UNITED STATES DEPARTMENT OF LABOR
L. B. Schwellenbach, *Secretary*
BUREAU OF LABOR STATISTICS
Isador Lubin, *Commissioner* (on leave)
A. F. Hinrichs, *Acting Commissioner*

✦

# Injuries and Accident Causes in the Slaughtering and Meat-Packing Industry 1943

*Bulletin No. 855*

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 15 cents

# Letter of Transmittal

UNITED STATES DEPARTMENT OF LABOR,
BUREAU OF LABOR STATISTICS,
*Washington, D. C., December 11, 1945.*

The SECRETARY OF LABOR:

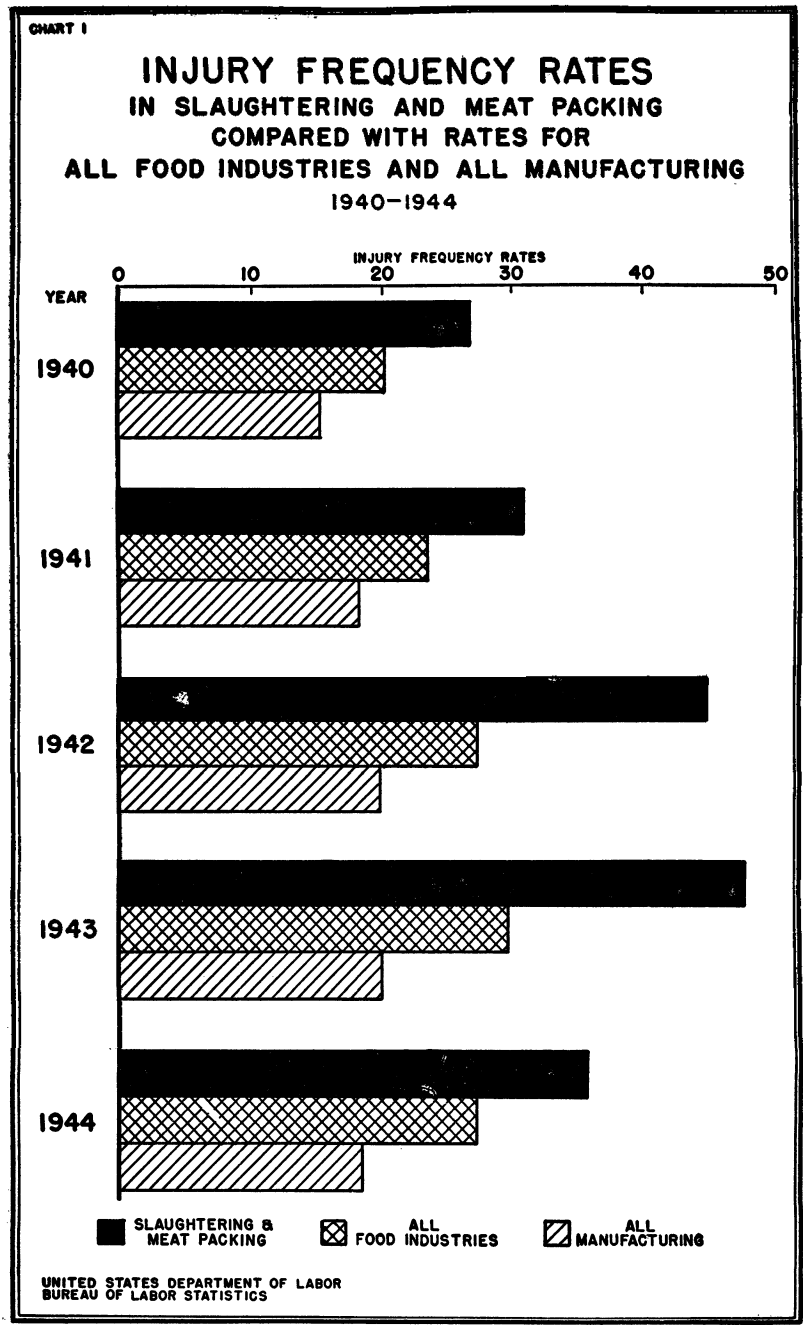
I have the honor to transmit herewith a report on the occurrence and causes of work injuries in the slaughtering and meat-packing industry.

This report was prepared in the Industrial Hazards Division by Frank S. McElroy and George R. McCormack. D. R. Blenis and Joseph Pochcp, safety engineers in the industry, assisted greatly by suggesting specific methods of accident prevention drawn from their experience. The American Meat Institute and the United Packinghouse Workers of America participated in the preparations for the survey; the American Meat Institute also provided technical assistance to check the accuracy of the process descriptions contained in the report.

A. F. HINRICHS, *Acting Commissioner.*

Hon. L. B. SCHWELLENBACH,
*Secretary of Labor.*

# Contents



*Bulletin No. 855 of the*
*United States Bureau of Labor Statistics*
[Reprinted from the MONTHLY LABOR REVIEW, November and December 1945, with additional data]

# Injuries and Accident Causes in the Slaughtering and Meat-Packing Industry, 1943

## *Summary*

It is axiomatic in safety circles that the elimination of work accidents can be achieved only as a result of carefully planned and executed efforts on the part of all persons concerned. Both management and workers benefit from a successful safety program and both groups must cooperate to make any program successful. Such cooperation, however, depends upon conviction that there is a definite problem to be solved and that there is a reasonable possibility that improvement can be accomplished through practical measures.

The emotional appeal, typified by the "horror" method of depicting the extremely unpleasant physical consequences of a disregard for safety, no longer constitutes the approved method of instilling safety consciousness or of driving home the realization that there is a safety problem. It may well be said that the safety movement has come of age and that the approach to safety now is generally based upon rationalized study of accident records with particular attention to the detailed analysis of the facts and conditions upon which those records are based. This study was designed to bring together such accident records for the slaughtering and meat-packing industry and to present as much detail as possible concerning the causes of the accidents in the industry. It was not intended to develop a safety program for the industry nor for any individual plant. The purpose is to measure the extent of the accident problem in the industry as a whole; to indicate specifically the sections of the industry in which the problem is greatest; and to show, wherever possible, what are the outstanding sources of injuries, thereby permitting a conclusion as to whether or not improvement is practicable.

Summary reports on accidents in 1943 were obtained from 177 plants doing slaughtering only, 400 plants doing packing only, and 389 plants carrying on both types of activity.[1]

Analysis revealed a considerably higher injury-frequency rate in slaughtering and dressing plants than in establishments carrying on meat-packing operations only—60.5 as compared with 29.7. In general, it appeared that the large plants and the very small plants had better safety records than the medium-size plants; the proportion of accidents resulting in permanent partial disabilities, however, was generally greater in establishments with 1,000 or more workers than in the smaller plants.

[1] See appendix, table 1.

Slaughtering and meat-packing operations during 1943 appeared to have been conducted most safely in the Middle Atlantic region, where the average frequency rate was 40.5. In contrast the relative volume of injuries was greatest in the South Atlantic region, where the average rate was 64.2. The East North Central region, from which the largest number of reports were received, had an average rate of 42.0. Among the 31 States for which separate average frequency rates were computed, Delaware had the lowest (9.4) and Georgia the highest (118.4). The Pennsylvania average of 38.5 was based upon a larger number of reports than was received from any other State. The Illinois rate of 41.4, however, was based upon the experience of a much larger number of workers than was reported from any other State. Various factors enter into these regional and State differences. State safety laws and the extent to which they are enforced, the general size of the plants in an area, the predominating type of operations performed by the plants, and the general interest in safety as evidenced by the safety activities of local associations all have much to do with the general level of frequency rates in any area.

