor similar to manhours. It was recommended that the national associations be called upon to determine the exposure base.

3.1 Patron-Days. The total number of patron-days available for potential accident experience (total number of patrons multiplied by the number of days during which the service is available.)

3.2 Patron Transactions. Total number of patron transactions (total number of persons accommodated during the time period covered).

3.3 Patron-Hours. Total number of patron-hours available for potential accident experience (total number of patrons accommodated multiplied by the number of hours during which service is available).

3.4 Admissions. The total number of patrons admitted to an event conducted on the service premises whether by paid admission ticket or complimentary pass.

3.5 Area. The total number of usable square feet of floor or service space on the service premises.

3.6 Frontage. The total number of linear feet contained in the entire property line abutting upon a public street or highway, including all alleys having sidewalks on one or both sides and all alleys on which a principal entrance is located.

3.7 Payroll. The entire remuneration received for services rendered by an employee, whether paid in money or a money substi-

Fifty organizations had no injuries, and the remaining units reported from one to 10 patron injuries.

To establish the Patron Injury Loss Rate, we take the dollar value of incurred losses times a constant (arbitrarily set at \$10,000) divided by gross sales. One hundred forty-nine injuries cost \$50,299 times \$10,000 incurred cost of claims, divided by \$79,212,000:

$$\frac{\$50,299 \times \$10,000}{\$79,212,000} = \frac{\$502,990,000}{\$79,212,000} = \$6.35$$

While this permits internal review and comparisons, it fails to provide a basis for comparison with other establishments within the lodging industry.

We are inclined to believe that this is essentially a good record. Review of actual injuries has focused corrective attention on slips and falls in tubs and walk-through incidents involving glass panels and doors.

As indicated initially, the industry again has the opportunity of recording and controlling an area of injury experience voluntarily; or may wait for a consumer advocate to implement the legislation that will dictate our methodology of statistical and accident controls.

tute.

3.8 Receipts. The gross amount of money charged to patrons generally for services, admissions, or entertainment (as opposed to products), including taxes.

3.9 Sales. The gross amount of money charged by the company or by subsidiary companies, for all goods and products sold or distributed, including taxes.

3.10 Unit. (Often referred to as "each.") Specifically designated unit of exposure; for instance, per person, per pupil, per vehicle, per mile (for public sewers), or per location/day (for social gatherings on premises not owned by the company).

Reviewing 141 lodging units for the year 1971, there were a total of 391 claims. Of these 149 were patron injuries reportable under the standard. Utilizing gross sales of \$79,212,000, we establish the following Patron Injury Frequency Rate:

$$\frac{149 \times 1,000,000 (\text{Constant})}{79,212,000} = \frac{1.8 \text{ or approximately two injuries per } \$1 \text{ million in sales}}$$

Since our average unit has one half million dollars in gross sales, the base line for this particular group of establishments becomes one injury as a norm.

A SAFETY SELF-INSPECTION PROGRAM FOR A FOOD SERVICE ESTABLISHMENT

By VERNON E. CORDELL

Director, Public Health and Safety, National Restaurant Association,
Chicago, Ill.

Why is a self-inspection program of importance to a foodservice operator? Both customers and employees are exposed to the safety and health hazards inherent in a foodservice operation. The employee faces all manner of operational hazards during his duty day. Few types of work confront an employee with such a multiplicity of types of hazardous equipment and conditions. Involved, on a routine basis, are the use of cutting, chopping, grinding, mixing, slicing and ware-washing equipment; high and low-pressure steam used in pressure cookers, urns, steam tables and for cleaning; microwave ovens; hot water, hot cooking fats and other hot liquids; floors made slippery by accidental spillage of fats or liquids, and even the hazards involved in the traffic patterns of many people busy getting out meals. The safety of the customer is involved every time he or she enters the establishment, and this may be as frequently as several times a day.

The foodservice operator's interest in protecting both customers and employees is not primarily to meet the requirements of the Occupational Safety and Health Act and the local sanitation regulations, or to provide evidence to the OSHA inspector and the public health department inspector on the occasion of their relatively infrequent inspection visits. The operator's moral obligation to protect both customers and employees is of primary importance! The operator's desire to survive and to operate a successful business is of primary importance to him!

Many factors are pertinent to the economics and the practical aspects of achieving an effective, continuing operation. Employee injuries can mean compensation costs and loss of their services. Customer illness or injury can mean claims, law suits, and loss of

patronage.

