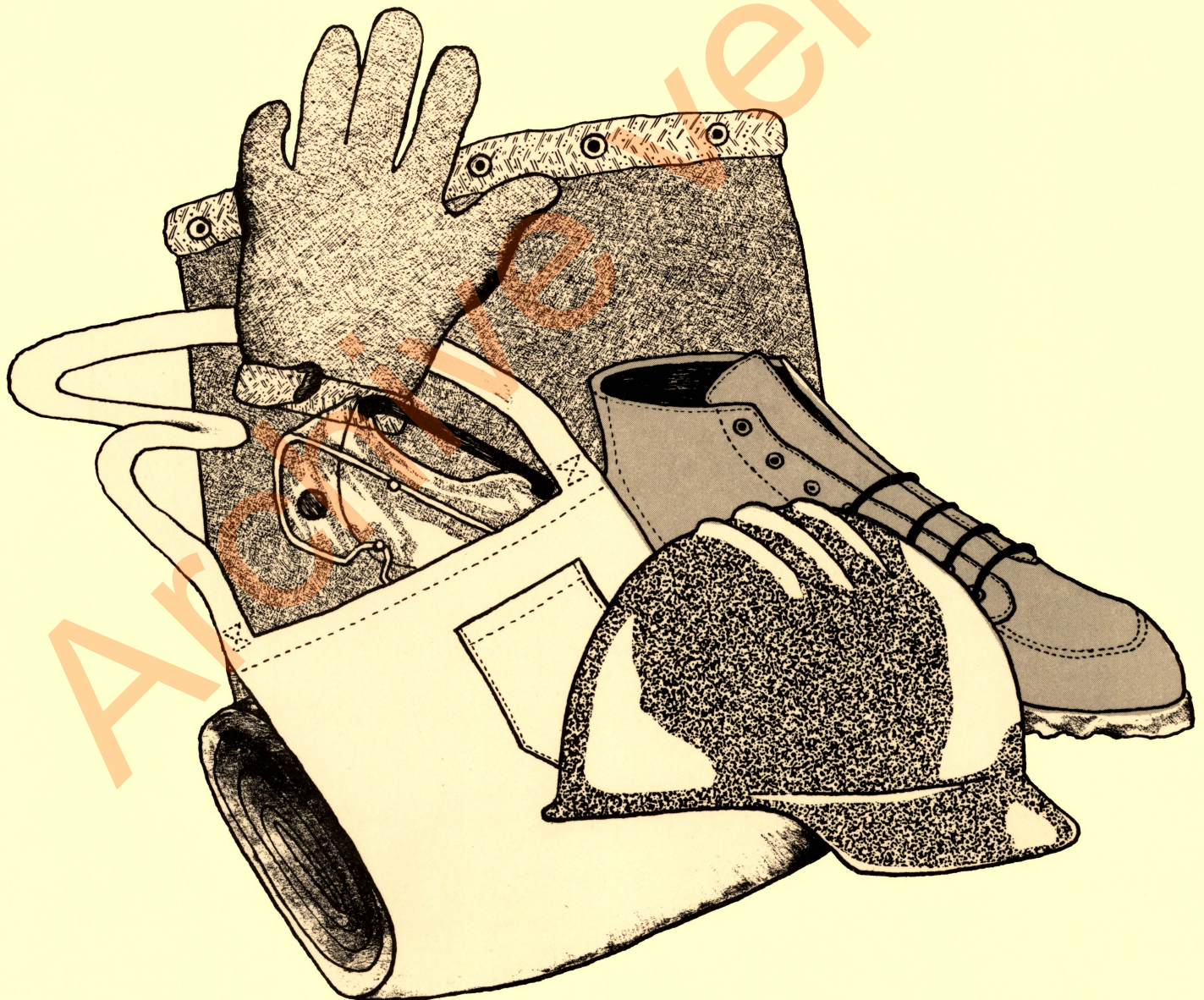


Safety for Meat Packers and Processors

Extension Division
University of Missouri-Columbia

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SAFETY FOR MEAT PACKERS AND PROCESSORS

A Manual for the Meat Packing and
Meat Processing Industries of Missouri-
Incorporating Pertinent
Material from the
Williams-Steiger Occupational
Safety and Health Act of 1970

by

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Columbia, Missouri

February, 1975

Acknowledgements

Many people have given generously of their time, expertise and experience to the authors during the preparation of this manual. To them, we owe a debt of gratitude. We would like especially to mention:

The Missouri Association of Meat Processors and its secretary, Norvin Kampschroeder.

The Missouri Meat Packers Association and its executive secretary, John J. Faust.

Dr. John Sutherland, Professor James M. Beauchamp and William McMahill who administered the grant which funded the project.

Charles Hennemeyer of the Governor's Task Force on Occupational Safety and Health, Missouri Labor and Industrial Relations Commission.

Harold Smith and his colleagues of the OSHA Regional Office in Kansas City.

Lois Fowler, Irene White and Thomas Bell of the Engineering Experiment Station. They prepared the manuscript for publication.

Phil Lincoln and Cheri Wright of Engineering Communication.

Prepared Under Special Contract To:

The Task Force On Occupational Safety & Health
Labor and Industrial Relations Commission
Department of Labor and Industrial Relations
State of Missouri

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Preface

This manual is designed to assist management of meat packing establishments to develop a program of voluntary compliance with the standards set forth under the authority of the Williams-Steiger Occupational Safety and Health Act, 1970. This material covers the major specific standards under the Act that concern the meat packing industry.

Our purpose is to point out situations in the work environment that are possible violations of the Act, and to refer the reader's attention to the section of the Federal Register that sets forth standards covering the possible violations.

Management personnel of the meat packing industry are urged to keep informed of periodic changes in the standards of the Act. Information on these revisions may be obtained from UMC's Industrial and Technical Referral Center or from any of the industrial extension specialists located throughout Missouri.

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Chapter I

The Williams-Steiger Occupational Safety And Health Act (OSHA) of 1970

The Williams-Steiger Act, Public Law 91-596, Occupational Safety and Health Act of 1970, was signed into law on December 29, 1970, with an effective date of April 28, 1971. When President Richard M. Nixon signed the act into law, his comment was that this was one of the most significant pieces of legislation to be enacted during this century.

How does this affect business in general? First, let's examine the law:

The objectives are "to assure safe and healthful working conditions for working men and women by authorizing enforcement of standards developed, by assisting and encouraging states in their efforts to assure safe and healthful working conditions, by providing research information, education and training in the field of occupational safety and health."

This law is simple and straightforward, and certainly American industry is in agreement with its intent. However, look at the accident frequency statistics from the 1972 edition of the National Safety Council's publication, "Accident Facts":

Wholesale and retail trade has an accident frequency of 28.28 injuries per million man hours worked (or 5.66 lost-time injuries per 100 workers employed).

The Occupational Safety and Health Act of 1970 was passed to reduce the number of occupational accidents and illnesses by requiring

minimum standards of safety and health in the factories and work places in the United States. Section V of the Act defines employer responsibilities as: a) Each employer shall furnish to each of his employees a place of employment which is free from recognized hazards which are likely to cause death or serious physical harm to employees and shall comply with Occupational Safety and Health standards promulgated under this Act. b) Each employer shall comply with Occupational Safety and Health Standards, all rules, regulations and orders which are pursuant to the Act and which are applicable to his own action and conduct.

It is important that this be interpreted literally, because in the absence of a standard covering a given situation or deferred date of applicability of a standard, any employer can be cited under this general clause when there is a hazard. It is also important to note that there are no penalties on the worker who violates OSHA regulations.

This is a law with teeth in it. When any employer violates SEC. V(a) of the Act (requiring him to furnish to each of (his) employees a safe and healthful place to work) he may be subjected to a civil penalty not to exceed \$1,000 for each violation. A period of time is allowed for abatement of the violation. Willfully, deliberate, and repeated violations may subject the offending employer to criminal actions.

The Occupational Safety and Health Act applies to all businesses engaged in commerce, including meat packers and processors, within the United States, District of Columbia, Puerto Rico, Virgin Islands, Samoa, Guam, Wake Island, and the Panama Canal Zone; in other words, wherever the United States has jurisdiction.

Standards

The Secretary of Labor had three years to promulgate permanent standards. Interim standards were published in the May 29, 1971, Federal Register. Some have been modified, especially in regard to effective dates. The standards have been effective since August 27, 1971. OSHA standards are based on existing standards, the previously enforced Walsh-Healy standards, construction safety standards, and so-called consensus standards developed by the National Fire Protection Association, the American National Standards Institute, the U.S. Department of Health, Education and Welfare (sanitation, food handling, etc.) and such organizations as the American Society for Testing Materials and the American Society of Mechanical Engineers. The latest general update on OSHA, General Industries, is presented in the Federal Register, Volume 37, Number 202, October 18, 1972. A later version is in preparation (Autumn 1974).

Many of these standards require technical interpretation and/or special testing equipment. Examples of certain specific requirements all businesses should be aware of are:

- * No exit, aisleway or passageway should be obstructed or blocked. 1910.36(4)¹.
- * Only commercial grade stock ladders should be used. 1910.25
- * Protection for the eyes is required wherever there is a likelihood of their being injured by foreign particles. This especially applies jobs involving automobile and other service operations. 1910.133 (a)

¹Numbers refer to the applicable section of the OSHA regulations as published in the Federal Register, Vol. 37, Number 202, October, 1972, Part II.

- * Noise levels must be adhered to. This may mean protective equipment and ear plugs for auto service and other operations. 1910.95
- * There is a limitation on the amount of flammable and combustible liquids you may keep on the premises. Skin must be protected from certain toxic solvents. 1910.106
- * There are certain specifics for accident prevention tags and signs. 1910.145
- * All fire extinguishers must be identified and their location designated. 1910.157 (a)
- * Check specific requirements for medical and first aid facilities. 1910.151
- * Specific machine guarding requirements extend even to the single pedestal grinder, table saws, etc., in the maintenance man's office or shop. 1910.212
- * Electrical requirements are basically those of the National Electrical Code which definitely prohibits the use of certain types of extension cords. 1910.308

It is imperative that every business have a copy of the pertinent sections of the Federal Register. The one applicable to meat packing is Volume 37, Number 202, Wednesday, October 18, 1972, Part II. An updated revision should be out sometime during 1974 or 1975. Probably the best way to keep up with changes affecting meat packing and processing is through your trade association. The Federal Register includes a vast amount of information; only a tiny fraction is applicable to OSHA. The individual businessman simply doesn't have the time to wade through the

entire register in search of those regulations which legally apply to his business.