In addition to providing summary reports, which were included in the general study of injury-frequency rates, 30 of the plants participating in the survey also furnished details concerning each of their reported accidents.

A representative of the Bureau visited each of these plants and, as far as possible, transcribed from their records the following items regarding each accident: Place where the accident occurred; nature and extent of the resulting injury; type of accident; the unsafe condition and the unsafe act which led to the accident; and the object or substance (agency) which caused the injury. These data were then analyzed according to the American Recommended Practice for Compiling Industrial-Accident Causes, approved by the American Standards Association.

In some instances all the desired details were not available. For this reason, the number of cases analyzed in respect to particular accident factors varied considerably. All parts of the cause analysis, however, were based upon the records of at least 29 plants. The plants visited were all integrated establishments carrying on both slaughtering and meat-packing operations, so that all phases of the industry were represented. The entire group employed approximately 60,000 workers. The plants were in 18 States, providing a cross section representing practically all the centers of the industry.

The detailed analysis indicated that 37 percent of the injuries were hand or finger cases, 15 percent were foot or toe injuries, and 11 percent were back injuries. In the main, the hand and finger injuries were cuts or lacerations, the foot and toe injuries were sprains, bruises, and fractures, and back injuries were sprains. The principal agencies involved in the accidents which produced the injuries and the proportion of injuries ascribed to each were as follows: Hand tools, including knives and meathooks, 19.8 percent; vehicles, principally hand trucks, 15.3 percent; and working surfaces, 15.1 percent. Broadly speaking, the principal unsafe working conditions involved in the injury-producing accidents studied—slippery working surfaces and tools or materials placed unsafely—may be characterized as failures to maintain good housekeeping. Among the various categories of unsafe acts which contributed to the occurrence of accidents,

that of gripping objects insecurely or taking a wrong hold was outstanding. Specifically, the most common unsafe act in this group consisted of mishandling knives.

## *The Industry Record*

### COMPARISON WITH OTHER GROUPS

Throughout the 5-year period 1940–44, the injury record of the slaughtering and meat-packing industry compared unfavorably with the records of most other industries of the food group and of most manufacturing industries in other groups.

In 1940 the reports submitted to the Bureau of Labor Statistics indicated that workers in the slaughtering and meat-packing industry experienced an average of 26.8 disabling injuries in the course of every million employee-hours worked, which was considerably higher than the average of 20.2 for the entire group of food industries, and 75 percent higher than the average of 15.3 for all manufacturing activities. Similarly in 1941, the average injury-frequency rate for slaughtering and meat packing was 30.9, as compared with averages of 23.4 for the food-industry group and 18.1 for all manufacturing. In 1942, the injury-frequency rates for most manufacturing industries again rose sharply, reflecting the operating difficulties occasioned by conversion to an "all-out" program of war production. From the safety viewpoint the most important of these difficulties were (1) the loss of trained workers to the armed forces or to the new war industries, (2) the introduction of large numbers of workers who were entirely new to industry, (3) pressure for greater production, and (4) lack of materials and facilities to accommodate the expanded work force adequately, which resulted in crowding, and the deterioration of machines and equipment, caused by excessive use and the absence of adequate repair or replacement parts. As a result of these factors the all-manufacturing frequency rate in 1942 was 19.9; the average for the food group was 27.3; and that for slaughtering and meat-packing was 44.8. In 1943 there were indications that the wartime safety problems were being brought under control; although frequency rates generally continued to rise, the rise was much less drastic than in 1942. In that year the all-manufacturing average was 20.0 disabling injuries per million employee-hours worked; the average for the food industry group rose to 29.7; and the slaughtering and meat-packing average reached 47.6.[2]

In 1944, the upward trend in injuries was generally reversed; the all-manufacturing average frequency rate declined to 18.4 and that for the food-industry group, to 27.1. In line with this trend but stimulated to greater achievements by a national safety campaign sponsored by the U. S. Department of Labor, the slaughtering and meat-packing industry reduced its average rate even more impressively to 35.9.

[2] This 1943 industry average, taken from the Bureau's regular annual survey from which all the other rates used in the above comparisons were also taken, differs substantially from the rate of 39.0, which was the average for all plants participating in the special slaughtering and meat-packing survey of 1943, reported upon in this article. The difference reflects the much broader coverage of the special survey, particularly the inclusion of many plants engaged in processing poultry, other small animals, and casings, which do not regularly participate in the annual surveys. For the purpose of comparison, however, either of the rates will serve to emphasize the greater incidence of injuries in slaughtering and meat packing than in most other industries.

682055°—46——2

Injury-frequency rates are considered to be the most reliable gauge for evaluating the safety record of any particular plant or industry. Their implications become more apparent when it is stated that 1 in every 9 slaughtering and meat-packing workers experienced a disabling injury in 1943, and that in 1944 this ratio was 1 for every 12 workers. In actual numbers, it has been estimated that 19,400 slaughtering and meat-packing workers were disabled by work injuries in 1943 and 18,300 in 1944. In the single year, 1944, about 35 workers in the industry were killed in the course of their employment and about 470 others were injured so severely that they will be physically impaired for the rest of their lives. Even these large figures tell only a part of the story for 1944. In addition to the 18,300 disabling injuries, there were untold numbers of minor injuries which were not recorded because they did not cause the injured employee to remain away from his work beyond the day of injury. In the aggregate, these minor, or nondisabling, injuries represent a tremendous loss to the industry in terms of working time taken for first-aid treatments and of direct cash expenditures for these treatments.

No accurate estimate of the volume of nondisabling injuries in the slaughtering and meat-packing industry is possible, because of the lack of sufficient records. Such evidence as is available, however, indicates that the commonly quoted ratio of 29 nondisabling injuries for every disabling case, which is considered a reasonable average for all manufacturing, is probably much too low for the slaughtering and meat-packing industry. As an example (although not presented as a generalization), an exhaustive review of the medical records in three of the large plants visited in the course of the survey revealed that, in a period of 12 months, 30,499 injuries were reported to the medical offices, and of these, only 337 were disabling. In other words, there were in these three plants 90 nondisabling injuries for every disabling case.

Without any allowance for the continuing loss in production and earning power arising from the deaths and permanent impairments, it is estimated that the actual employment losses resulting from the disabling injuries experienced by slaughtering and meat-packing workers amounted to at least 366,000 man-days during 1944. When the standard time charges for deaths and permanent impairments are included, it is estimated that the future economic loss accruing from the more serious injuries will eventually bring the total loss to at least 673,000 man-days. This evaluation of the loss arising from the disabling injuries of 1944 takes no account of the losses in time and money resulting from the vast number of nondisabling injuries which also occurred, nor of the collateral or hidden costs connected with the injury-producing accidents. As a monetary cost item, these hidden losses undoubtedly exceed the direct injury cost several times over.