The foodservice operator cannot afford to ignore safety in his operation. He must personally involve himself in seeing that employees are properly instructed and supervised; that hazards to health and safety are identified and either controlled or eliminated. A comprehensive and effective self-inspection program is essential to provide the operator with the information that he must have to evaluate the effectiveness of his sanitation and safety efforts and to indicate to him the weak points which require action on his part.

Who should make the inspections?

The effective protection of both employees and customers can be achieved by requiring that both managers and supervisors be involved in a continual job of self-inspection of both practices and facilities. Establishment personnel who should be scheduled to perform inspections in the foodservice establishment would normally include the owner/operator or manager, departmental supervisors, night managers or supervisors, and safety and sanitation consultants under contract to perform inspections.

What activities and facilities should be covered?

The safety and sanitation self-inspection programs, to be effective, should include:

1. A check of administrative compliance with safety and health regulations with respect to display of permits, posters, and so forth, and the maintenance of required records.

2. A review of actual operational procedures and personal practices of employees as they perform their required tasks.

3. An inspection of equipment and physical facilities on a department-by-department

ment or function-by-function basis.

The self-inspection check should include a review of the physical fitness of employees to determine their capability to safely perform assigned duties and a check to assure that ill or infected employees do not handle food. The self-inspection check should cover observing the manner in which employees use hazardous equipment and work in observance of good safety practices, as well as the manner in which they store, prepare, and serve food and handle food-serving equipment in a sanitary manner.

Inspection checks of equipment and facilities should be all inclusive of the operation but should include: receiving areas for food and supplies; storage facilities for dry and refrigerated food and supplies; food preparation areas and equipment; ware-washing and storage facilities; dining rooms and food holding and serving areas; entry-ways and emergency exits; customer rest rooms; employee facilities such as toilets, lavatories, locker rooms, lunch rooms; storage areas for soaps, detergents, solvents, pesticides, and other hazardous supplies; garbage and trash storage and disposal areas; boiler rooms, compressor installations, and other utilities; exterior surroundings including parking lots, drive-in service areas, incinerators, etc; vehicles used for transporting food; equipment and systems installed or available for fire protection; and, finally, first-aid supplies.

How frequently should inspection be accomplished?

Inspection frequency should be based on the relative extent of hazards to health and safety. Critical points in both operational procedures and those inherent in certain types of equipment should be identified. The frequency of inspection checks should be based on their relative importance. A program of self-inspection is not for the purpose of meeting supervisory requirements but rather for the purpose of checking on the adequacy and completeness of supervision and to ensure that all important areas and activities are being adequately covered.

How should inspection check lists be developed?

It is recommended that inspection check lists be developed by and for specific opera-

tions or establishments, in order that they include that which is pertinent to the procedures and equipment types of that operation. It is further recommended that inspection check lists be divided to permit separate checks of specific functional areas or procedures. A single all-inclusive self-inspection form is self-defeating, as it will seldom be used.

It is particularly desirable that each operation develop its own program and inspection forms to ensure that they are specifically applicable to the company policies, practices, and procedures and that they are compatible with applicable state and local sanitation and safety regulations.

Foodservice operators can expect to receive guidance materials from their nearest local or regional OSHA office and from their local health department. The National Restaurant Association and the state and local restaurant associations, working in conjunction with the OSHA administration, the National Safety Council, and public health departments can provide material assistance to the operator desiring to initiate a program and can act as coordinators in resolving problems involving interpretation of requirements.

What follow-up actions should be taken?

The operator should initiate appropriate action to correct undesirable situations which his self-inspections may reveal and will, no doubt, include mention of many of them during training sessions for employees or through the media of employee bulletins, newsletters, and posters.

A file of the self-inspection reports should be maintained to permit management review of (1) the immediate and long-range effectiveness of the self-inspection program; (2) the effectiveness of supervision over operations; and (3) the promptness and adequacy of action taken to correct unsatisfactory procedures and conditions.

What benefits may accrue to the foodservice operation when inspections and follow-up actions are recorded?

When a file is maintained on the self-inspections accomplished and on follow-up actions taken to correct undesirable situations and to bring deficient procedures and condi-

tions to the attention of employees, a number of benefits can result.

1. When copies are furnished to the local health department or shown to the OSHA or health department's inspector, they will know the extent of the operator's interest in maintaining a safe operation and of the continuing program to identify and correct unsafe conditions. This could lead to a reduction in the number of official inspections made of the establishment, as official attention is turned to problem establishments. Officials will also be able to recognize conditions or situations causing difficulty and, in

many cases, will be able to assist in resolving them.