Employees have a right to refer to and examine any standards, and this right should be granted within 24 hours of request. There is no requirement stipulating employees should be given time to research these standards on company time, although this, and reimbursement for time spent accompanying an OSHA compliance officer, may be part of labor contracts in the future.

Enforcement

The enforcing agency for OSHA is the Occupational Safety and Health Administration of the U.S. Department of Labor. The Department of Health, Education and Welfare provides information on occupational illness and toxicity, and develops training research facilities through its National Institute of Occupational Safety and Health (NIOSH) in HEW.

Enforcement is carried on through area and regional offices throughout the United States. The regional office for Missouri, Kansas, Iowa and Nebraska is located in Kansas City, Missouri. Each region has a director supported by a staff of safety compliance and industrial hygiene officers. The compliance officers do the field work of inspecting employees' premises, citing violations and similar duties.

Inspections of any premises occur at the discretion of officials (usually the regional director) of Occupational Safety and Health Administration, the Department of Labor, or the Department of Health, Education and Welfare. Any establishment may be entered. This does not

preclude, or interfere with, the authority of any state or municipal body to conduct inspections.

The inspections are conducted by an OSHA compliance officer, a civil servant vested with the duty and authority to make inspections. By law, he may not notify the employer in advance of an inspection and he must officially cite every violation he sees in the course of his inspection of the plant.

He is required to identify himself and present his official credentials to the company representative. The company may telephone the OSHA area office to verify the compliance officer's status before he is admitted to the plant. A management representative should accompany the compliance officer at all times he is in the plant.

If a compliance officer is refused admittance to a work place, he will either leave or inspect another area where no objection is raised. He is instructed to obtain the reason for refusal and immediately report to the OSHA area director. The area director will immediately consult with the regional administrator who can take appropriate action, including court orders, to obtain access if necessary.

During inspection, an employee or designated employee representative may accompany the OSHA inspector. If there is no designated employee representative, the inspector is free to talk to as many employees as he deems necessary during his walk through the plant.

If the inspector finds a violation of occupational safety and health standards, he writes up a citation of the employer for the violation. A copy must be given to the employer or his representative by the

inspector before he leaves the plant. The employer may discuss the citation and ask questions at the time of the exit interview.

The inspector turns in the citations and reports to his supervisor who then approves or disapproves the citation and any penalties. A copy is then mailed to the employer who must post the citation in a conspicuous place where it can be seen by his employees. He must also comply with any stipulations in the citation or face further penalties.

By law, the inspector cannot come into a plant except in his official capacity. He must cite any violations he sees. He cannot make a courtesy or non-official visit to a place of employment. However, the employer can visit the inspector or other OSHA officials in the OSHA office or in any place other than the place of employment for discussion, clarification or information on OSHA. Some employers have taken photographs, specifications, drawings, and descriptions to the OSHA office for an opinion.

Failure to comply with the standards established by this legislation can result in:

1. Closing the business establishment or operation if inspection reveals a condition posing imminent danger to personnel.
2. Fines up to \$1,000 per violation per location.
3. Expensive modifications to the facility, its environment, equipment, or methods of operation to meet published standards.
4. Punitive, monetary and/or jail sentences for persons in authority for willfully ignoring standards.

The employer may appeal the citation by:

1. Consulting with the area director (usually by phone) during the fifteen-work-day period between the date of issuance of a citation and its effective date.
2. Appealing to the three-person commission set up specifically to hear and act on appeals from OSHA citations.
3. Appealing to a Federal court.

Appeals may be made on any ground. However, the commonest and most successful are:

1. Modification of the abatement period due to unavailability of equipment or labor.
2. A method as safe as, or safer than, the method proposed in the citation.
3. Inapplicability of OSHA, i.e., citation does not involve employees of the company.

Employee Rights and Duties

Any employee has the right to request an inspection if he feels there is a violation of safety or sanitation regulations. This may be done on an official form or in a letter to the area director, Occupational Safety and Health Administration. If the area director feels the complaint indicates there is "imminent danger" or that a serious hazard exists, he can order that an inspection be made. The employee's name can be, and usually is, removed from the complaint form before the compliance officer visits the plant. Note that the employee is protected from any harassment, discipline, or other activity resulting

from this inspection. Nothing should be placed in the employee's personnel file regarding this legislation or the fact that he filed a complaint with OSHA.

The interpretation of a "serious hazard" is somewhat discretionary, but to the meat packer or processor it may mean an exit door from the stockroom which was locked for security reasons; an unsafe freight elevator, unsafe mechanical equipment such as fork lift trucks or other material handling equipment, or the stacking of materials in an overcrowded and unstable manner.

Employees, even though given a specific duty to comply with standards and rules, cannot be fined under this interpretation of the Act, even though they may be guilty of an unsafe act or ignoring a standard.

Training Requirements Under OSHA

The OSHA compliance inspector is paying increasing attention to the employer's training program for his workers. If there has been an accident, he asks what training and instruction the injured worker had previously received. He also asks to see records of safety training programs. The employer should have at least a statement of the training policy and a record of who received the training.

An important phase of the new law which should not be overlooked is under Section 21, Training and Employee Education:

- c) The secretary, in consultation with the Secretary of Health, Education, and Welfare shall:
 - (1) Provide for the establishment and supervision of programs for the education and training of employers and

employees in the recognition, avoidance, and prevention of unsafe or unhealthful working conditions in employments covered by this act, and (2) consult employers and employees as to effective means of preventing occupational injuries and illnesses.

The University of Missouri through its Extension Division is prepared to assist employees of the state with their educational and training problems in occupational safety and health.

Conflicts Between OSHA and Other Agency Requirements

On occasion, there have been differences in interpretation between OSHA inspectors and those from the Meat Packing Inspection Division of the USDA Animal and Plant Health Inspection Service concerning platform railings. Railings adequate for accident prevention are difficult to keep clean and sanitary. Other instances of differences between various agencies on regulations or interpretation can and do occur. The agencies concerned are working to resolve these discrepancies but they still exist.

The State OSHA Plan

The Federal OSHA law provides that a state may take over the inspection and enforcement activities of the occupational safety and health if it passes a law which meets the provisions of the Federal law and is approved by the U.S. Department of Labor. The state OSHA standards must be at least as effective as the Federal ones. Also, the state plan must

cover employees of the state and its local subdivisions; these employees are not covered by the Federal act.

At the time of this writing (June 1974), the Missouri legislature adjourned without acting upon a state OSHA plan. Future action is uncertain. Until a state plan is passed and approved, the Federal government will handle all the OSHA enforcement activities in Missouri.

Chapter II Accident Causes

Accident Statistics: The Record of the Meat Packing Industry

How does meat packing compare with other industries in accidents? Statistics on the frequency and severity of industrial accidents have been collected for many years. Definitions, methods of data collection, and the analysis have been standardized by the National Safety Council, a non-profit private association for the promotion of safety and accident prevention. Data from other sources may differ but usually not substantially.

According to the National Safety Council's 1972 edition of "Accident Facts," representative rates are shown in Table I:

Table I
Selected Accident Rates

<u>Industry</u>	<u>Frequency Rate: Lost-time injuries per million man- hours worked</u>	<u>Severity Rate: Lost days per million man- hours worked</u>
Automobile manufacturing	1.44	140
Aerospace	2.32	175
Electrical equipment	2.57	119
Textile manufacturing	4.18	244
Chemical manufacturing	4.76	510
Machinery manufacturing	4.88	298
All industry	9.37	611
Meat packing	28.28	661
Mining, underground coal	37.41	4,232

The frequency rate measures how often accidents occur while the severity rate measures how serious the accidents are. These rates are compiled in accordance with the ANSI Standard Z16.1-1967 Method of Recording and Measuring Work Injury Experience. Generally, an accident

does not enter the statistics unless the worker loses time from his scheduled shift following the one during which the accident occurred. OSHA has introduced the incidence rate computed as the number of reportable accidents per 200,000 man-hours worked.

Note that the accident frequency rate in meat packing is one of the highest for any industry in the United States. However, the severity rate is less than ten percent above the average for all industries.

The average cost of accidents in all industries was estimated at \$120.00 per worker. The average cost per industrial lost-time accident in 1972 was \$1,070.00. This is costly not only to the employee in pain, suffering, and money, but to employers in production, service, and customer relations.

The Department of Labor has embarked on a "Worst First" program in selecting target industries to improve. Meat packing is a target industry because of its high frequency rate. This means that meat packing will receive special attention until its frequency rate is substantially reduced.

Causes of Accidents in the Meat Industry

The American Meat Institute reported in September 1971 the following analysis of causes of accidents in the meat industry.

1. Knife	22.0%
2. Struck by	15.0
3. Struck against	11.2
4. Strain-Exertion	9.1
5. Strain-Repeated Motion	8.2
6. Caught in or between	8.1

7. Falls-Same Level	8.0
8. Slip-No Fall	5.0
9. Miscellaneous	4.2
10. Fall-Different Level	3.1
11. Eye Injuries	2.1
12. Burns	2.0
13. Occupational Disease	<u>1.1</u> <u>99.1%</u>

The report goes on to further analyze the statistics.

Knife Accidents

The most common accident in meat packing and processing is a knife cut. Knives must be razor-sharp to be effective. Mechanical guards are difficult to design and use without interfering with worker comfort and with production. The major ways to prevent costly knife accidents are worker training, personal protective equipment, and good supervision. More than 70% of the knife accidents occurred on beef dressing, hog dressing, and hog cutting operations. Sixty-five percent of the injuries involved the left hand and fingers; 25%, the right hand or fingers; and 10%, wrist and arms. High incentive earning jobs, such as boning, skinning, sectioning, etc., were in the lowest category except for one company. These are operations in which workers are more skilled, stay on their job longer, are not subject to bumping and transfer, and wear and use the maximum protective equipment.