## *Hazards of the Industry*

Although the hazards faced by the workers in any particular department are primarily related to the specific operations of that department, certain hazards affect to some extent practically all workers in the industry. Slippery floors, which cause many slips and falls, are particularly common in dressing, cutting, and trimming rooms.

Grease, carried on the workers' shoes, however, frequently makes slippery floors and stairways a hazard throughout an entire plant. Water is used freely in slaughtering and meat-packing plants for cleaning floors and equipment, as well as for washing carcasses. Unless it is promptly removed from the floor, this water adds appreciably to the slipping hazards in many parts of the plants. Inadequate plant maintenance is frequently a contributing factor in the creation of slipping hazards, particularly in respect to rough and uneven floors, on which the water collects in little pools.

Crowded working conditions and improper lay-out of traffic also contribute to many accidents in various parts of the plants. Although the use of conveyors is widespread, many of the products and trimmings must be transferred from one place to another in hand trucks. The movement of these trucks through the aisles presents a hazard to all employees who use the passageways or who work adjacent to the trafficways. Poor maintenance of the passageway floors and poor housekeeping in the aisles may add greatly to these hazards, as the trucks are easily deflected from their course by uneven flooring or by material lying in their way. Poor routing and inadequate planning for the transportation of materials also contributes to many injury-producing accidents. A case illustrating this point was observed in a plant where the indicated route for tractor-trailers passed through a doorway which was so low as to require each driver to duck his head as he went through. As might have been expected, one driver eventually forgot to duck and was severely injured when his head struck the top of the doorway.

Knives are used to some extent in nearly all of the operating departments, and practically all employees on occasion must move or help to move relatively heavy materials. As a result, the possibility of knife cuts and of injuries from overlifting are hazards common to most of the departments.

### THE PRINCIPAL OPERATIONS AND THEIR HAZARDS

The departmental organization reported by the participating plants varied extensively—from no departmentalization at all in some small plants to 20 or more departments in the larger integrated plants. For this reason there were many differences in the number of units and in the operations and occupations included in the various departmental groups. This was particularly true in respect to the various meat-processing and by-products operations. Generally, however, most of the plants were able to furnish comparable data for the principal types of operations, such as beef and hog dressing, trimming and cutting operations, sausage making, and smoked-meat processing. Other departments frequently reported separately included curing cellars, hide cellars, rendering departments, and the various plant-service departments, such as boiler and engine room, maintenance, shipping, and watchmen.

*Livestock handling.*—Most of the larger slaughtering plants reported separate livestock departments, which are responsible for the care of the animals during the period between their arrival at the plant and their delivery to the killing floor. The smaller plants generally reported that this function was included in the duties of the dressing departments. The principal hazards connected with this work consist of the possibility of forcible contact with the animals, falls on

the irregular and sometimes slippery surfaces of the pens, and strains or sprains arising from overexertion in the handling of feed and water for the animals.

*Dressing departments.*—Although there are marked differences in the detailed procedure in slaughtering and dressing various kinds of animals, the operations generally follow the same basic pattern. After the animal has been killed and the blood drained from the carcass, the hide or hair is removed, the head and entrails are also removed, the carcass is divided into halves, washed, inspected and stamped, and then placed in the cooler for approximately 24 hours to remove the body heat. Production-line methods are used extensively. To eliminate unnecessary handling of the carcasses or cuts of meat, the killing floors are frequently situated at the top of the building, to which the live animals are driven over ramps. Chutes can then be used to pass the cuts of meat to successive operations on the lower floors. The use of these chutes sometimes constitutes a definite hazard in that there are usually tables at the foot of the chutes on which the meat is further cut or trimmed. It is not unusual for a cut of meat to slide with considerable force from the chute and to strike one of the workers at the bench.

In dressing operations the carcass is transferred from one point to another by the use of shackles attached to wheels which run on overhead monorails. These wheels usually are held on the rail only by the weight of the carcass, and swinging loads frequently throw the wheels off the rails. Switches, built into the rails at various points to permit diversion of the loads, present a similar hazard unless they are properly equipped with dogs or lugs to prevent the wheels from running off the end of the rails when the switches are open. It also happens at times that improperly suspended loads will come loose from the hooks or shackles and fall from the conveyor. In any of these cases workers near the conveyor line may be struck either by the falling carcass or by the equipment with which it was suspended. For protection against head injuries in such accidents, many plants encourage the wearing of hard hats or helmets by all employees who work in coolers or near conveyor lines. In none of the plants visited, however, was the wearing of helmets mandatory, and most of the plant officials who were interviewed stated that it was very difficult to persuade workers to wear helmets or other personal protective devices.

The usual procedure in killing hogs is to drive the animal into an enclosed area on the killing floor, where an employee, called "the shackler," places a shackle on one of the hog's hind legs. The other end of the shackle is then hooked into an endless chain, which rides up over a large powered wheel, lifting the hog off the floor. When fully suspended, the animal hangs head downward about 4 feet off the floor. A considerable amount of skill and extreme care are necessary in applying the shackle so that it will not come loose and permit the hog to fall. The animal is then killed by an employee, called "the sticker," who cuts through its jugular vein. As the sticker must stand in the blood which drains from the animals, he must wear boots and be very careful of his footing on the slippery surface of the blood pit. As a safety measure, it is necessary that the surface of the blood pit be made of a nonslip material. Another hazard faced by the sticker is the possibility of being kicked by the

forefeet of the suspended animal. Such a kick against the hand in which he holds his knife sometimes will drive the knife into his other hand or arm or even into his body.

After the blood has been drained from the carcass, it is lowered into a hot-water tank to be scalded and is then passed through a dehairing machine, where most of the bristles are removed. The remaining bristles around the ears and other irregular surfaces are removed later with a hand scraper. In some plants the bristles are removed by placing the carcass in a tank of hot resin. The resin hardens when the carcass is removed from the tank and can be peeled off, lifting the bristles with it. Burns from contact with the hot water or hot resin are common in this work, and strains from lifting the carcasses out of the tanks are numerous. The dehairing machines are generally completely enclosed and, therefore, present little hazard.

The carcass then passes by monorail conveyor through a series of specialized operations during which the head and entrails are removed and various other cuts are made. Certain parts of the animal, such as the heart and liver, are passed to the warm fancy-meat department and the intestines are sent to the casing department. During these operations each carcass is examined for evidence of disease, and condemned carcasses are sidetracked to be used in the manufacture of fertilizer. Approved carcasses are thoroughly washed, the stamp of the inspector from the Meat Inspection Division of the U. S. Department of Agriculture is applied, and the carcasses are then pushed along the conveyor into the cooler. In these dressing operations most of the work involves the use of knives. Knife cuts, therefore, constitute the chief hazard.

As a general rule, the killing and dressing of other small animals, such as sheep and calves, is very similar to the procedure in handling hogs.

In killing beeves the procedure is somewhat different. The animal is driven into a small pen in which it cannot turn around. At the side of the pen a worker, called the knocker, stands upon a raised platform. The knocker stuns the animal by striking it between the eyes with a long-handled hammer. When the stunned animal has slumped to the floor, the gate at the front of the pen is opened, and the back of the pen is raised. This causes the animal to slide out onto the killing floor. The platforms from which the knockers work are usually rather narrow and are seldom railed. Guardrails would eliminate the hazard of falling.