2. Self-inspection records will be useful as evidence of the operator's interest and effectiveness in maintaining a safe and sanitary operation in case he is confronted by representatives from the news media or consumer groups.

3. The continuing management review of both inspection results and follow-up action will, undoubtedly, result in fewer law suits and claims because of actions taken to reduce or eliminate illness and injury causes.

FIRE SAFETY

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Holiday Inns' Safety and Loss Prevention Department work in the fire safety field can be summarized in what I will call the IIR. Basically, this stands for instruction, inspection, and research.

Instruction starts at the Innkeeper's School in Memphis where each innkeeper's class is given instruction in fire fighting techniques by the Memphis Fire Department. The Safety and Loss Prevention Department is allotted a time for general safety instruction to each class also.

The next step in instruction is the Alert Bulletin. The safety Alert Bulletins are sent out to all innkeepers on an as-needed basis and are written by the Safety Department. The bulletin covers such items as fire protection and general safety subjects. On a periodic basis, safety seminars are held on a regional level, at which time the innkeepers are given new ideas on fire safety and a review of some of the old ones. We also help the innkeepers train their employees. One way that we help to do this is by assisting in the making of training films that are shown to the employees.

From instruction we proceed to the inspection stage of our work. At the present time we are making between one and three physical inspections, depending upon condition, at each location. Our main concern is fire, and involves such items as proper fire stopping, approved exits, automatic extinguishing systems, etc. We have a licensed electrical inspector who makes the necessary electrical inspections where needed. We have immediate contact with all the Inns through our Holiday terminal in our office, thereby giving us immediate knowledge of any happenings that need to be brought to our attention. At the present time, we are making a concentrated effort on all high-rise locations to in-

sure that they do not stop at meeting the minimum standards, but exceed the standards. Included in our inspection duty is the review of all construction plans. The plans are approved by us with or without exceptions before they are released for construction.

This brings us to the last phase of our work, and that is research. Our safety department also works on developing new ways of protecting present exposures and correcting deficient ones. During one period of several months, we sustained several fires located in our storage rooms involving plastic glasses, etc. After some study, an automatic sprinkler and alarm system was devised that would provide adequate coverage for these utility rooms and give immediate notice to the front desk in the event of a fire in one of these locations. While this system is not an approved system as such, it does provide us with some measure of extra protection in the areas where we need it. Currently under study is an in-house high-rise room alarm system that would alert the front desk in the event of a fire in any room located in the Inn. Also under consideration at this time is some type of inexpensive alarm system that could be attached to the fire extinguishers in areas where breakfront cabinets are not easily installed.

Our safety department was also involved in the design of the fire and vandalism protection system on the computer center located in Memphis, Tennessee. Our department worked in conjunction with the Walter Kidde Company in designing the halon system that is currently in use to protect the entire computer system for Holiday Inns, Inc.

The last item under this section, one we feel at this time is one of the most important items, is the work that is currently being done

on providing a fire-retardant treated room. Several departments within Holiday Inns, along with the Safety Department, are working on this program in conjunction with the Monsanto Company. Early in our program we asked the Monsanto Company to review for us fire retardancy legislation and regulations. With Monsanto's knowledge of the state of the art, we were able to keep our specifications within bounds of today's technology. We are hoping that by doing much of the advance work on new specifications, etc. that the tests that are being run could

possibly be used as future standards in this area.

In conclusion, I would like to emphasize that to the customer his safety or security while staying at your motel or hotel is of the utmost importance. I feel that it is our duty—no, our obligation—to provide a place in which this person can completely relax without fear from fire. I also feel that it is our duty as an industry to provide this and I am looking forward to working with you in the future.

CUSTOMER, PATRON AND PRODUCT LOSSES AND STATISTICS

By THOMAS J. REILLY
Manager, Casualty Dept., Sehirmer Engineering Corp., Niles, Ill.

To the retailer, loss control goes beyond OSHA and into other areas. One of these areas is definitely the patron and the product.

My topic in this connection is customer and patron injuries. It is very timely inasmuch as we can trace the development of Federal legislation and see, or perhaps foresee, the direction this legislation is taking.