In contrast, many of the slaughtering, dressing, and cutting jobs are quite varied and, even though some require a great deal of skill,

there is considerably more movement from job to job. Also, there is a great deal of job realignment through bumping, and variation in manning due to fluctuating livestock supplies. The highest accident rate was on those operations where mesh gloves are not allowed for reasons of sanitation. These are generally pre-inspection operations such as heading, opening hogs, dropping bungs, cutting cords, and working with suspect or condemned products. There is no particular pattern in hog cutting, but most agreed that mobility from job to job is especially high. From this observation, the group felt that the suggested project of evaluating the cleanliness of mesh gloves on non-inspected jobs was very much in order.

The group further felt that a vertical standard should be developed for knife safety.

Struck by

In this category, a wide variety of objects were named. Most common were falling trolleys, doors, powered industrial trucks and hand trucks. Most packing plants are quite compact; proper aisle widths are difficult to maintain. The biggest offenders from the standpoint of departments were again the dressing and cutting departments. This is due to the overhead hazard of noncaptive rails, transporting products in vehicles over slippery floors to refrigerated zones, opening and closing doors, and slippery surfaces causing hazards to hand truckers.

Struck against

Here again there was a great variety of objects mentioned. The majority of injuries affected hands and fingers. Bone cuts, saws, hooks, and conveyors rated highest in objects contacted.

Strains--Exertion

The majority of accidents in this group narrowed themselves to hand trucking, handling boxed or carton products, handling and lugging beef, and lifting meat tubs or buckets. Two companies indicated a fairly high incidence of back strains on beef dressing operations. The majority of accidents in this category were back injuries.

Strains--Repeated Motion

Most of these injuries affect wrists and forearms and are associated with hand and finger manipulative jobs. This category produced the highest percentage of lost-time injuries for the number of reported cases.

Caught in or between

Sixty-six percent of these accidents related to boxes, barrels, doors, hand and powered trucks. Most involved material handling. Thirty-four percent involved machinery. Conveyors were the most frequent accident source followed by skinning machines and vacuum packing machinery. The balance of accidents was reported as one each for the following machines: Ham press, stapler, fan, lift truck hoist mechanism, blood dryer, vacuum closing machine, jack hammer, frozen meat chopper, Wolverine flesher, case packer, addressograph machine, corn elevator, sausage linker, and triple cleaner.

From this survey, machine accidents that might be avoided by guarding according to standards represent 3% of the total sample.

Falls--Same Level

Sixty-five percent involve workers walking or pulling hand trucks. Most accidents occurred in hog cutting and hog dressing maintenance and

sanitation departments.

Slip--No Fall

The majority of these accidents resulted in back strains and followed about the same pattern as "Falls--Same Level". Wet or greasy floors were mentioned in nearly all cases. Other walking surfaces noted were uncovered drains, stairs, and platforms.

Falls--Different Level

The most frequently mentioned surface was stairs; others were truck beds, ladders, and conveyors. Conveyor accidents affected only sanitation and clean up employees.

Eye Injuries

Most of the eye injuries happened in maintenance operations; the rest were in sanitation. The most commonly mentioned production jobs in this category were wire strapping or banding.

Burns

Injuries were confined almost entirely to cleaners and hot water. Cleaning up with lower temperature water should help prevent some burns.

Occupational Disease

This category was confined to dermatitis and brucellosis. In most cases, dermatitis was "hog itch."

Ratio of Lost-Time to Total Number of Accidents

Members were asked to determine the percentage of doctor-treated cases that became "lost time." On the average, companies in this group indicated that one of every three workers undergoing medical treatment

for dermatitis was taken off work and would be counted a "disabling injury" under the Z16 formula that is used by the National Safety Council and Bureau of Labor Statistics for determining industry injury rates. In other industries, the ratio of medical cases to lost time injuries is a minimum of one to thirty. In other words, we take people off the job in the meat industry at a rate ten times above the average of other large manufacturers.

Since the "disabling injury" is the criterion of accident frequency measurement, the meat industry is a statistical target industry rather than one in which many accidents occur.

Many workers with knife cuts or similar injuries are kept off the job until the wound heals. In most other industries, a worker may receive medical treatment and return to work with little or no lost time. This is why the frequency rate in the meat industry is reported so much higher than the all-industry average, even though the frequency and severity of its accidents are not out of line with other industries.

Chapter III Record Keeping and Reports

Recording Keeping Requirements

The U.S. Department of Labor, Bureau of Labor Statistics, has distributed a ten-page instruction booklet "Record Keeping Requirements Under the Williams-Steiger Occupational Safety and Health Act of 1970," to all businesses making FICA payments. For example, each business establishment is specifically required to post in a conspicuous place a special bulletin (center-fold) "Safety and Health Protection on the Job." Failure to do so may bring a fine of up to \$1,000.

For more specific instructions and responsibilities refer to "Record Keeping Requirements," U.S. Department of Labor. Since changes have been and will be made in these record keeping requirements, you should consult one of the sources of information listed on the last page of this guide. For instance, employers with fewer than eight employees are not required to keep safety and health records unless:

1. The Secretary of Labor requests help in compiling data through record keeping on safety and health.
2. An employee dies on the job.
3. An incident occurs that requires medical attention for five or more employees.

Accident Reports

Every accident should be reported and investigated. The report data are used for:

1. OSHA required reports
2. Workmen's compensation reports
3. Internal analysis, control, and action.

The internal reporting system frequently includes "near-misses" or accidents that produce no injury. These reports serve to identify and correct those conditions which could cause a lost-time accident in the future.

The accident report should include the following information:

1. Name, employee number, and social security number of the injured worker.
2. Date and time of injury.
3. Date, time, and mode of reporting the injury.
4. Sex and age of the injured worker.
5. Type of injury, such as broken limbs, abrasion, etc.
6. Activity of the employee when injured. This should be recorded exactly because injuries frequently occur during activities associated with the job, such as sharpening tools, and not during the work cycle itself.
7. Category of injury, such as lost-time accident, first-aid only, medical treatment.
8. Days lost from work. Sometimes this is not known at the time of filing the original report, but must be filled in later.
9. Any conditions which might affect compensation status later. An example is an existing partial disability.
10. Plenty of space for the safety officer's comments and reports. This should include a recommendation for action to prevent similar accidents in the future.

The information should be filled in carefully and accurately. General terms should be avoided. This is important since the accident report may be the basis of legal investigation and action later. OSHA will accept accident reports filed for workmen's compensation in Missouri as meeting their requirements. The form, "Report of Injury," Missouri Workmen's Compensation, Form 1 revised, substitutes for OSHA Form 101.

Attached are typical report forms which are required or used for accident reporting in Missouri. Please note that workmen's compensation is a state function and requirements may vary from state to state. OSHA is Federal legislation and requirements are uniform throughout the nation.

Other Reports

Every employer must report within 48 hours, usually by phone, if:

1. Accidental occupational death occurs.
2. A catastrophe requiring hospitalization of five or more employees occurs.

The area director will decide whether an inspection is warranted. For example, OSHA may decide not to investigate an employee death in a vehicle accident on a public highway since this falls within the jurisdiction of state or local police.

The employer must also keep a log of occupational accidents and illnesses.

He is also required to post certain reports, notices, and all proposed citations where the employees can read them.

Chapter IV Management and the Worker

Accident Prevention and Control

Accidents don't just happen. They are caused. In each accident, there are at least two observable types of causes:

1. An unsafe condition.
2. An unsafe act.

The combination of unsafe act and unsafe condition must normally occur simultaneously for an accident to happen. The unsafe condition does no harm if there's nobody there; an unsafe act harms no one unless the conditions for an accident are there.

Control of conditions is normally less difficult than control of people. Unsafe equipment, machinery, and buildings can be identified and improved. Experience data on which to base optimum safe design is readily available for most industrial machinery and equipment.

Unsafe acts which cannot be prevented completely by guards are important in the meat industry. For example, knife accidents are the leading cause of lost time in meat packing even though the most modern, best available knives and personal protective equipment such as mesh gloves are used. Lifting and moving sides and quarters manually cause many lost-time injuries. These are hard to prevent even when mechanized lifting equipment is used.

Unfortunately, unsafe acts cannot be completely avoided by equipment design. Prevention of unsafe acts requires:

1. Top management support - strong, continuous, and conspicuous.
2. Worker training and retraining in safe working methods.

3. Continuous alertness of supervisors and foremen to prevent unsafe acts and to take appropriate action when they do occur.

The ultimate responsibility for safety belongs to top management. It can't be ignored or delegated. Unless top management expresses strong interest in safety and backs it with vigorous action, subordinates and workers will take little interest.

PREVENTION OF ACCIDENTS and injuries is achieved through:

1. Control of conditions - the working environment.
2. Control of the actions of people - behavior.

The first obligation of management is to provide the safest possible working environment. A safe working environment invites safe behavior. It includes much more than good plant layout and proper guarding of machinery. The best environment is of no value unless it is properly maintained. This includes the proper operation of equipment, good house-keeping, and effective maintenance.

The responsibility for a safe working environment and the control of the actions of people cannot be delegated to committees or inspection teams. The ultimate responsibility for a safe and profitable operation must start with the top executive and be carried down through all levels. It must include engineering, purchasing, industrial engineering, quality control, personnel, and medical--all the staff functions of the company.

The Safety Director

The concept of staff safety services has changed radically over the past 50 years. Safety services now include managing a safety program in all its aspects. Larger companies are now staffing their safety departments with efficient administrators who are capable of developing

programs on a staff basis. This leaves on-the-line administration of safety to supervision and engineering, where the control of the environment and actions of people rightfully belongs.

Smaller plants assign responsibility for developing safety programs to someone from personnel, industrial relations, or industrial engineering--someone who has a background in successful program management. In a very small company, the owner or manager will have safety responsibility as part of his managerial function.

Safety Committees

Safety committees have two basic functions: (1) Creating and maintaining an active interest in safety, and (2) serving as a means of safety communication.

There are three fundamental points to be kept in mind by safety committee members:

- * Safety committees should not be a one-way communication.
- * Safety committees should not be so big that they are unwieldy.
- * Safety committees should have the full backing of the entire management if they are to function efficiently. If they are not functioning efficiently, they should be disbanded.

Training

There are three levels of safety training responsibility: Plant-wide, departmental, and on-the-job.