When the stunned animal reaches the killing floor, a shackler places a shackle around both its hind feet, and a sticker cuts its throat with a long-handled knife. The carcass is then raised to the conveyor to permit the blood to drain. The chief hazards in these operations are the possibility of being struck by the animal as it slides from the knocking pen, of being kicked by incompletely stunned animals, and of slipping on the blood-covered floor.

After the blood has been drained, the carcass is lowered to the floor, and the hide is removed. As this is mostly knife work, the possibility of cuts constitutes the chief hazard.

When the hide has been removed, the carcass is returned to the conveyor. From this point onward, it passes through the same series of operations as were outlined for the hog-dressing departments. The head and entrails are removed; the carcass is split in half, washed,

stamped, and moved into the cooler. The danger of knife cuts is the major hazard in these operations, but strains from overlifting are also numerous.

*Warm fancy-meat separating.*—In many plants the warm fancy-meat separating unit is considered to be merely a collateral operation of the dressing department, and, as a result, few separate reports covering this work were received. In the Bureau's tabulations, therefore, the experience of the employees engaged in this work was included with that of the dressing departments. The work, however, is sufficiently different to warrant some comment regarding its hazards.

The function of this department is to process specialties, such as kidneys, hearts, livers, brains, pigs' feet, tongues, lungs, etc. Most of the work consists of trimming the various parts and of removing fat. As this is primarily knife work, the workers are constantly faced with the danger of cutting themselves. They stand around long tables, onto which the material usually slides from a chute leading from the killing and dressing floor. Crowding of the workers around the table and congestion of the materials on the table frequently create hazards in that the workers may not have sufficient room to make their cuts without exposing themselves or their neighboring coworkers to the possibility of cuts if their knives should slip. When chutes are used to deliver the material to the tables, there is always the chance that a sliding piece will skid across the table and strike one of the workers. The chief danger in such an accident is that the worker's knife may be deflected against himself or another worker at the table.

Opening skulls for the removal of brains is probably the most hazardous operation performed in the warm fancy-meat departments. Frequently the skulls are split with a cleaver, although the more usual procedure is to use a skull-crushing machine. These machines are similar to a guillotine, with a heavy blade which breaks or crushes the skull. No satisfactory guard has been designed for skull-crushing machines, and as a result the operators are always exposed to the risk of losing their fingers or hands under the falling blade.

*Casings departments.*—As in the case of the warm fancy-meat units, the work of the casing units was commonly reported as a part of the dressing departments, and for this reason their injury experience was not separately tabulated. In these units, the intestines of the slaughtered animals are prepared for use as sausage casings. The preparation of the casings consists primarily of cleaning, scraping, and trimming foreign matter from the intestines. After cleaning, the casings are tested with water or compressed air, graded, and packed in salt for curing or toughening.

Practically all this work is done in water, and consequently the working areas are generally quite damp. Knife cuts are the most common injuries, although salt sores resulting from the curing operations are also numerous.

*Coolers.*—From the dressing department the carcasses and half carcasses pass into the coolers, which are merely large refrigerated rooms in which the meat is chilled and held until it passes on to the trimmers and cutters. Throughout its stay in the cooler, the meat remains suspended from the monorail conveyor. In order to distribute it, however, considerable switching and moving is necessary inside the cooler. In this moving and switching, as in all the overhead-conveyor operations, there is danger of the meat and the suspension equipment falling from the rail. Hard hats are generally recom-

mended, but are not customarily worn. Because of the moisture generally present in the coolers, the floors are frequently covered with frost or ice and present a definite slipping hazard. Liberal use of salt or sawdust and frequent cleaning can do much to minimize this hazard. Another hazard faced by workers in the coolers is the sudden change in temperature which they experience as they pass in and out of the cold room. Care must also be exercised in going through the cooler doors. These doors are usually very heavy and are equipped with automatic closers. Severe injuries sometimes result when workers are struck by these doors or have their fingers caught between a closing door and the doorframe.

*Trimming and cutting departments.*—In the trimming and cutting rooms the carcasses are prepared for the wholesale market. Beef carcasses are frequently sold as halves or quarters and in such cases require only a minimum of cutting and trimming. Most of the beef cutting and boning, therefore, is performed inside the coolers. Hand saws and knives are generally used in this work, and the workers face the constant hazard of cutting themselves with these sharp tools. There are also certain hazards involved in handling the beef carcasses in this work. The carcasses and part carcasses are quite heavy, and many workers experience severe strains from overlifting in taking them from, or returning them to, the conveyor. This hazard is intensified when the floor is slippery, making it difficult to maintain good footing. There is also the danger of having the carcasses fall from the conveyor onto the persons who work around them.

Hog carcasses, on the other hand, are usually divided into a number of specialty cuts, such as hams, loins, etc., which necessitate considerably more handling than is normally the case in cutting and trimming beef. Pork cutting and trimming, therefore, is commonly organized on a production-line basis, and each worker performs only one specialized operation. When a carcass is taken from the cooler, it is placed upon a belt conveyor which carries it to the first operator, who removes it to his work bench, makes the first cut, and returns the pieces to the belt for transfer to the next bench, where a further cut is made. In some cases only the remaining part of the carcass is returned to the belt, the smaller separated pieces being thrown into gravity chutes which slide the pieces onto benches on a lower floor, where further trimming is done. Removing the pieces from the conveyor and returning them to the belt is heavy work and results in many strains. Grease on the floor frequently adds to this hazard by making it difficult to maintain a firm footing while lifting or pulling the meat.

Power saws, which are used in many of these cutting operations, frequently present a great hazard. None of the band saws or circular saws observed by the Bureau representatives in the course of the survey were guarded, and the general opinion expressed by the plant safety men was that they could not be effectually guarded. In a few instances, however, the saws were mounted well back from the edge of the bench beyond the reach of the operator. In these installations the meat was pushed up to the saw on a sliding section of the table. This procedure affords some protection in that it normally keeps the operator's hands away from the blade and makes it impossible for him to fall against the blade if his feet should slip on the grease around the bench. It does not, however, constitute complete guarding.

At the trimming benches the workers handle smaller pieces of meat, and most of their operations consist of trimming off fat. As this is lighter work, considerable numbers of women are employed. The chief hazard lies in the possibility of knife cuts.

*Sausage departments.*—Scraps of meat salvaged from the various cutting rooms are routed to the sausage department, where they are ground, mixed with spices or other ingredients, cooked or cured, and stuffed into casings to form sausages.

The grinding machines are frequently very hazardous, in that the hand of the operator may be drawn in as he forces the meat into the hopper. Practically all plants have rules prohibiting the use of hands to force the meat into the grinder and requiring that a stamper be used for this purpose. The rule is frequently ignored, however, and grinder accidents are rather common. A more effective procedure used in some plants to safeguard grinder operators is to mount the grinder at the back of a wide feeding table, so that the operator cannot reach across to place his hand inside the throat of the machine. Another method is to extend the hopper so that the grinding mechanism is beyond arm's reach, thus making it impossible for anyone to get his hand caught.