Going back historically, Congress signed into law in 1966 the first Highway Safety Act. In 1969 they came along with the first Construction Safety Act. In 1970 we know that OSHA came into existence. We know that prior to this, we had old Walsh-Healey and other legislation which was all packaged into OSHA. Now Congress has made another step to legislate safety. This was done by Presidential Order signed October 23, 1972: Senate Bill S3419, which establishes the Consumer Product Safety Commission, a five man commission appointed by the President. Its responsibilities are as follows:

1. The commission will collect data relating to consumer injuries resulting from defects in products.
2. It will develop standards for various types of products. This will be in the typical consensus standard-making process. One important exclusion is involved in this legislation, and that is that sole producers of a product are not allowed to participate in the standard-making body.
3. It will embark upon a consumer education program. Consumers will be informed of the hazards and the standards. There is no provision, however, to inform manufacturers of their responsibilities.
4. The commission will be required to keep records of accidents arising out of a product.
5. This will be a federal body with no state participation, as opposed to the OSHA or-

ganization where state activity is really being promoted.

6. With the bill, automatic expenditure is provided. Budgets for the three years following its passage are 55, 65 and 75 million dollars respectively.

7. This law is effective 60 days from October 23, 1972.

8. Consumer products covered under this legislation include all materials manufactured for use in schools, homes and in the work place.

Why is all this legislation necessary? I will place it on the line in this way:

Looking at the travesty that occurred on the highway, we saw the Highway Safety Act and the day of the super highway which now is or is not working, as you wish to look upon it. The states were not doing the job; "the feds" moved in.

Looking at construction safety you can see the same parallel.

Looking at OSHA you know this is a law that was designed for the noncompliers. It was not designed for the compliers. This was a law enacted to force a uniformity of application, of enforcement, and of standards, which all must live up to.

Now in these days of consumerism (Call it Naderism, call it anything you want), the public has a right to be protected.

What does this mean to the retailer? It is one more area where the loss control man for the retailer must become involved. Consider the large retailer who has goods manufactured for this label. We all know the ramifications of product liability insurance. With no fault insurance, we can also see where the attorneys who used to gather about the auto injury statistics are no longer going to have a place to do business. What direction will they take?

I hold that they will go into the arena of labor relations, with OSHA and consumerism the most popular issues of the day. For the retailer who sells many goods or many products, this is most important. Consider the points we listed as responsibilities of manufacturers, even though they are not going to be informed of what these responsibilities are. Consider the fact that the purchasing and the merchandising people will have to put out, on the floor, goods that are inherently safe. Goods that contain the necessary labels, warnings, etc.

Selling organizations will have to embark upon a systematic procedure whereby the consumer is informed of the inherent hazard found within a product. This will mean a re-write of every sales ticket. This may well require a specific technical write-up on every appliance, on every tool, on every piece of machinery that is sold, be it a lawn mower or a garden hose. Taking the sublime to the ridiculous, one must assume that what is behind this act and legislation is the danger to the consumer. I live in a suburban community which had a recent injury involving a seven-year-old boy. A water hose exploded under normal, typical, village water pressure conditions. Will this be covered under this legislation? I think it will.

Take the gasoline-powered rotary lawn mower and you know why this particular industry has enacted its own standards of performance, safety and reliability. The number of injuries occurring due to the rotary are fantastic. This was not the action of a noncomplier, this was the effort of an industry group to reach compliance prior to enactment of this standard, and this is what you can see ahead in every electrical or powered appliance or tool that will be sold in the market places of the retailing industry.

Taking it one step further, it will be necessary to take precautions beyond the customer-level to the employee of the retailer who will be demonstrating, possibly installing, and definitely repairing such merchandise. They must know what safety standards are put into the product and how to make sure, when repairing an appliance, they have not aborted the safety that is built into the product.

Once again we have an aura of change. We have an aura of equalization. The equalization that was created by OSHA in getting all employers to comply to a uniform law is now going into the product arena. Will this raise the price of the merchandise? Undoubtedly.

Will this raise the level of skills needed to become a real safety pro in the retailing industry? Undoubtedly. How will safety professionals or safety men in the retailing industry, be they few in number, keep abreast of this information? Well, we know its going to mean more reading, more soul searching, more investigation, and more of a team effort by his organization.

Let's take the positive approach, now that we have painted the picture very grim. What can the safety man for the retailing industry do to help himself?

Step No. 1 of any engineering problem is to find a means of recognizing that a problem exists. I have in my hand a log of customer accident reports from one retailing end of a major supplier. Let me go down the list of some of the injuries that have occurred.

Customer injured car when a tire blew in the automotive department.

Questions: Did the tire meet performance specifications and standards? Why was the customer in the automotive department, where he could be hurt?