Plant-wide training consists of general plant rules and practices affecting workers in all departments. It is the duty of the plant manager, or some reliable person delegated by him, to perform this duty.

Departmental training consists of general department rules and practices that will affect the worker regardless of where he works in the department or what shift he is on. This training is the responsibility of

the department head. It can be delegated, if necessary, to someone in the department capable of doing a complete and satisfactory job.

On-the-job training is the responsibility of the foreman. Even if he delegates men to assist in training, he is not relieved of any part of his responsibility. He must see that these assistants are thoroughly trained in both knowledge of jobs and methods of instruction. He must follow up to be sure of top performance in all phases of the work.

Before Instructing - Think

It is important to the employee, to supervision, and to the company that proper training procedures be used. There are many factors that must be considered. Perhaps the man has been with the company for years. Perhaps he has been recently transferred. Maybe he is just starting his first job. Perhaps he has long experience with some other department or company and is starting with a new group.

It is also important for the instructor to think of the objectives of safety training.

1. Having the new worker work safely while coming up to the quality and quantity requirements of production as quickly as possible.
2. Avoiding accidents which may injure workers.
3. Avoiding damage to machines or equipment.

How to Instruct

Many supervisors start by instructing or correcting a worker without thinking or planning. Instructing a man in the right way takes just a little extra time at the moment, but it saves hours and days later on. It prevents accidents, scrap, and damaged equipment. The JIT (job instruction training) plan is simple and easy to follow. Before instructing, check these points:

1. Have a time table

How much skill is the man to achieve? How soon should he achieve that skill?

2. Break the job down

There are a few key points in every job that make or break it. If these key things are done right, the whole operation is safe and right. If any one of them is missed, the operation is unsafe and wrong.

3. Have everything ready

Have the right tools, equipment, and materials. When teaching a job in front of a worker, set the correct example. If everything is done in the right way, he is more likely to do the same.

4. Have the work place properly arranged

Have all tools and the work area just as the worker is expected to keep it. Again, set the correct example.

The Procedure Itself

Here is the general procedure to be used when instructing an individual:

1. Prepare the worker to receive instruction.

* Put him at ease

* Find out what he already knows about the job.

* Get him interested. Relate his job or operation to the final product, so he knows his work is important.

* Put him in the right position. Don't have him see the job backwards or from any other angle than that from which he will start.

2. Present the operation.

* Tell him, show him, illustrate, ask.

* Put it over in small doses. He (like all of us) can catch only six or eight new ideas at one time and really understand them.

* Make the key points clear.

- * Be patient and go slowly. Get accuracy now - speed later.
3. Try out his performance.
 - * Have him do the job, but watch him.
 - * Then have him do it over again. As he does it over, ask him what he is doing and why. You want him to understand.
 4. Have him explain.
 - * Have him explain the key points. "Safety - Quality - Care of Machinery - Products - Material - Housekeeping." Correct his errors (but don't reprimand him). Errors can become habits.
 5. Follow-up
 - * Put him on his own. He has to get the feel of the job.
 - * Tell him whom he should see if he needs help. Make this definite: yourself or someone you designate.
 - * Check him frequently. Perhaps every few minutes at the start, every few hours or few days later on. Be on the lookout for any incorrect or unnecessary movements.
 - * Get him to look for key points as he progresses. He may have some good suggestions.
 - * Taper off this extra coaching until he is able to work under normal supervision.

You will find it amazing that such greatly improved results can come from such a simple plan. Use this plan, or whatever part of it applies, every time you want to put over a new operation, check a man's work, or change a work procedure.

Motivation for Safety

One of the most difficult, yet most important, factors in a good safety record is worker motivation. The worker who is motivated toward safety will himself use safe methods and observe safety rules. He will want to work safely. If he is not well-motivated to safety, his attitudes and actions will tend to result in more job accidents.

A major difficulty in motivating the worker to safety is the relative rarity of accidents. Even in plants with a high accident rate, the average worker will seldom lose time from an accident. He tends to take the attitude, "It can't happen to me." The outcomes of safe working habits are not immediately apparent in his pay check or any other tangible form.

The old combination of the carrot and the stick is the best available motivation. The stick is disciplinary action or reprimand for unsafe acts. The carrot is much harder. It is the knowledge that safe working habits will reduce the probability of painful and expensive accidents.

Motivational experts have identified four worker desires basic to his motivation. They are:

1. Significant and meaningful work
2. Personal fulfillment
3. Security
4. Acceptance by his peer group

The supervisor who can identify safety with these worker desires has gone a long way toward having a safe plant with a good accident record.

Safety Training for Workers in Small Plants

The most effective way to prevent accidents is proper training and supervision of workers. In the small plant, formal classes and training programs are inappropriate. However, supervision may be easier since the manager (often the owner) is in close personal contact with each worker during the working day.

The small plant operator can carry out his training responsibilities by:

1. On-the-job instruction. When the manager instructs the worker in the details of his job, he can show the worker safe methods and emphasize safe working habits. This is particularly important, because learning safe working habits in the beginning is much easier than correcting unsafe ones that have become habitual.
2. Comments and instructions to the worker when he is performing his job. Positive attitude and action are important. Mention what the worker is doing right as well as what he is doing wrong. Emphasize the "do" instead of the "don't." Be alert at all times and keep unsafe habits and attitudes from becoming established.
3. Combine safety with other training. If the employees meet as a group during the working day, take the opportunity to push and emphasize safety.

Good supervision is a continuous, never-ending process. The supervisor-manager must be constantly alert and take appropriate action immediately

whenever safety standards are violated.

Good training methods apply to all phases of safety training such as production, clerical record-keeping, and plant security. Good publications and extension courses in worker training are available.

Chapter V

Personal Protective Equipment

General Requirements

OSHA requires that these items be provided, used and maintained in a sanitary and reliable condition:

- * Protective equipment for the eyes, face, head, and extremities.
- * Protective clothing, shields, barriers, and respiratory devices.

They must be used whenever the hazards posed by mechanical equipment, the environment, processes, or chemicals are present. Their function is to prevent injury to workers through absorption, inhalation, or physical contact.

All personal protective equipment shall be of safe design and built for the work to be performed. The regulations further require that the employer shall be responsible for the adequacy, maintenance, and sanitation of any employee-owned protective equipment.

Mesh Gloves

Cuts are the most common cause of lost-time accidents in meat-packing and processing. The most practical way to guard against hand cuts is a metal mesh glove on the hand opposite the knife. The glove is strong enough to deflect the knife and prevent an accident and yet flexible enough for normal work motions.

Cuts are particularly troublesome in meat packing since regulations require that the cut heal before the worker returns to the job. Thus, a cut which might cost only a day or two in other industries might cost a week or ten days in meat packing.

Mesh gloves must be kept clean and sanitary. The best method is daily cleaning and sterilization.

Helmets

Helmets to protect the worker's head from falling and flying objects, and from limited electrical shock and burn, shall meet the specifications of the American National Standard Safety Requirements for Industrial Head Protection Z89.1-1969. (1910.135)

Occupational Footwear

Safety-toe footwear for employees shall meet the specifications in American National Standard for Men's Safety-Toe-Footwear, Z41.1-1967. Modern safety-toe shoes are comfortable and attractive; they can prevent many painful, disabling injuries to the foot from falling objects.

Protective Equipment for Chemicals

The best protection against chemicals used in cleaning is high knee boots. Trousers legs can be worn inside or outside the boots. Wearing them outside the boots protects against chemicals or liquids getting inside the boots. If worn outside, strap-top boots are recommended.

Personal protective equipment requirements will vary with the strength and characteristics of the chemicals involved. For example, if the cleaning materials are used in spray or brush form overhead, protective hoods, long gloves with gauntlets turned back and aprons should be worn. 1910.133

The proper respiratory protective device is required when mists or gases are encountered. The specifications will depend upon the chemical and physical characteristics of the chemicals being used. Safe use and proper maintenance are necessary for full protection of the worker. 1910.134

Chemical goggles or safety glasses are recommended for workers using any cleaning solution. Even mild solutions such as ordinary soap can cause severe eye irritation. Contact lenses should not be permitted. 1910.133

Any worker mixing dry ingredients should wear goggles, rubber gloves, apron, and a dust respirator. 1910.133

All protective equipment should be thoroughly cleaned and checked after use. It is important that any residue, wet or dry, be removed as these residues can cause injury if the worker puts on contaminated equipment. 1910.132

Chapter VI

Housekeeping and Facilities

Housekeeping is the orderly arrangement and consistent maintenance of operations, tools, equipment, storage facilities, and supplies. Not only does good housekeeping reduce accidents, it improves productivity, employee morale, and public relations.

Good housekeeping reduces the probability of falls, tripping, stumbling, and similar accidents. These account for about one-quarter of all industrial accidents. Because these accident sources are less spectacular and obvious than moving-machine parts, they are often neglected. (See OSHA regulation 1910.176)

According to the National Safety Council, the steps in achieving good housekeeping are:

1. Decide to do something about existing bad housekeeping.
2. Develop a plan, put it in writing, and notify all subordinates of the details of the plan.
3. Establish a schedule for executing your plan and arrange for self-reminders, such as writing your schedule one year ahead on your desk calendar. Establish a day, time, and place for each activity. Depending on your individual needs, your part in the plan may require 15 minutes, one hour, or four hours per week.

Plans should include:

1. Survey of your area for unused or seldom-used equipment. Can it be removed from the department immediately? Can it be used some place else? Should it be stored or sold for scrap?

2. Set up a schedule for talking to a few employees each day or to a larger number of employees each week. Appeal to their pride. Show each how he can benefit by keeping his work space free from congestion, keeping meat scraps or grease off the floor, helping maintain aisles, and keeping material in proper storage areas. Always recognize good employee performance.
3. Be sure to explain the specific responsibilities of each employee for good housekeeping. Make sure that instructions and directions are complete and understood.
4. Develop a definite schedule of departmental inspections to evaluate your housekeeping program once each week if possible.
5. Set a good example to show employees you mean business. The first piece of trash, clutter, or disorganization calls for immediate action.
6. Provide sufficient trash-disposal equipment to prevent cluttered corners.
7. Eliminate the practice of keeping excess materials at work places. This is one of the more prevalent poor work habits that causes congestion.
8. Look for the sources of slip-and-fall hazards such as leaking pumps, pipes, valves; overloaded vehicles, work tables, or conveyors that invite spillage; and runoff from greasy equipment.
9. Encourage employees to report conditions which contribute to disorder.
10. Physically identify the problem area when possible. Painted aisles, corners painted white, limiting loads to prevent spillage,

and established limits for stacking and piling are some of the suggested means.