Stuffing machines, driven by compressed air, are generally used to fill the casings. Several instances were reported in which these machines had exploded because of excessive pressure. Such accidents must be considered as evidence of improper design or of inadequate maintenance, because the required working pressure in such operations should always be well below the capacity of any metal parts, and safety valves should be provided in the line to release automatically any abnormal pressure which might be built up through mishandling or through the misfunctioning of the machine.

The filled casings are passed from the stuffer to a bench where they are twisted into links and tied by hand with string or rope. Finger cuts, which frequently become infected, are quite common in this operation, particularly when bare knives are used to cut the string.

After tying, the sausage is hung on racks, or "trees," and carried on the overhead conveyor to the cooler or to the curing rooms. The use of these trees involves some hazard, in that it is not uncommon for them to fall from the conveyor rail.

*Smoked-meat processing.*—In this department hams and bacon are cured, trimmed, and packed for shipment. The cuts are first trimmed and then placed on racks in the smokehouse for curing. After removal from the smokehouse, the hams are packed in paper or stockinette and tied with rope or string. Bacon is usually sliced in automatic slicing machines and then weighed and wrapped automatically. The slicing machines normally are well guarded, but occasionally the finger of an employee comes into contact with the revolving blade. Such contact usually results in a permanent injury.

## *Record of Plants Participating in Special Study*

### DEPARTMENTAL INJURY RECORDS[3]

*Dressing departments.*—The killing and dressing departments generally reported much higher injury-frequency rates than prevailed in any of the other departments. In the integrated slaughtering and

[3] See appendix, table 2.

packing plants the beef-dressing departments had an average of 93.6 disabling injuries for every million employee-hours worked. In the same type of plants the hog-dressing departments had an average frequency rate of 82.1. These rates, which indicate that nearly 20 percent of all the workers engaged in killing and dressing operations experienced some kind of disabling injuries in a single year, are exceedingly high by any standard of evaluation. In view of this record, there can be little question as to the urgent need for intensified safety activities in these departments.

In the abattoirs, the frequency of injuries in hog-dressing operations was even higher, averaging 113.9 disabling injuries per million employee-hours worked. For beef-dressing operations, however, the average frequency rate of the abattoirs, 76.0, was somewhat lower than that of the integrated plants.

Among the 1,632 disabling injuries reported for the hog-dressing departments of the integrated plants, there were 21 cases of permanent impairment and 1 fatality. In the beef-dressing units, the proportion of serious injuries, as indicated by 27 permanent impairments and 1 fatality among 921 disabling injuries, was substantially higher. Similarly, the average amount of time lost per case of temporary disability was somewhat higher in the beef-dressing departments (12 days) than in the hog-dressing departments (11 days). In each of these two departmental groups, the time lost during the year because of temporary disabilities alone amounted to more than 2 days for every employee.

*Cutting and trimming departments.*—In the integrated plants, the average injury-frequency rate for the beef cutting and boning departments was 70.9 disabling injuries per million employee-hours worked; the hog-cutting department's rate was 70.7. Although these rates represent a substantially lower incidence of injuries than prevailed in the dressing departments, they are, nevertheless, very high and should be interpreted as calling for stringent safety measures in these departments.

In the plants which perform no slaughtering operations, the beef cutting and boning departments ranked as the most hazardous of the various departmental units. The frequency rate for these departments, 57.8, was nearly double the general average for the packing plants. The hog-cutting units of these plants had a better record, but, even so, their average of 44.4 disabling injuries per million employee-hours was 50 percent higher than the average for all packing-house departments. It is apparent, therefore, that the cutting and trimming departments deserve first attention in any effort to eliminate packing-house accidents.

*Sausage departments.*—The sausage departments of the integrated slaughtering and meat-packing plants had an average injury-frequency rate of 47.5; similar departments in strictly packing plants had an average rate of 28.8. Each of these rates is just slightly below the average for all departments in their respective groups.

In evaluating the injury record of the sausage departments, it is pertinent to note that these departments reported a disproportionately large number of fatalities. Of the 10 fatalities reported by the integrated plants, 3 were sausage-department cases. In contrast, the total number of sausage-department injuries represented only about 8 percent of the total number of cases reported by the integrated plants.

682055°—46——3

Similarly, in the packing plants the sausage-department injuries represented only 24 percent of the injuries reported for all departments, but 1 of the 7 fatalities and 1 of the 2 permanent total disabilities reported for the group were sausage-department cases.

*Smoked-meat processing.*—The smoked-meat processing departments of the integrated plants had an average frequency rate of 38.2. This rate was considerably below the average for all departments in the integrated plants, but it is nevertheless too high to be accepted as indicating the existence of good safety practices or safe working conditions.

In the plants engaged exclusively in packing, on the other hand, the smoked-meat processing departments had an average frequency rate of 19.4 which was the lowest average recorded for any of the major departmental groups.

*Other production departments.*—Among the miscellaneous production departments reported by the integrated plants in sufficient volume to permit the computation of separate average frequency rates, the small stock-dressing departments had an average rate of 91.3; the oleo oil-house and tallow-rendering departments had an average of 73.0; and the inedible-rendering departments had an average of 70.0. The averages of 32.2 for the canning departments and 32.0 for the livestock departments were the lowest among the average rates of the operating departments of the integrated plants.

In the packing plants the curing cellars had the high average frequency rate of 51.7 and the canning departments an average rate of 34.7.

*Service departments.*—The integrated plants reported a substantial volume of accident experience for a number of service departments, such as boiler and engine-room departments, cooperage and box departments, maintenance departments, shipping departments, and watchmen's departments. Among these groups the cooperage and box departments had by far the highest average injury-frequency rate—74.2. Despite the fact that woodworking activities are generally recognized as being more hazardous than most other types of industrial operations, this rate must be characterized as extremely high.

The maintenance and shipping departments also had high average frequency rates of 49.8 and 47.7 respectively. In respect to the maintenance workers, this high rate reflects the fact that a large part of their assignment consists of working on defective equipment, with the result that they are frequently exposed to hazards which other workers meet only rarely. In the shipping departments, overlifting and mishandling of heavy materials account in large measure for the high injury-frequency rate.

In the other service departments of the integrated plants, the frequency rates were reasonably low. For the boiler- and engine-room units, the average rate was 24.1 and for the watchmen's department 15.8.

In the packing-house group, the shipping departments were the only service units for which a separate average could be computed. These departments had an average frequency rate of 26.6.

### REGIONAL AND STATE DIFFERENCES IN INJURY FREQUENCY[4]

Many factors contribute to the wide differences in the injury-frequency rates prevailing in the various States and regions, and in

[4] See appendix, table 3.

particular instances it may be difficult to specify which is the controlling factor. Variations in the types of operations carried on by the reporting establishments may have a direct bearing upon the level of frequency rates when the number of reporting units is small. When the groups to be compared are reasonably large and the comparisons are limited to groups of establishments engaged in similar activities, however, the differences in the average injury-frequency rates may be considered as reflecting primarily variations in safety activities rather than variations in inherent hazards. Differences in State safety requirements and in the degree to which the requirements are enforced exert a direct influence upon the frequency-rate levels in different States. Similarly, safety activities, or the lack of such activities, on the part of trade associations or other organizations may have considerable effect upon the accident record of an area. The average size of the plants in different areas and the availability or the lack of experienced personnel are also factors which may influence the injury-frequency rate levels.