Four-year-old "customer" cut while playing with swing on display.

Questions: Did the swing indeed have sharp edges? Were swings examined for safety before being placed on sale?

Customer was splashed on face with paint remover when salesman was removing can from rack in paint department.

Question: Was the paint remover, which is a poison, packaged properly according to recent legislation?

Customer drank some artist's turpentine in the camera department.

Question: Was this a child-proof container, properly stored?

Customer injured index finger while examining grass trimmer in lawn mower department.

Question: Was the tool designed to the standards?

This is one-unit reporting. Not a very big unit. How do we determine where our problems are unless we go into a system of recording, statistics, and analysis? The loss or the "near miss" that occurs, we know as safety professionals, is the clue to what will happen in the future. The loss that occurs can trigger a meaningful safety standard that will help alleviate the possibility of a loss occurring in the future.

But how do you do it? Let's just go into what one concern has done:

1. A log is kept of all customer and product liability claims and reports. These are fed into a computerized statistical loss analysis programs and each one is investigated.

2. To provide a meaningful basis for comparison, these statistics are set up on a statistical frequency basis, based on the ANSI Standard Z108 statistical standard for patron injuries. Frequency and severity are determined by the number of injuries per million dollars of sales and this is broken down by the various departments, sections and types of units within the organization. In this way they are comparing the loss statistics with their automotive service departments nationwide, with their hardware departments nationwide, and with each of the other departments. This way, they can "zero in" on the loss-producing areas.

Coupled with this are spot investigation reports which are kept at corporate headquarters and evaluated.

They also maintain a laboratory where products manufactured for use under their label are tested to meet certain performance and safety standards.

We, ourselves, evaluate not only display techniques, but merchandise offered for sale by this concern.

With the myriad of products manufactured, with the myriad of patron injury losses due to falls, it is essential to know and identify where your problems are. This particular concern we are dealing with has been involved in this loss analysis for some time. As a result of keeping statistics, and analyses which are now required by law under the Consumer Products Safety Commission, they have been able to accomplish a number of things. As everyone in retailing knows, slips

and falls can result from sloppy waxing of floors. This concern cut slips and falls in their establishment by more than 44 per cent by recognizing what type of floor surface and what sort of floor treatment compounds were involved in the majority of their slip-and-fall accidents. Based on these findings, they have limited their units to a choice of one of four basic products as a floor-surfacing treatment. This also gives them the advantages of mass buying and field service. We have been able to devise for them, based on statistical analysis, the percentage of additive for surfaces such as terrazzo on corborundum or other nonslip ingredients, in a design standpoint, to design safe environment. Before you know what your problem is, you have to "start at the beginning" and find out where these losses have occurred.

Looking at the legislation, we see record-keeping is being required of product manufacturers. We have seen that, where employees' injury records are required under OSHA, the manufacturers of goods are going to have to be required to keep records. It will not be long before the Federal government, if they find people are really being hurt in business establishments, will require that the same type of approach be used by any establishment inviting a client into their premises, whether an amusement park, a warehouse, a customer pickup service, or a selling unit of any type.

To this end several years ago I became involved with Doctor Tom Allen of the University of Tennessee in developing a total loss control analysis system designed for retailers. It started out to be for retailers, but grew into a separate program for the hotel/motel industry, another for the construction industry, another for general industry. This particular program involves not only employee and patron injuries but product liability loss, fire, crime, inland marine losses, and finally fleet losses. This particular statistical coding procedure would fulfill a number of purposes for the retailer, or for any industry group, and I am not trying to sell it because it is copyrighted in my firm's name. However, it is an example of what can be done and what is being done.

Let's not wait for "Big Daddy" to legislate

and "put the arm" on us before we conform. We must demonstrate that we are already conforming or actively participating in standards-making bodies that are going to make America the safest place in the world. It has to be a safe place not only for the employee but also for the patron who comes into the premises, and after he leaves the premises with the merchandise. With the cost of injury lawsuits and legislation, we must address ourselves to the total loss-control picture, and it is to this end that we designed the Z108 statistical coding procedure.

We are available to discuss this procedure and also to provide you with copies of the procedure in special instances where we

think it will do some good. It is a project in which you should become involved.

Based on the historical legislation we have outlined here, it is apparent that in the not too distant future, the government will require records on all injuries, illnesses, law suits or anything that affect the American citizen—be it at work, in your business establishment or after he purchases something from you. It will behoove us all to analyze, to move first. Remember the direction the legislation is taking: It is moving against the non-compliers, the nonconformers and the radicals. He who cares for his customers will take this seriously. He who cares for his job had better "gear up" for it.