11. Equipment should be properly maintained. Metal edges worn sharp, or metal tools, appliances, trucks, or buckets that are broken or cracked, should be sent to repair immediately. Employees will generally cooperate in pointing out these hazards. But you must establish the rules designed to prevent or minimize these conditions by insisting on orderly use of the equipment.

OSHA has specific regulations on many aspects of good housekeeping.

Especially important are:

1. All places of employment, passageways, storerooms, and service rooms shall be kept clean and orderly and in a sanitary condition. (OSHA regulation 1910.176 a)
2. The floor of every workroom shall be maintained in a clean and, so far as possible, dry condition. Where wet processes are used, drainage shall be maintained and false floors, platforms, mats, or other dry standing places should be provided wherever practical. (1910.176 d)
3. To facilitate cleaning, every floor, working place, and passageway shall be kept free from protruding nails, splinters, holes, or loose boards. (1910.176)
4. Aisles and passageways shall be kept clear and in good repair with no obstruction across or in aisles that could create a hazard. (1910.176)

Under these regulations, the inspector has wide latitude to cite the employer for violation for poor housekeeping practices. However, if the plant is neat, clean, and orderly, it should meet the OSHA standards. Experience with enforcement, court rulings, and administrative rulings should clarify what is acceptable and what is not.

Railings

Barriers erected along exposed edges of floor openings, wall openings, ramps, platforms, and runways to prevent falls should meet the standards of A12 of American National Standards Institute (New York City 10017): "Safety Code for Floor and Wall Openings, Railings, and Toe Boards."

Forty-two inches is the most desirable height. Because it is above the center of gravity of a tall person, it provides reasonably adequate protection. A standard railing consists of a smooth-surface top rail, intermediate rail, and posts. The vertical height is measured from the upper surface of the top rail to the floor. The intermediate rail should be approximately halfway between the top rail and the floor. The spacing of upright posts should not exceed eight feet. (OSHA regulation 1910.24)

Standard railings should have toeboards at least 4 inches high. Toeboards should always be used, unless they constitute a hazard in areas where there is a spill-over of material, and unless toeboards would cause an accumulation of material resulting in a slippery surface on the platform. The backside of all dressing floor platforms should have standard railings and toeboards, unless the above condition is encountered. Short toeboards are desirable on the rail side of dressing floor platforms,

unless they cause an accumulation of product on the floor of the platform.

Stair Railings

Stair railings on an open-side stairway should be similar to a standard railing, but the vertical height should not be more than 34 inches or less than 30 inches from the upper surface of the top rail to the surface of the tread in line with the face of the riser at the forward edge. Stair rails should be on the right side descending on stairways except where a stair may be open-sided on the left.

All stairways wider than 44 inches must be equipped with two railings. In wet locations where there is an accumulation of moisture, grease, or meat scraps, two railings should be used regardless of the stair width. All stairways 88 inches or wider should be equipped with a median rail at midpoint in addition to the two side rails. (OSHA regulation 1910.24)

Stairways

Stairways should adhere to standard specifications of a 12-inch tread with a 7-inch riser, providing for a one-inch backward slope or set of the riser. If there are vertical risers, 11-inch treads are allowable. (OSHA regulation 1910.24)

Stairways should be made of suitable materials. In wet manufacturing areas, slip-resistant grating treads are preferred. In drier areas, masonry stairways are satisfactory, but should be equipped with approved abrasive nosings and the masonry face of the tread should contain a finished troweled-in coat of abrasive to a depth of 1/4 inch. When stair treads or nosings become worn, they may be covered with abrasive adhesive strips. However, if such stairs are exposed to clean-up, abrasive strips

will not adhere.

Mixtures of resin and grit can be applied to stairs in wet locations and will withstand normal clean-up. Newer plastic and grit floor coatings have been developed, and some have shown exceptional slip and wear resistance. Installation of these materials must be made by well-trained and qualified personnel. It is also desirable to test the material for slip resistance prior to installation.

Fixed Ladders

All fixed ladders should be attached no closer than 7 inches to any fixed object. The distance between rungs and cleats should not exceed 12 inches and should be uniform throughout the length of the ladder. The minimum length of rungs or cleats should be 16 inches. All fastenings should be an integral part of the ladder design.

Side rails of fixed ladders should extend at least 42 inches above the landing point. It is preferred that they be goosenecked over roofs, and that such ladders terminate on platforms. The side rails should be smoothly and continuously fastened to the top rail of a standard railing on the landing platform. Fixed wooden ladders should have rungs recessed into the side rails.

The minimum live designed load should be a single concentrated load of 200 pounds including the weight of ladder and attachments. In most cases, attachments shall not be farther apart than 8 feet.

Fixed ladders over 18 feet in height should be equipped with a ladder cage. The cage should begin seven feet from the bottom of the ladder and extend to the top railing. Cages should not extend less than 27 or more than 28 inches from the center lines of the rungs of the ladder.

They should not be less than 27 inches in width. Vertical bars should be located approximately 9 1/2 inches center to center around the cage. No fixed ladder should be more than 30 feet in height without providing landing platforms at 30-foot intervals which provide for the staggered construction of such a ladder. (OSHA regulation 1910.27)

Portable Ladders

Portable ladders should be types approved by the American Ladder Institute (Chicago 60611). (Contact your supplier for specifications.) All straight ladders should be provided with nonslip shoes. No step-ladder should be used where it becomes necessary for the workman to ascend beyond the third step from the top of the ladder, unless the ladder is provided with a suitable safety platform on top with railings.

Lighting

Good illumination is important to safety as well as to good production. OSHA has adopted the American National Standard Practice for Industrial Lighting A11.1 1-1965 (R1970).

Good lighting is required for the work areas. Also, exits and other areas where workers may enter or travel through must be lighted well enough for the worker to distinguish obstructions and other potential causes of accidents.

Safety Markings and Color Coding

OSHA specifies the use of signs, colors, and tags to identify clearly both safety hazards and safety equipment. OSHA regulations are based upon the following standards:

ANSI Z53.1-1967 Safety Color Code for Marking Physical Hazards

ANSI 3.51-1969 Specifications for Accident Prevention Signs

ANSI Z34.2-1968 Specifications for Accident Prevention Tags

OSHA inspectors have made numerous citations for lack of signs, improper signs, poor sign visibility, and similar violations. Compliance is neither difficult nor expensive. In addition, proper marking is a highly visible safety effort that creates a favorable attitude on the part of employees, supervisors, visitors, and others. Among the hazards which must be marked are:

1. Hot surfaces such as uninsulated pipes.
2. Low overhead or insufficient clearance.

Exits

Exits are a common cause of citation under OSHA. The general requirement is that every building, old or new, designed for human occupancy shall be provided with exits sufficient to permit the prompt escape of the occupants in case of fire or other emergency. The exit consists of three parts; the access to the exit, the exit itself and the exit discharge to a public way. These must be kept free of obstruction and well-marked at all times.

Older buildings may have difficulty meeting the requirements of the code. Please note that there is no grandfather clause exempting buildings existing prior to the passage of the Act in 1970 from the law's requirements. Older buildings must meet the same standards as new ones. This may require extensive remodeling to allow quick, easy and unobstructed egress from the building. In some cases, it may be advisable to abandon

the old building and construct a new one.

The OSHA requirements for exists are taken from the NFPA 101-1970 Life Safety Code.

Safety in Maintenance

The accident rate of maintenance personnel tends to be considerably higher than that of production workers in most plants. The major reasons are:

1. The maintenance worker's task is difficult to standardize. He may be working in many different locations for a short time only. Seldom will one maintenance job be identical to another one. Thus, the safeguards which can be built into a production operation are difficult to incorporate into maintenance.
2. The maintenance worker is less subject to direct supervision.
3. The hazards of many types of maintenance work are considerable.

Examples are repairs at elevated levels and electrical repairs. Management must be conscious of the hazards in maintenance work and alert to enforce safe work practices.

Toilet Facilities

Toilet facilities are covered by the OSHA regulations which specify the number and type of fixtures required, the construction of facilities, the supplies furnished, and other features. This section of the regulations is still under discussion and may be modified. You should consult the local OSHA office for the latest word before you make expensive modifications. (OSHA regulation 1910.141 iii)

Wash and change rooms are required whenever the worker must change from street clothes to work clothes. There must be separate facilities for men and women. (1910.141 e)

Lunchroom facilities must be provided if the employees eat on the premises. The eating area must be separate from any room where toxic materials are used or stored and from any toilet facilities. It must be kept clean and sanitary and provided with approved trash receptacles. (1910.141 g)

Chapter VII
Material Handling

General Provisions

The OSHA regulations have several provisions on materials handling which also involve good housekeeping and maintenance. These include:

1. Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, loading docks, doorways, and wherever turns or passage must be made. Aisles and passageways shall be kept clear and in good repair, with no obstructions across or in aisles that could create a hazard. Permanent aisles and passageways shall be appropriately marked. (OSHA regulation 1910.176)
2. Materials in storage must be stacked, blocked, and limited in height so they are stable and secure. (1910.176 b)
3. Good housekeeping shall be maintained. Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage.
4. Proper drainage shall be provided.
5. Clearance limits shall be posted on signs.
6. Covers or guard rails shall be provided to protect personnel from the hazards of open pits, tanks, vats, ditches, etc.

Elevators

Economics favor the one-story plant over the multi-story plant with elevators. The elevator is a bottleneck costing considerable money for unproductive waiting time and for slow and inefficient material handling. However, multi-story plants with elevators do exist, usually in an old, congested, high land cost district.

Elevators can result in accidents if improperly maintained or used. Most government jurisdictions require periodic inspection and approval of all elevators used by workers or open to the public. The employer may need to supplement this inspection by a more frequent inspection and preventive maintenance checks.

Industrial Power Trucks

A power truck has much greater work capacity than a hand truck. It also can produce more serious accidents if improperly used.