The plants participating in the survey were distributed among 47 States and the District of Columbia. However, in a number of States the coverage was insufficient to permit the computation of representative averages for the various types of operations. For purposes of general comparison the reports were combined into regional groups corresponding to the 9 regions used in the tabulations of the United States Bureau of the Census.[5] On this basis average frequency rates for integrated slaughtering and meat-packing plants were computed for each of the 9 regions; averages for plants engaged only in packing operations were computed for 7 regions; and averages based upon the experience of abattoirs were computed for 5 regions.

In addition, it was possible to compute separate State averages covering the operations of integrated plants in 24 States. Only 12 State averages could be computed for packing plants, and only 2 for abattoirs. No State rates were computed unless the data included the experience of at least 3 establishments with a combined exposure of over 900,000 employee-hours worked.

### *Integrated Plants*

The highest of the regional average frequency rates for the integrated plants was that of the 34 establishments reporting from the South Atlantic States. These plants reported an average of 75.7 disabling injuries for every million employee-hours worked. In large measure, this high regional rate reflects the unfavorable rates reported by plants in Georgia and Maryland. The Georgia average, based upon the experience of 3 plants, was 128.4—nearly 40 percent higher than the average for any other State. The Maryland average, covering 8 plants, was 74.3, which was exceeded by the averages of only 4 other States. In contrast, the Virginia average of 44.4 for 4 plants was well below the middle of the range of State rates.

The lowest of the regional averages was that of the East North Central States—44.8. This average was based upon the records of

[5] The regional groupings and the States included in each region are as follows: *New England.*—Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. *Middle Atlantic.*—New Jersey, New York, and Pennsylvania. *East North Central.*—Illinois, Indiana, Michigan, Ohio, and Wisconsin. *West North Central.*—Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota. *South Atlantic.*—Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia. *East South Central.*—Alabama, Kentucky, Mississippi, and Tennessee. *West South Central.*—Arkansas, Louisiana, Oklahoma, and Texas. *Mountain.*—Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming. *Pacific.*—California, Oregon, and Washington.

112 plants, the largest number included in any single region. With this volume of reports it was possible to compute separate averages for each of the five States comprising the area. Ohio's average of 36.1, covering the experience of 50 establishments, was the lowest State rate in the region, although the Indiana average of 38.6, covering 23 plants, was only slightly higher. Six plants in Wisconsin had an average rate of 42.6, and 20 plants in Illinois an average of 46.0. The Michigan average of 66.8, based upon the records of 13 plants, was the only State rate in this region which ranked above the middle of the range of State rates.

Reports were received from 18 integrated plants in the East South Central region. These plants had the high average frequency rate of 67.8, which was exceeded only by the average of the South Atlantic region. The Tennessee average of 75.1, based upon the records of 8 of these establishments, was the third highest of the various State rates, while the Kentucky average of 51.0 was the median in the range of State rates.

The 12 plants reporting from the Mountain region had an average injury-frequency rate of 58.7. These plants included 3 establishments in Utah, for which the average rate was 74.6.

In the New England region, 12 reporting plants had an average frequency rate of 57.0. This rate reflects primarily the experience of 8 plants in Massachusetts, which had an average rate of 57.8.

The West South Central region had an average rate of 50.4, based upon the combined experience of 29 integrated plants. Again, the regional average in this area reflects primarily the experience of plants within a single State. Fifteen of these plants were in Texas; their average rate was 53.2.

In the Middle Atlantic region, the average frequency rate for the 84 participating establishments was 50.1. Sixty-four of these plants were in Pennsylvania, 17 were in New York, and 3 in New Jersey. The State average frequency rates were 66.7 for New York; 45.6 for Pennsylvania; and 22.5 for New Jersey. The New Jersey rate was the lowest average recorded for any State.

The Pacific Coast States were represented in the survey by 36 integrated plants, with an average frequency rate of 48.9. Twenty-four of these establishments, in California, had an average injury-frequency rate of 40.4, while 8 others, in Oregon, had an average rate of 91.8. The Oregon rate was the second highest State rate recorded.

In the West North Central region, reports from 52 establishments yielded an average injury-frequency rate of 45.7. Within this region 4 plants in Nebraska had an average rate of 62.3; 14 plants in Missouri had an average of 57.4; 5 plants in Minnesota had an average rate of 47.5; 13 plants in Iowa had an average rate of 41.7; 12 establishments in Kansas had a rate of 38.1; and 3 plants in South Dakota had an average rate of 24.0.

### *Packing Plants*

The 7 regional average injury-frequency rates for plants which engage in meat packing, but which perform no slaughtering operations, ranged from a high of 54.7 for 30 plants in the South Atlantic region to a low of 20.0 for 36 plants in the Pacific region. The high average in the South Atlantic region was largely due to the experience of 9 Maryland plants, which had a combined frequency rate of 71.6.

The low average for the West Coast States resulted primarily from the excellent record of the 29 plants reporting from California. These California plants had an average rate of 13.8, which was next to the lowest among the 12 State rates recorded.

In the New England region, 49 packing plants reported an average frequency rate of 32.8. Thirty-one of these plants were in Massachusetts and 5 were in Maine. The average rate for the Massachusetts plants was 27.0, while the Maine average was 22.6.

The Middle Atlantic States had a regional frequency rate of 28.6, based upon the experience of 120 packing plants. The New York frequency rate of 40.1, representing the combined experience of 47 of these plants, was the second highest of the 12 State rates recorded. In Pennsylvania 55 packing plants had an average frequency rate of 28.6, and in New Jersey 18 plants had an average rate of 18.0.

The East North Central region had an average of 26.9, based upon the reports of 106 packing establishments. Within this group there were 48 Illinois plants, with an average frequency rate of 29.5; 24 Wisconsin plants, with an average of 29.6; 14 Ohio plants, with a combined rate of 23.5; and 16 Michigan plants, with an average of 11.6. The Michigan rate was the lowest State rate computed for the packing-house group.

The West South Central region's average frequency rate of 26.9 was identical with that of the East North Central region. Only 14 packing plants reported from this region, and as a result the only State in the area for which an average rate could be computed was Louisiana. In that State there were 7 plants which together had an average frequency rate of 16.1.

In the West North Central region, 29 packing plants reported an average frequency rate of 25.7. Many of these plants were quite small, however, and the limited volume of exposure reported in the separate States precluded the computation of any State averages in this area.

*Abattoirs*

The five regional average frequency rates computed from the reports of plants engaged only in slaughtering operations ranged from a high rate of 92.3, covering 23 plants in the West North Central region, to a low rate of 35.6 for 6 establishments in the West South Central region. In the Pacific region, 26 abattoirs had an average frequency rate of 74.4; 46 establishments in the East North Central region an average of 52.9; and 43 others in the Middle Atlantic region had an average rate of 50.0.

The only States for which separate rates covering slaughtering operations could be presented were California and Illinois. In California the 23 reporting abattoirs had an average frequency rate of 81.5, and in Illinois 5 plants had an average of 31.7.

## INJURIES, BY SIZE OF PLANT[6]

In general, the very small plants and the large plants had better injury records than the plants in the medium-size group. This was true for all three types of plants, even though there were wide differences in the size distribution within the three major groups.