FIRE PROTECTION

By A. M. LOWNSBURY

Chairman, Fire Protection Committee, American Warehousemen's Association, Chicago, Ill.

The subject of fire protection is a timely one as, in spite of the best efforts of fire protection agencies and industry, fire losses in 1971 increased to an amazing \$2,743,260,000 and 11,850 lives were lost in the same year in fires. The 2,728,200 fires recorded represent an increase of seven per cent over 1970. This discussion will deal primarily with fire protection for warehouses, although much of it can be applied to other occupancies.

Fire is the major cause of catastrophic warehouse losses. Though other perils may cause more frequent losses, fires cause the serious ones. Control of the hazards listed below will give the warehouseman much better odds against the hazard of uncontrolled fire.

Heating. Poorly arranged and portable heating devices (salamanders) are a major cause of warehouse fires. Any warehouse which may ever require heating should have a well-arranged, permanently fixed heating system. Use of portable heaters of any type, even small electric heaters in offices, should be avoided.

The heating device itself as well as all exhaust vents, chimneys, steampipes, etc. should be well insulated and have adequate clearance from any combustible material. Fuel for heating devices should be stored well away from any source of ignition and (if oil or gas) carried to the device through rigid, substantially supported pipes. Burner controls and steam boilers should be inspected at least annually for proper condition and operation. All control devices on heating units should be of the fail safe type.

Lighting. Use of temporary or makeshift wiring should be avoided. If extension or drop cords must be used, they should be inspected for any signs of mechanical damage (fraying, etc.) and replaced if found defec-

tive. Immediately after use, they should be disconnected and properly stored. Lighting fixtures should be protected against mechanical damage and arranged to prevent stock being accidentally stored in contact with the heated surface. Efficient warehouse operation requires that lighting fixtures provide adequate illumination to prevent accidents and to preclude the use of temporary lighting or matches.

Fuse boxes should be checked to insure that only proper size fuses are used and that no jumper wires or other bridging devices are bypassing the fusible element. An adequate supply of spare fuses of the proper type should be on hand. An unusual number of blown fuses or frequent tripping of breaker switches indicates overloaded circuits. Additional circuits should be installed if the need is indicated.

Housekeeping. The most important factor in fire prevention, yet the one most frequently ignored. Collections of trash, packing material, and broken pallets provide the perfect place for fire to start. In addition, poor housekeeping causes many accidents to your employees and costs you money in reduced efficiency. It also leaves a poor impression in the minds of customers who may happen to visit your premises.

Areas where poor housekeeping is most frequently found and where it can cause the greatest problems are: under and around the loading dock; in remote corners of the building; in the packing, crating and/or reoperating area; and the area used by employees for eating lunch and smoking.

Metal cans with tight fitting lids should be provided in convenient places throughout the premises. Any trash accumulations should be removed from the premises regularly. If the trash is to be burned, a substan-

tial incinerator with a well-maintained spark arrester should be provided, well away from buildings and other combustibles.

Housekeeping in the yard and around the building is equally important. Windblown debris and trash piles should be removed regularly. Weeds and grass should be cleared away from the warehouse and any outside storage areas for a distance of at least 20 feet. Open space under buildings and under loading docks is particularly inviting to transients and arsonists. Such spaces should be enclosed by heavy wire mesh or tightly boarded up.

Lift Trucks and Tow Motors. These machines have greatly increased warehouse efficiency but have also introduced new hazards. Fires have been started by hot exhausts and backfires, electrical shorts, fuel leaks, and unsafe refueling. All are preventable through proper maintenance and operating rules.

A good preventive maintenance program is of primary importance. Fuel lines, battery connections, and exhaust systems should be checked by qualified mechanics regularly. Shields should be provided to prevent gasoline spills during refueling from flowing over hot engine parts.

Power equipment should be stored and serviced at a point well removed from the warehouse. Operating rules should prohibit filling fuel tanks in the warehouse building. Locked gas caps can be used to insure compliance with this rule.

Water mufflers or condensation mufflers on gasoline-powered equipment are strongly recommended in warehouses storing highly combustible materials.

Smoking. Smoking should be strictly prohibited in warehouses storing combustible material. "No Smoking" signs should be prominently posted. Penalties for violation of no-smoking rules should be explained to all employees and applied uniformly. The warehouse management should be especially careful to set a good example for employees. On any trips through the warehouse, foremen and managers should be alert for any sign of smoking.