Good maintenance is the first step in safe power truck operation. Many accidents are due to defects which could have been discovered by preventive maintenance and quickly corrected. In addition to safety improvement, good preventive maintenance increases the productivity and efficiency of the power truck.

Details of preventive maintenance are too long to include in this publication. You should refer to the manufacturer's manual or to publications of the National Safety Council for detailed preventive maintenance instructions.

The other major factor in preventing power truck accidents is safe operation. The rules are very similar to those for safe operation of a

private automobile. The basic rule is to look ahead to avoid operating conditions which could lead to collisions, fallen loads, or other accidents.

Hand Trucks

Hand trucks are seldom the source of serious lost-time accidents. However, minor cuts, scrapes, and bruises from improper use are common. The pressure for production often leads to short cuts and unsafe practices which result in accidents.

Most safety rules for hand trucks are based on common sense. Don't overload, do balance and secure the load, and don't turn too rapidly. Also, be careful that the truck does not strike the operator's foot, another worker, stored materials, equipment, or building.

Lifting and Carrying

In many packing plants, a worker will carry a quarter of beef or side of pork manually from one place to another, such as from cooler to truck. Since a quarter may weigh several hundred pounds, improper lifting and carrying may result in back injuries or strains. The lost time and cost due to a back injury may be quite serious.

The best way to avoid injuries due to manual material lifting and carrying is to mechanize or automate the operation if feasible. Not only does this reduce the opportunities for accidents, it can reduce fatigue and unit labor costs. Cranes, hoists, elevators, lift trucks and similar devices, dollies, and conveyors are some of the material handling devices which can be used.

The National Safety Council recommends the following general rules for safe lifting:

1. Size up the load. Do not attempt to lift alone if there is any doubt as to your ability to do so.
2. Be sure footing is secure. Get a good balance. This means feet fairly wide apart (8 to 12 inches).
3. Place the feet close to the base of the object to be lifted. This is important because it prevents the back muscles from taking all the load.
4. Bend the knees outward and straddle the load somewhat, keeping the back straight as possible.
5. Now start pushing up with the legs using the strongest set of muscles. Keep the load close to the body to take full advantage of mechanical leverage of the body.
6. Slowly lift the object to the carrying position. Do not jerk it. If necessary to change direction when in an upright position, be careful not to twist the body. Turn body by changes of foot position.
7. If the load is to be deposited on a bench or table, place it on the edge to make the table take part of the load and then push it forward with arms, or if necessary with part of the body in forward motion.
8. In putting the load down to the floor surface from a waist-high carrying position, bend the knees and with back straight and load close to the body, lower the load with the arm and leg muscles.
9. Never walk with a load that obstructs vision unless the path is clear and there are no floor obstructions.

The employer should pay special attention to the chronic health conditions which make the worker prone to lifting accidents. These include congenital back trouble, hernia and a medical history of back injuries. Workers with these conditions are more likely to have back injuries than the average worker.

Dockboards

Dockboards are frequently used in loading trucks. They must meet the following requirements:

1. They shall be strong enough to carry the load imposed.
2. Portable dockboards shall be secured in position, either by being anchored or equipped with devices which will prevent their slipping.
3. Handholds, or other effective means, shall be provided on portable dockboards to permit safe handling.

While in use, a loading dock used to pass material into and out of a truck need not be guarded. This doesn't mean that as quickly as a truck leaves the dock, guards must be installed. (1910.178 d)

Chapter VIII

Machine and Tool Guarding

Many machines and tools have sharp edges, mating gears, or other moving parts which can injure the worker. Accidents from these causes can usually be prevented or minimized by designing and installing guards at the danger points. For example, a mesh guard around a ventilating fan will keep the worker from cutting his hand on the rotating blades.

Hand and portable tools can cause accidents. Guards can be added to some to prevent contact or at least to minimize the chance of an accident. However, guards cannot completely take the place of training in safe practices and of good supervision. There is unfortunately the human tendency to take the guard off if it interferes with production or with worker comfort. Management must be constantly alert to see that the worker uses safe methods and doesn't circumvent the guards installed on equipment. Proper machine guarding is an engineering problem as well as a safety problem. The guard must be designed to prevent accidents, be easy to maintain, and yet not interfere with production and comfort. It is normally best to buy the machine with the guards installed.

Only the basic principles of machine guarding are covered here. The meat processor should consult with the equipment manufacturer on the guards needed for his machine.

Machine Guarding

OSHA regulations do not specifically deal with meat packing and processing machinery as such. They do have machine guarding provisions applicable to all types of machinery used in the plant. The major points are:

1. One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards created by point of operation, ingoing nip points, rotating parts, flying chips, and sparks. Examples of guarding methods are carrier guards, two-hand tripping devices, electronic and mechanical safety devices.
2. Guards shall be securely affixed to the machine where possible and secured elsewhere if attachment to the machine is not possible. The guard shall be such that it does not offer an accident hazard itself.
3. The point of operation of a machine shall be guarded if its action exposes the employee to injury. If a standard exists, the guard shall conform to it. If there is no applicable standard, the guard shall be designed and constructed to prevent the operator from having any part of his body in the danger zone during the operating cycle.
4. Special hand tools for inserting and removing material can be used to supplement, but not to replace, other guards. It cannot be the sole safety device employed on the machine.
5. Fan blades must be guarded with no openings larger than one-half ($\frac{1}{2}$) inch unless the blades are seven feet or more above the floor or work surface.
6. Machines designed for a fixed location must be securely anchored to prevent moving or "walking."

Guards on Power Transmission Apparatus

Guards or covers must be installed on all moving pulleys, belts, conveyors, chains, and similar devices. These guards must prevent the worker from accidentally coming in contact with the moving parts. Flywheels and pulleys must also be guarded.

Shafting of all kinds must be encased to prevent accidental contact.

Certain exceptions are made if the power transmission apparatus is accessed only for maintenance and is locked against unauthorized access at other times.

Hand and Portable Power Tools and Equipment

Hand and portable power tools should have the following safety features:

1. Guards at point of operation when possible.
2. Grounds or double insulation against electrical shock.
3. "Dead man's switches" to stop the equipment when the operator releases pressure on the switch.
4. Preventive maintenance to keep the equipment in good condition.
5. Training and supervision to insure safe working habits.

The employer is responsible for the safe condition of portable tools and equipment used by employees whether furnished by him or by the employee.

Chapter IX Electrical

Electrical Hazards

National, state, and local electrical codes including recent revisions must be followed. State and local electrical codes usually follow the pattern of the "National Electrical Code," published by the National Fire Protection Association (Boston 02110) and other agencies dealing with installation and rating of hazardous locations. (1910.308)

All portable hand and production tools operated by electric power should be provided with polarized grounded receptacles. A sufficient number of polarized outlets on walls or other fixtures should be provided to assure safe sources of energy for maintenance workers. All extension cords should be the three-wire type designed to fit the type of polarized receptacles on tools and wall outlets. The type most commonly used for 110-volt powered tools and equipment is the receptacle having two knife tongs with a round ground plug. The ground plug is longer than the energized tongs so that the ground is contacted before energy passes through the tool.

Mechanical workers are frequently forced to operate 110-volt power tools in light sockets. There is no way of adequately grounding such tools in a positive manner. Some operators provide pigtail clamp grounds for attaching the ground to a grounded object; however, it is never known whether the attached object is adequately grounded. Permanent wiring should carry an independent ground wire and the neutral wire should never be considered a ground except at the neutral bar in a terminal box.

Frequently, problems arise with attachments for portable appliances which operate on 220-volts or more. Installation should be designed to prevent or at least minimize the number of pieces of equipment operating on higher voltages.

Higher voltage receptacles are prone to explode, even though they carry the necessary ratings, for two reasons:

1. The worker may attempt to turn off the machine while it is under load by disconnecting the receptacles. This results in an arc.
2. Cleaning detergents increase the conductivity of water. An explosion may occur when engaging a high voltage receptacle that is wet with detergent mixtures.

High voltage receptacles can only be disconnected safely by:

1. First disconnecting the source of power at the master switch.
2. Less safely, with reasonable safety, by first turning off the machine, thereby eliminating the current load.

Portable drop cords used for maintenance, sanitation and loading should be the three-wire type when used for either light or power. Portable lights used in loading and maintenance operations should be provided with adequate bulb covers or bulb guards with hooks or other devices to properly position them for safe and for maximum light utilization. For work in tanks or other grounded metallic vessels, light sources should be either low voltage or battery powered. Powered tools and appliances should either be low voltage, portable battery powered, or double-insulated.

Whenever portable power tools are used, effectiveness of grounds should be checked prior to each daily usage. This should also include the effectiveness of grounds of sources of electrical energy and portable grounded drop cords.

Covered electrical outlets should be provided for electric welding equipment. A fused safety switch should be provided immediately adjacent to all welder outlets so that it is not necessary to plug in or unplug welding machines while the receptacle is energized.

All personnel who may be required at any time to operate electrical switch gear of any voltage should be trained to stand to one side and then turn away from the switch gear before engaging or disengaging the switch. This is especially true of, but not necessarily restricted to, switches controlling voltages above 120 volts. Under certain conditions, an arcing switch will ionize the air within a switch box, releasing free hydrogen and oxygen resulting in an explosion. This may never occur on low voltage equipment, but it is best to form the habit of following this procedure so the habit is well ingrained in the mind of the employee.

Electrical Grounding

All portable electrical equipment operating at more than 90 volts must be grounded with a separate ground wire and a polarized receptacle. This may require the rewiring of old buildings and modification of old equipment. Old equipment that doesn't meet the regulations should be replaced by new equipment that does. The supervisor must see that the worker uses the equipment and ground wires in accordance with regulations.

If rewiring or modification of the electrical system is undertaken, be sure that the system will meet the requirements of the National Electrical Code and any applicable state or local electrical code. Points to watch are outlets, switches, junction boxes, and similar devices that the worker uses or comes in contact with.

Dead-man controls are now required on all hand-held tools. These turn the tool off if the worker's hold on the tool is relaxed.