Although group averages constitute an effective basis for the evaluation of a safety record, they have one weakness from the viewpoint

[6] See appendix, tables 4 and 5.

of the management and the employees of any particular establishment. In the averages all variations among the different plants are obscured and no clue is offered as to the relative standing of any individual plant in respect to other competing establishments. However, comparisons based upon individual plant frequency rates can be enlightening on this point. It is a matter of considerable interest, for example, that, among all the reporting plants, there were none employing over 250 workers which had a zero frequency rate in 1943, but that among the plants employing less than 250, about 55 percent reported that their employees had worked the entire year without a single disabling injury. Similarly, it is pertinent that some plants reported frequency rates of over 200, but that none of those plants had as many as 100 employees.

Without regard to the size of the reporting units, the grouping of the plant frequency rates for establishments engaged in both slaughtering and meat packing in 1943 was as follows: 34 percent had a rate of zero; 19 percent had rates between 0 and 30; 20 percent had rates between 30 and 60; 11 percent had rates between 60 and 90; and 16 percent had rates of over 90. Among the plants engaged exclusively in slaughtering, 61 percent had rates of zero; 5 percent had rates between 0 and 30; 11 percent had rates between 30 and 60; 5 percent had rates between 60 and 90; and 18 percent had rates of over 90. In the packing-house group, 62 percent of the plants had rates of zero; 14 percent had rates between 0 and 30; 12 percent had rates between 30 and 60; 6 percent had rates between 60 and 90; and 6 percent had rates of over 90. From these data, it appears that reasonably safe working conditions prevailed in 2 of every 3 slaughtering and meat-packing plants and that the unfavorable injury record of the industry was due primarily to the poor experience of about a third of the plants comprising the industry. Unfortunately, the group of high-rate plants included about two-thirds of the establishments which employ over 250 workers and represented nearly half of the employment in the entire industry.

The extremely wide variations in the frequency rates among the individual plants indicate that in single establishments the injury record may be influenced but not controlled by the factor of plant size. For example, among the 9 largest integrated plants for which reports were received, 2 had frequency rates of under 20 and 2 others had rates of over 60. Similarly, among the 323 integrated plants employing less than 250 workers, there were 134 which had frequency rates of zero and 34 others with rates of over 100.

The formulation of positive conclusions as to how and why variations in the size of plant influence frequency-rate levels must be somewhat subjective, as there are no clear-cut differences in the types of operations or in specific hazards which can be directly related to plant size. The fact that studies in other industries have almost uniformly produced a similar pattern in respect to plant size and general frequency-rate levels, however, indicates that this is a phenomenon of fairly general occurrence, rather than a significant characteristic of the slaughtering and meat-packing industry.

The evidence available seems to indicate that small plants tend to have good safety records because they usually operate under the close personal supervision of the owner or plant manager. This close asso-

ciation with plant activities enables the owner or plant manager to see unsafe conditions and practices as they develop and permits him to take immediate precautions to eliminate incipient hazards.

In medium-size plants the problem of safety is complicated by the fact that the responsible head of the establishment seldom can devote much of his time to observing the routine plant operations and, therefore, must delegate much of the responsibility for safety to others. Unfortunately, few such plants can afford to employ a safety specialist and, as a result, safety becomes merely an added responsibility of the operating foremen or supervisors, who rarely have had safety training and who frequently feel that their production responsibilities are of much greater importance than continuous attention to safety.

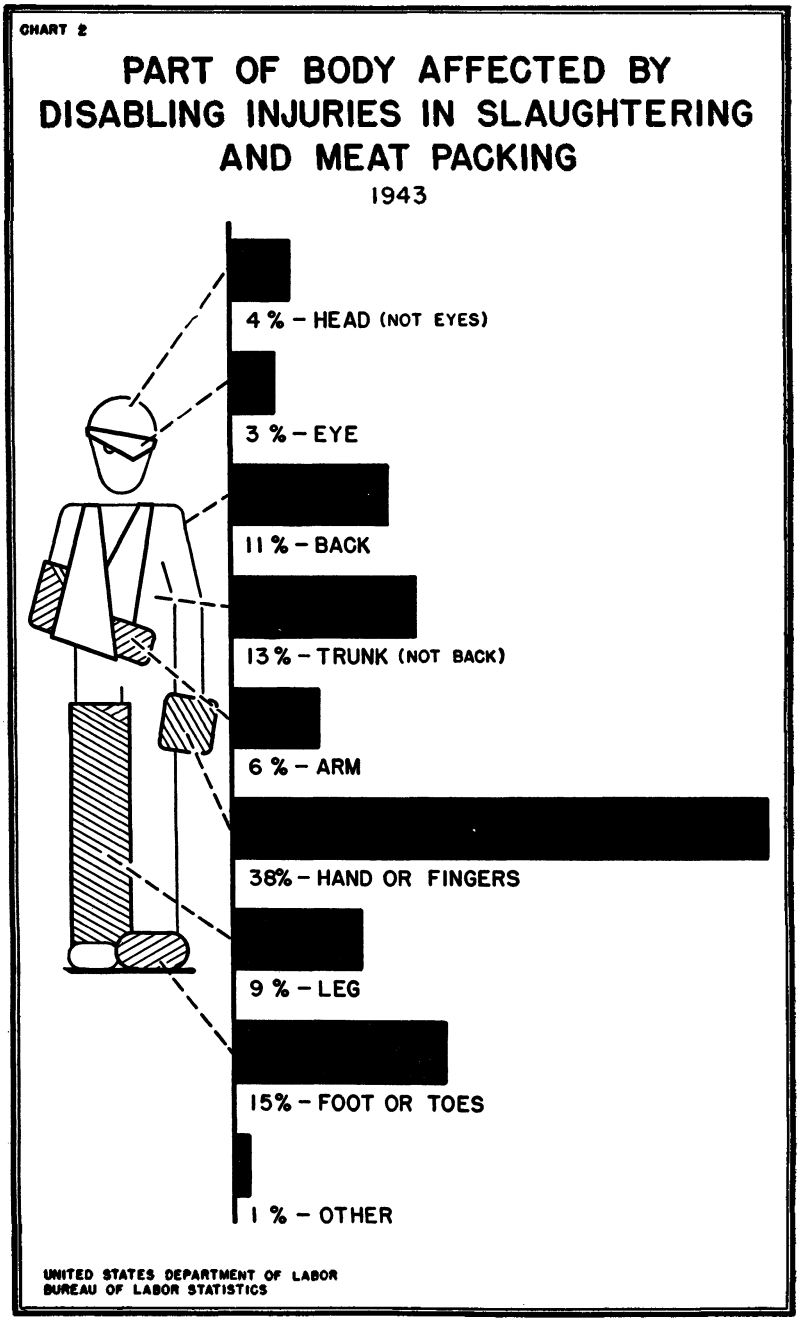
In large plants, on the other hand, the volume of production generally makes it possible to give special attention to safety. These plants can usually afford to employ a safety engineer to carry on a scientific accident-prevention program, and to provide all guards and safety equipment known to be available. Large plants also have the advantage of professionally engineered plant lay-out and work processes, and are usually in a position to utilize mechanical equipment more extensively than are the smaller plants. This is of particular importance in connection with material-handling operations, in which the provision of mechanical equipment can do much to minimize many of the hazards connected with the manual performance of such operations.