As important as the "No Smoking" rule is the provision of a safe smoking area. Unless such an area is designated, men will find concealed corners of the building to have their

smokes. This can prove even more dangerous than unrestricted smoking. The smoking area is usually set up in the area where employees have their lunch. Ashtrays, waste cans, and a fire extinguisher should be provided.

Storage Practices. Certain materials should be stored separately. The manufacturer or supplier of chemicals should be consulted concerning the possibility of the products reacting with other materials. Concentration of highly flammable materials should be avoided when possible.

Storage piles, aisles, and cross aisles should be carefully checked. Normally, at least three feet of clear space should be maintained between the top of the pile and the ceiling for fire fighting purposes. In buildings protected by automatic sprinkler systems, this space may be reduced to 18 inches.

Main aisles should be no less than 12 feet wide and cross aisles should be at least eight feet wide. At least 18 inches should be maintained between stock piles and side walls to reduce the possibility of water damage. All stock should be stored at least four inches off the floor on skids or pallets for the same purpose.

Fire Doors. These should be checked to insure they will operate freely. Watch especially for bent retaining brackets which may have been hit by lift trucks. Check for presence of fusible links.

Stock should never be piled against fire doors, even when aisles leading to them are blocked. At least two feet of clear space on each side of the fire wall should be maintained.

Fire Extinguishers. Either portable fire extinguishers or fire hose connected to water lines of adequate size should be provided. Units should be spaced so that it will not be necessary to travel more than 75 feet from any point in the warehouse to reach the nearest one. Care should be taken to select the proper type extinguisher for the type fire which can be anticipated. If extinguishers are to be exposed to below freezing temperatures, anti-freeze types should be used.

Extinguishers should be checked monthly and recharged or weighed at least annually.

Sprinkler Systems. Automatic sprinklers pro-

vide the most effective means of fire control in warehouses. Their performance record has been outstanding. The few failures which have occurred can usually be traced to closed sprinkler valves. For this reason, management should assume the responsibility of checking valves occasionally to be sure they are open. A procedure can be set up to seal valves open, using a railroad car type seal. Post indicator type valves located outside the plant can be locked in the open position using frangible shackle locks.

Occasionally, new ceilings are put in offices, restrooms, or other structures inside a warehouse with no consideration given to sprinkler protection. Any fire which starts in these areas will have to burn through the ceiling before the sprinklers can do any good. In the meantime, heavy smoke and water damage will be suffered in the remainder of the building.

Painters will occasionally paint sprinkler heads when refinishing the warehouse or parts of it. Paint slows the action of the fusible element in the sprinkler head and may even render it inoperable. If any sprinkler heads have been painted, they should be replaced immediately.

Sprinkler systems are shut off occasionally for repairs or modifications. Be sure they are tested after repairs are completed to insure that valves have been reopened and that no blind gaskets have been left in any part of the system.

Dry pipe sprinkler systems require a compressed air supply to keep water from prematurely entering the system and freezing. Pressure gauges on dry systems should be checked to make certain that adequate (but not excess) air pressure is maintained in the system. Heating units in dry valve rooms should be checked regularly to be certain they are operating properly. Water tanks should be checked to be sure they are full and that tank heaters designed to prevent freezing are operating.

Fire insurance rating engineers check sprinkler systems at regular intervals. Be certain that any serious deficiencies found during these inspections are corrected immediately. A schedule should be established for regular sprinkler system tests. The extent and

type of tests should be in accordance with suggestions made by the fire rating engineers.

Water Supplies. Adequate water must be available for use by the fire department. If there are hydrants on your premises, be certain they are not blocked by outdoor storage, parked equipment, etc. If they are subject to vehicle damage, make certain they are protected by heavy posts or rails.

Fire Alarm Systems. Automatic fire alarm systems should cover all portions of the building, including small storage rooms. The installing company should test the equipment at regular intervals and take care of maintenance. Records should be checked to determine that maintenance calls are actually being made.

Watchmen. Watchmen should be questioned to insure they are fully familiar with their duties and emergency procedures. If watchmen are provided with recording dial clocks, the dials should be spot checked to determine rounds were made as required. Any discrepancies should be carefully investigated.

Review watchmen rounds occasionally. Changes in the building or storage methods may make it necessary to revise the location of watch stations.