Standards

OSHA has adopted the provisions of national codes for electrical equipment installations and use. The applicable codes are:

National Electrical Code NFPA 70-1971

American Code C1-1971 (Revision of 1968) National Standards
Institute (ANSI)

Chapter X Dangerous Chemicals

Chemicals and Cleaning Compounds

The OSHA regulations devote considerable attention to chemicals which can cause accidents such as fires and explosions or illnesses such as dermatitis. Cleaning compounds used today are frequently toxic, strong, or both. Care must be taken to insure that these chemicals are stored and used properly, safely, and according to regulations.

Cleaning compounds are the major source of chemical safety and health problems in meat packing. These compounds are strong enough to remove soil and contamination quickly; they are also strong enough to produce burns, poisoning, dermatitis, and other worker illnesses. Although seldom fatal, some cases can remove the worker from the work force for a considerable period of time.

There are three different types of hazardous situations arising from cleaning chemicals:

1. Storage and handling
2. Using the cleaning solutions
3. Blending and mixing the cleaning solutions

The three means to prevent accidents, injuries, and illnesses to workmen are:

1. Personal protective equipment
2. Proper storage and handling
3. Training in safe methods of mixing, handling, and using dangerous chemicals.

Dermatitis

This is an increasingly common industrial illness. The increase in the number and quantities of chemicals used in factories increases the exposure of the worker to dermatitis. Since individuals vary in sensitivity to chemical agents, some workers may develop symptoms after light exposure while other workers may be immune. Sensitivity changes from time to time. A worker may suffer no ill effects from exposure for long periods and then develop a sensitivity to a chemical he uses.

The industrial or consulting physician should be familiar with various forms of dermatitis and the causative agents involved. If chemical hazards are important, the company may wish to have a consulting dermatologist. Even so, the plant management and supervisors should be familiar with the basic principles of preventing dermatitis and be trained to recognize a case of dermatitis and refer it to prompt medical treatment.

A plant survey should be made to determine which chemicals cause dermatological reactions in the worker. These chemical agents should be listed and posted at the first-aid station and for the supervisors. The suggested antidote or first-aid treatment should also be listed.

Mixing and Using Chemicals

As with other dangerous materials and equipment, the key factor in preventing accidents from industrial chemicals is the well-trained, alert, and conscientious supervisor. He should know the characteristics of the chemicals his workers use and the methods of safely handling, using, and storing them. This alone is not enough; he must be constantly alert to be sure the workers are using the safe methods.

Almost all industrial chemicals come with instructions for safe handling and mixing. These instructions should be rigorously and carefully followed at all times. It is particularly important to stick to the recommended concentrations; some chemicals are relatively safe at specified concentrations but react violently when mixed in stronger solutions or with higher concentrations. Safe disposal of unwanted or left-over ingredients should be carried out according to instructions.

Storage

A major requirement of the OSHA regulations (1910.106D) is that only strictly limited amounts of dangerous chemicals be kept at or near the work place. Additional quantities must be kept in a separate, isolated, completely secure, and protected location. This is a common violation cited by OSHA inspectors and often overlooked since it concerns the maintenance and housekeeping functions and not production, where the average manager concentrates his attention.

The type of container is carefully specified. Chemicals should be kept in the original container until used. Once removed from the original container, the chemical should be used immediately or discarded. It should not be returned to the original container.

Storage should follow these principles:

1. Store chemicals in a cool, dry place in the original container.
2. Keep chemicals away from heat and from sources of fire.
3. Keep away from foreign materials such as paints or petrochemicals.

4. It is vitally important that industrial chemicals be kept well away from foods, beverages, tobaccos, paper towels, soaps and anything else ingested or used by a worker. Eating in an area where chemicals are stored or used is strictly prohibited.
5. The storage area must be protected against fire.
6. Keep all container lids tightly closed when not in use.

Liquified Petroleum (LP) Gas

Many small meat processors in rural areas use LP gas. Its use and storage shall be in accordance with National Fire Protection Association (NFPA) 58-1969. If you use LP gas, you should get a copy of this standard.

Personal Protective Equipment

Personal protective equipment for protection against chemicals is covered in Chapter V.

Chapter XI

Industrial Hygiene

Industrial hygiene is becoming more and more important in the total concept of occupational safety and health. The number of illnesses covered by workmen's compensation, OSHA, and other laws and regulations keeps increasing. Experience over a long period of years shows that many chemical substances have injurious toxic effects that are not noticeable during a shorter period of years.

Some major hygiene problems are:

1. Prevention of diseases due to poor sanitation and cleanliness. Food poisoning is a conspicuous example.
2. Preventing injury or impairment through inhalation, ingestion, or contact with toxic substances. A common industrial ailment is dermatitis from certain chemicals.
3. Loss of hearing from exposure to high strength or high frequency noise sources.
4. Permanent lung damage or illness from dangerous substances, notably free silica and asbestos.
5. Injury from radiation.

Some aspects of industrial hygiene are quite important in the meat packing industry. Others are non-existent or unimportant.

Noise Control and Hearing Conservation

In recent years, culminating with OSHA, increasing attention has been paid to industrial deafness and hearing conservation. This is a difficult subject because much is still unknown and deafness is hard to

allocate between industrial and non-industrial causes. However, OSHA has set definite standards for noise levels in industrial plants. The plant operator should get a decibel meter and learn to use it. (1910.95)

Noise levels are measured in decibels. This is not a linear measurement; the number of decibels is not directly proportional to the noise level.

The factors of noise which affect occupational health are:

1. The level of environmental noise to which the worker is exposed.
2. The duration of the exposure to noise.
3. The frequency and other characteristics of the sound waves which produce the noise.

As with other safety and health conditions, individual tolerances and reactions to various noise conditions vary widely. The plant manager should remember that administrative agency personnel tend to be biased in favor of designating loss of hearing as due to occupation if there is a reasonable possibility this is true.

Exposure to noise can be reduced by:

1. Cutting down the noise levels in the plant.
2. Cutting down the time during which the worker is exposed to high noise levels.
3. Using ear plugs or muffs.

Many machines were built before attention was paid to noise levels. Newer models are usually quieter since a competent designer can reduce the noise level if this is called for in the specifications. The most efficient way to reduce the noise level is to design the machinery for

quiet operations. Other remedies are to enclose or segregate noisy machines so the worker is not exposed to the high noise level, or rebuild the machines to reduce the noise level. Both these alternatives are expensive and often less than satisfactory.

Ear plugs or muffs worn by the individual worker reduce the noise level entering the ear. Both are commercially available, but should be fitted by a trained, experienced person. This method will work but is usually less satisfactory than reducing the noise level.

Chapter XII Fire, Medical, and Emergency Protection

Fire and Emergency

Fires are a leading cause of disastrous loss and business failure in the United States. Most businesses hit by a major fire do not reopen their operations. In addition to the economic loss, a major fire can cause injury and death.

Local governments usually have fire prevention regulations and inspection staffs to enforce these regulations. The meat processor should consult local authorities for these requirements. OSHA does have some requirements which may duplicate or supplement local regulations. Some major points are discussed in this section.

Emergencies with potential to cause injury may arise from causes other than fires. In the Midwest, tornadoes can cause injury and heavy damage although the probability of a single plant being hit is small. OSHA requires that the employer have plans for evacuating the building and taking other necessary measures to minimize injuries. OSHA also requires that personnel be trained in the plan and that specific assignments to specific individuals be made, understood, and kept current.

Fire Extinguishers

A common source of OSHA citations is violation of the standards on fire extinguishers. The extinguisher must be maintained in a fully charged and operating condition, properly marked and located, and kept in designated locations when not in use.

The most important requirements are:

1. Extinguishers shall be conspicuously located, readily accessible, and immediately available.
2. Extinguishers shall not be obstructed nor obscured from view. The location should be conspicuously marked.
3. If extinguishers are for different classes of fire, their intended use shall be conspicuously marked.
4. Extinguishers shall be installed on hangers or in brackets, mounted in cabinets, or set on shelves.
5. Extinguishers under 40 pounds shall be installed so the top is not more than five feet above the floor. If over 40 pounds, the top shall be not more than 3-1/2 feet above the floor.
6. Extinguishers shall be mounted or placed so that the instructions are facing outwards at all times.
7. The temperature range to which extinguishers are exposed shall be from +40° to 120° Fahrenheit. If subjected to a temperature outside this range, they shall be a type approved for the temperatures to which they are exposed.

Fire extinguishers shall be placed so that no more than 75 feet of travel from any point in the work place is required to reach the extinguisher.

Normally, a meat processing or packing plant does not have hazards requiring special types of extinguishers. If you have special problems, you should consult the OSHA regulations.

Fixed Fire Protection Systems

A plant may have a fixed fire protection system such as sprinklers. This is normally governed by local and state fire codes. However, OSHA regulations provide that a system shall meet specified standards of two types, those of the National Fire Protection Association and OSHA. If your plant has a fixed fire protection system, you should examine both regulations carefully for compliance.

The applicable NFPA standards are:

1. NFPA 14-1970 Standard for the Installation of Standpipe and Hose Systems
2. NFPA 13-1969 Standard for the Installation of Sprinkler Systems
3. NFPA 17-1969 Standard for Dry Chemical Extinguishing Systems
4. NFPA 12-1969 Standard on Carbon Dioxide Extinguishing Systems
5. NFPA 72A-1967 Standard for Installation, Maintenance, and Use of Local Protective Signalling Systems for Watchmen, Fire Alarm, and Supervisory Service

Medical and First Aid

The employer must insure the ready availability of medical personnel for consultation and advice on plant health and for medical treatment in case of an accident. The employer may, if the plant is large enough, provide an infirmary or first-aid room within the plant. The minimum require-

ment is a person trained in first aid on duty at all times there are employees working in the plant. (OSHA regulation 1910.151)

Emergency Plans and Procedures

Every plant needs some form of procedure to deal with emergencies. In a small plant these can be kept relatively simple. However, preparation for an emergency will reduce the possibility of loss of life, limb, and property in those rare cases where they are needed.

The following situations may call for emergency action:

1. Fire or explosion
2. Failure of building structures, power or equipment
3. Panic or riot
4. Employee injury or sudden illness
5. Flood
6. Tornado, windstorm, or blizzard
7. Airplane or vehicle crashing into the plant
8. Sabotage

Organization and training should cover the following:

1. Assign responsibilities to the managers, supervisors, and others. These should include alternates in case of absences from the plant.
2. Select and train emergency crews.
3. Coordinate with established authorized agencies such as municipal police and fire.

All preparations are useless unless they are maintained in readiness.

These include:

1. Updating the assignments and responsibilities as personnel changes occur.
2. Conduct periodic drills and training sessions.
3. Periodically review emergency procedures.

An important feature of the emergency procedure is the protection of plant machinery, equipment, and records. The loss of these items can seriously handicap the business or even lead to permanent closing. However, protection of human life and safety must in all cases take priority over the protection of physical property.

Many types of emergency equipment such as fire extinguishers are specified in OSHA, fire, safety, or other laws and regulations. However, plant management should review emergency needs to be sure necessary equipment is available and in good working order. Naturally, a company cannot protect itself against every possible emergency. However, it can take action to comply with legal regulations and to avoid the most serious and crippling emergencies.

One emergency item every plant should provide is emergency lighting. This is particularly important where some work areas do not have outside lighting or where considerable work is performed at night.

Chapter XIII

A Safety Check List

You may feel that safety and the training of employees to work safely are unnecessary, time-consuming tasks which result only in ringing of "No Sale" on your cash register. Too easily we forget the monthly payment on insurance premiums, and often consider this as the cost of doing business. But remember:

- * Injured employees cannot produce, sell, or handle merchandise.
- * Qualified help is difficult to get or replace.
- * Injured customers cannot purchase merchandise. Accidents within the plant also hurt goodwill and the meat processor's business reputation.
- * An accident that costs \$1,000, not a very large figure in today's economy, is not "paid for" until a company with a 3% margin sells \$33,000 worth of goods.

The Occupational Safety and Health Act of 1970 (OSHA) became effective April 28, 1971. The purpose of this act is to assure safe and healthful working conditions for employees. As of July 1, 1971, all employers who have eight or more employees "engaged in a business affecting commerce" are required to maintain records which include a log of accidents and an annual summary of injuries and illnesses.

The first standards under the Act have been published by the Labor Department as the official guide for achieving safer and more healthful working places. These standards became effective August 27, 1971. In special instances, some were not be effective until February 15, 1972. We strongly urge that you:

- a) Maintain the detailed records required by law, including a log of accidents and the annual summary of injuries and illnesses. (See previous comments concerning exemptions.)
- b) Familiarize yourself with the standards which apply to a) and to observe them at all times.

A record keeping guide, copies of forms, and other information may be obtained from any Department of Labor regional or field office in your area.

The following safety check list can assist you in planning a safe operation in a situation which might not be covered by OSHA standards.

Exterior Areas

1. Check areas near the plant entrances periodically to make certain they are clear and free of obstructions.
2. Keep sidewalks and approaches to plant entrances unobstructed, with smooth surfaces in good repair and slipping hazards under control.
3. In the winter:
 - a) Keep sidewalks, parking lots, and loading areas free of snow, ice, slush, and debris.
 - b) In the event of thaw and freeze, salt down icy areas and remove icicles which may fall and injure employees or passersby.
 - c) Arrange for help to report earlier, as needed to speed removal of overnight snowfall.
 - d) Check the facade of the building for loose bricks or ornaments that could fall off in a freeze and thaw.

- e) Block off sidewalks to prevent accidents from falling icicles or sidewalks freezing from water dripping from the building.
- f) Check sidewalk areas for buildups of ice during an extended freeze and thaw period.

Entrances, Exits, and Stairways

1. Check that rubber or fibre mats are in good condition; that is, not curled or otherwise presenting a tripping hazard.
2. Revolving doors: Check proper rotating speed and instruct personnel on the procedure for emergency opening of revolving doors.
3. Keep regular entrance doors in good condition. Adjust door checks to close slowly. Paste decals on glass panels to prevent people from walking into or through them.
4. Exit doorways: Insure proper operation of panic hardware on exit doors and be sure that exits are not blocked during working hours. See that exit signs and lights are not obscured by decorations.
5. Check all stairways and handrails and make needed repairs.
6. Provide for periodic checks to remove debris or obstructions from stairways.

Stock Room Receiving and Shipping Areas

1. Material and equipment should not be piled or left standing in aisles.
2. Remove containers and skids from aisles immediately after they have been emptied. Eliminate tripping hazards.

3. Maintain aisles wide enough for material handling equipment; that is, hand trucks and racks (Federal Register Section 1910.22).
4. Pile and arrange merchandise neatly to avoid collapse or toppling; clear sprinkler heads by distance stated in OSHA standards.
5. Keep adequate ladders, used for reaching material on high shelves, in good condition.
6. Keep bins and shelves in good condition.
7. Make sure conveyors are properly guarded to prevent injuries to personnel.
8. Be careful with flammable liquids; store them in metal safety cans. Use them where vapors cannot be ignited.
9. Clear up spills immediately and dispose of old oil-soaked cloths.
10. Observe safe storage practices. Never block sprinklers or fire doors.
11. If possible, move material through the plant before or after store hours.
12. Keep electrical wiring in good condition and cords out of the way where they will not be damaged or tripped over.

Fire Prevention

1. Periodically check all alarm systems and review emergency fire procedures and proper use of fire fighting equipment with employees. Schedule periodic fire drills.
2. Check all fire fighting equipment and keep in servicable condition at all times. Inspect sprinkler systems and fire extinguishers at scheduled intervals.

3. Keep all aisles and stairways and fire doors clear. Check automatic closing devices. Be sure all exits are properly marked.
4. Post "No Smoking" signs so that they can be seen readily and enforce "No Smoking" rules (employees and others).
5. Make certain that electrical cords and connections are in good condition. Use permanent wiring instead of extension cords or make-shift lighting.
6. Check entire plant's electrical system for faulty or damaged wiring of fixtures. Make sure electric circuits are not overloaded.
7. Keep all areas free from rubbish and combustibles. Minimize accumulation of trash in storerooms and on selling floors. Arrange for frequent trash pickups and removal.
8. Make certain to flash-proof combustible display materials.
9. Review your fire prevention plans with local fire department authorities. Replace safety markings on stairways where necessary.

Material Handling

1. Train the employees in the correct method for lifting and carrying heavy loads such as quarters and sides. Insist they use correct methods.
2. All material handling equipment operators must be trained.
3. Guard all moving conveyors and rotating shafts.

Production

1. Furnish hand tools (such as knives) in good condition. Be sure the workers are properly trained to use them safely.
2. Require that the employees use personal protection equipment (mesh gloves, gauntlets, aprons) when performing dangerous operations.

3. Guard production machines at points of operation and contact with moving parts.
4. Limit the noise to allowable levels. Require ear plugs or ear muffers if necessary.

Chemicals

1. Store toxic and dangerous chemicals away from the work place except for quantities actually being used by the employee.
2. Observe all precautions listed on the label.
3. Insist that the workers wear personal protective equipment when required. Keep this equipment clean and in good repair.

Electrical

1. Bring your plant into compliance with the National Electrical Code.
2. Avoid using worn or frayed electrical cords.
3. Ground all electrical equipment that is not double insulated.

General

1. Instruct employees in general safety practices. Give special instructions on specific hazards.
2. Encourage employees to adhere to safe practices, including handling material, proper use of equipment, safe piling or arranging of inventory, and good housekeeping practices.
3. Provide adequate first aid facilities under proper supervision.
4. Hold periodical meetings with all employees to review safety and fire prevention procedures.
5. Provide for emergency lighting in case of power failure, even flashlights if necessary.

6. Make certain that all employees know the procedures in the event of an accident or fire: how to summon medical and maintenance personnel, how to fill out an accident report, etc.
7. Include in your plant's safety policies and procedures, a statement on how to proceed if an accident occurs on the premises.
8. Furnish adequate lighting at the work place, over aisles, and at all exits.

Chapter IXV
University of Missouri Extension

How Extension Can Help You

The University of Missouri's business and industrial specialists, with support from the Industrial and Technical Referral Center on the Columbia campus, offer the following services to help you comply with the Occupational Safety and Health Act:

- * Assist in obtaining speakers for seminars, conferences, and meetings on the Occupational Safety and Health Act.
- * Provide answers to your questions with information from OSHA compliance officers.
- * Help you obtain qualified personnel to visit your plant and identify employee practices or site hazards for which you could be penalized.
- * Furnish, on a loan basis, books, video tapes for closed-circuit TV, films, and other aids related to the Act and Safety in general.
- * Lend your company review copies of the American National Standard Institute's Standards that are directly relevant to the Occupational Safety and Health Act.
- * Locate university faculty experts who can help you choose the best and most economical way to satisfy OSHA requirements.
- * Instruct your company in library searches for information on safety, the Act itself, or the technology required to ensure compliance with its specific provisions.
- * Provide access to a system that identifies both proposed changes and final changes in the Act.

Standards Organizations

The following organizations have issued standards which have been adopted for OSHA or other public authority and which affect the meat industry:

American National Standards Institute (ANSI)
1430 Broadway
New York, N.Y. 10018

National Fire Protection Association (NFPA)
60 Batterymarch Street
Boston, MA 02110

American Society of Mechanical Engineers, Inc. (ASME)
United Engineering Center
345 East 47th Street
New York, N.Y. 10017

Institute of Makers of Explosives (IME)
420 Lexington Avenue
New York, N.Y. 10017

Underwriters Laboratories, Inc. (UL)
207 East Ohio Street
Chicago, Illinois 60611

National Safety Council (NSC)
425 North Michigan Avenue
Chicago, Illinois 60611

University Libraries
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Local identifier

Source information

Format	book
Content type	
Source ID	Gift copy to Digital Services; was not added to collection
Notes	Publication date not found on the piece

Capture information

Date captured	August 2020
Scanner manufacturer	Fujitsu
Scanner model	fi-7460
Scanning system software	ScandAll Pro v. 2.1.5 Premium
Optical resolution	600 dpi
Color settings	24 bit color for covers; 8 bit grayscale for the rest
File types	tiff
Notes	

Derivatives - Access copy

Compression	Tiff: LZW compression
Editing software	Adobe Photoshop CC
Resolution	600 dpi
Color	color covers; gray text
File types	pdf created from tiffs
Notes	Images cropped, straightened, and brightened Canvas size: 8.5" x 11"