Standards. The National Fire Protection Association has been the recognized leader in the field of fire protection for many years, and has published many standards covering the many facets of the subject. Two of these standards are of utmost importance to those who store merchandise. The Indoor General Storage Standard, NFPA 231, and the Rack Storage of Materials Standard NFPA 231-C.

NFPA 231, the "Indoor General Storage" standard, applies to storage of materials representing the broad range of combustibles, 25 feet or less in height, stored in solid piles or palletized piles. This standard applies only to buildings protected by automatic sprinklers. Storage piled higher than 25 feet is not within the scope of this standard and requires special consideration. This standard also does not apply to storage (1) on racks, (2) storage of commodities which, with their packaging and storage aids, would classify as noncombustible, (3) unpackaged bulk storage, such as grain, coal, or similar commodities.

ties, or (4) special hazard commodities such as tires, plastics, roll paper, flammable liquids, wax-coated cartons, and other commodities covered by other NFPA standards.

The provisions contained in this standard apply to new buildings, and when converting existing buildings to warehouse occupancy. They should be used as a basis for evaluating or improving arrangements, safeguards, and protection at existing storage facilities or when converting existing buildings to warehouse occupancy.

NFPA 231-C, Rack Storage of Materials Standard, applies to storage of materials representing the broad range of combustibles stored from 12 feet to 20 feet and 25 feet in height on racks. For storage heights of 12 feet or less, see NFPA 13.

Storage of high hazard materials such as tires, plastics, flammable liquids and rolled paper is outside the scope of this standard. Bin storage is also outside the scope of this Standard.

NFPA 231-C was adopted by the NFPA in May 1971 after almost four years of committee work. It is a new standard and was developed by a new method. Heretofore, all standards were based on actual fire experience and so-called "sound engineering judgment" for the very simple reason that adequate fire test facilities were not available. Because of this lack of proper test facilities for large scale fire testing, the Factory Mutual Group built at West Gloucester, Rhode Island, a research center, including a building large enough to conduct such tests. The test building is approximately 200 feet by 250 feet (50,000 square feet in area) of fire-resistive construction and contains approximately 2.25 million cubic feet, the equivalent of a 100,000 sq. ft. building 22.5 ft. high. The test building has two primary heights beneath a single large ceiling. The east section is 30 feet high and the west section is 60 feet high.

The 20 foot test series was conducted in the 30 foot section, with clearances nominally 10 feet. Conventional racks and conventional pallets were used in the eight foot aisle tests. Over a period of several years, well over 100 tests were conducted, with almost 50 of them being full-scale tests. The results were

amazing and caused a great deal of concern.

In the first full-scale test, pallets of tri-walled cartons within tri-walled cartons were stored in racks to a height of 20 feet in four tiers on ordinary 42 inch two-way pallets.

Protection was ceiling sprinklers providing a 0.3 gallons p-r minute per square foot, the sprinkler heads being spaced on 10 foot centers. A total of 141 sprinkler heads opened, and the water demand was approximately 4,250 gallons per minute, with 80 per cent of the boxes being consumed.

Other tests were conducted using sheet metal containers within tri-wall cartons, as this gave the closest approximation to actual storage of material. As a result of these tests and the data derived from them, 231-C was written. I would suggest that those of you who store commodities, procure copies of these two standards and that your key personnel be given the opportunity to read them.

With conditions as they are, no discussion of fire protection would be complete without mention of civil disturbances and their fire problems. Molotov cocktails are probably more of a hazard to the person who throws them than to anyone else.

Do not react irrationally; It will not explode. It has a minimum amount of flammable liquid. Smother the burning area with rugs, blankets, sand, or use CO₂ or dry chemical extinguishers.

One story buildings and buildings with taller buildings adjacent may have a roof fire problem. Try to evaluate what problems may arise and which areas are most vulnerable.

Experience in riots has indicated that a building should not be completely abandoned without careful consideration.

The public fire department may not be able to assist.

Fires may be put out by sprinklers, and unless someone is in the building, water may flow for days.

Supply additional plant protection if possible. Be sure that all protective devices are in operating condition. Remove all wrenches or wheels from outside valves. Keep fire pumps in readiness for starting. Make sure that all fire doors are operative. Keep easily ignitable material away from windows. Cov-

er windows where possible with heavy screen or boards. Keep dried grass and weeds away from buildings. Flood light as much as possible. Equip a four wheel truck with six soda acid fire extinguishers, two buckets of sand, two buckets of water, one shovel, one axe, one CO₂ extinguisher (10 lb.).

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