*Injury Record, by Type of Plant*

Among the integrated slaughtering and packing plants, those which employed fewer than 25 workers had an average injury-frequency rate of 31.5, which was lower than the rate for any other size group. Plants with employment ranging between 750 and 1,000 workers had the second lowest rate—39.8—which was followed closely by the average of 40.7 for plants which employed 2,500 or more workers. In the intervening size groups the average frequency rates were generally much higher, reaching a peak of 76.2 in the group composed of plants employing from 500 to 750 workers.

Among the plants which perform no slaughtering operations, those employing fewer than 10 workers had an average injury-frequency rate of 8.6; those employing from 10 to 25 workers had an average of 18.8; and those employing from 25 to 50 workers had an average of 23.0. Next in line were the large plants employing 500 or more workers, which had an average frequency rate of 26.4. In the intermediate size groups the average frequency rates ranged upward to an average of 40.5 for plants employing between 50 and 100 workers.

The abattoirs covered a much narrower size range than was the case in respect to the integrated and packing-house groups. Nevertheless, within this narrow range the frequency rates for the different size groups formed a pattern very similar to that of the other plants. The abattoirs employing fewer than 25 workers had the lowest average frequency rate—39.0—which was followed by the rate of 57.1 for the plants employing 100 or more workers. The highest average rate among the abattoirs was 89.5, for the plants employing between 50 and 100 workers.



## *Disabling Injuries*

Although it is commonly recognized that personal protective equipment seldom prevents accidents, its use as a means of minimizing the probability of injury when accidents occur is generally considered fundamental to most successful safety programs. In the course of this survey, however, the Bureau representatives, who visited the various cooperating plants, repeatedly were impressed by the fact that relatively few of the workers were utilizing the personal safety devices known to be available. Few knives were equipped with guards to prevent the hand from slipping down over the blade. The use of wire-mesh gloves was far from universal. Similarly, it was observed that goggles were not generally worn in grinding and bone-crushing operations, nor were hard hats commonly worn in the operations involving exposure to falling materials. The use of safety shoes when handling heavy materials was also an obviously necessary precaution which was ignored more often than it was put into practice. In contrast, it was observed that the use of leather aprons for protection against body injuries was quite common.

Inquiries addressed to the safety engineers of the industry as to why personal protective devices were not more generally used elicited the explanation that the workers generally considered the use of such equipment an inconvenience. Strangely enough, it was emphasized that the resistance to the general use of protective equipment was greatest among the more experienced workers. A further factor of importance in this respect was that, because of the war, the supply of such devices was limited.

The general pattern formed by the injuries for which full details were obtained bore out these observations and indicated clearly a need of an expansion in the use of protective equipment. More than a fourth of all the injuries reported consisted of cuts or lacerations to fingers or hands, largely inflicted by knives. The use of wire-mesh gloves undoubtedly would have prevented a large proportion of these injuries. Likewise, the use of safety shoes by workers handling heavy materials probably would have prevented an appreciable proportion of the injuries characterized as cuts, bruises, and fractures of the toes or feet, which together included over 10 percent of all disabling injuries. Eye injuries were not numerous, nor were injuries to the skull. Nevertheless, practically all—nearly 4 percent of the cases reported—might have been prevented by the use of goggles or hard hats. From these data, it appears entirely safe to say that at least a third of all disabling injuries in the industry during 1943 could have been avoided through the use of personal protective equipment.

### TYPES OF DISABLING INJURIES [7]

Over 81 percent of the reported disabilities resulted from 3 general types of injuries: 34 percent were cuts or lacerations, 27 percent were bruises, and 20 percent were strains or sprains. The cuts and lacerations were predominantly finger, hand, and arm injuries, although there was also a substantial number of head, foot, and leg cuts. Cuts on the trunk were infrequent. Bruises, on the other hand, occurred in considerable numbers to all parts of the body. Back, shoulder,

[7] See appendix, tables 6, 7, and 8.

682055°—46——4

and foot cases were particularly prominent among the injuries characterized as strains or sprains.

As a group, fracture cases represented about 7 percent of the total volume of disabilities, and burns and scalds nearly 5 percent. Broken toes and fingers were most common among the fracture cases. This group also included several cases of fractured skull which resulted in death. Burns and scalds most commonly affected the upper or lower extremities, but also included a considerable number of eye burns.

The volume of hernia cases must be considered as particularly significant. Nearly 2 percent of all disabling injuries reported were of this character. As hernias almost invariably arise from overexertion, this relatively high proportion should be interpreted as indicating a need for close investigation and possible revision of the material-handling procedures in the industry.

The problem of guarding against infection is generally recognized as of utmost importance in the slaughtering and meat-packing industry. In some plants the practice is to send any worker home who experiences an injury involving a break in the skin, no matter how minor. In spite of preventive efforts, however, a rather high proportion of infections was reported.

One in every 4 of the disabling cuts or lacerations involved infection and, somewhat surprisingly, 1 in every 25 of the disabling bruises. For the entire group of disabling injuries, the average of infections was about 1 in 10.

## *Nondisabling Injuries*

Because of the fact that records of nondisabling injuries are difficult to maintain and therefore not generally available, the customary procedure in evaluating the injury record of a plant or an industry is to consider only the disabling injuries. The frequency rates used for comparison, therefore, present only a part of the injury picture. It is true that the disabling injuries represent the more serious segment of the accident problem, but it is also recognized that the nondisabling cases, because of their great number, present a problem of considerable magnitude. Particularly in respect to costs, it is frequently maintained that the nondisabling injuries are just as important as the more serious disabling injuries. Nearly every nondisabling injury results in the loss of some productive time, even though the injured person does not leave the premises.

Studies made over a long period in a wide variety of plants have indicated that for manufacturing as a whole about 29 nondisabling injuries occur, on the average, for every disabling injury.[8] This generality has received wide acceptance as a basis for making broad comparisons. Its author, however, has pointed out that this ratio cannot be considered as representative of conditions in any specific industry and that it is to be expected that there will be wide variations in the experience of different industries or of different plants.

In the present survey an attempt was made to collect information concerning nondisabling injuries in order to provide some indication of the volume of such injuries in the slaughtering and meat-packing industry and, incidentally, to indicate how the record of this industry differs from the ratio generally accepted as normal for manufacturing

[8] Industrial Accident Prevention, by H. W. Heinrich, New York, McGraw-Hill Book Co., 1941.

as a whole. However, complete records of nondisabling injuries were obtained in only three of the plants visited. The sample, therefore, was insufficient to support more than a tentative generalization.

The combined records of the three plants listed a total of 30,499 work injuries reported to their medical or first-aid offices and there treated. Of these, 337 were disabling injuries. For the group, therefore, the ratio was approximately 90 nondisabling injuries for every disabling case. Among the three plants, however, the ratio varied widely.

In Plant A the ratio of nondisabling to disabling injuries was 65 to 1. This plant had a medical office with both a doctor and registered nurses in attendance at all times, and strictly enforced the requirement that all injuries be reported to that office. A full-time safety engineer was employed and a safety committee of employees had been organized. Goggles, knife guards, wire-mesh gloves, leather aprons, and arm guards were supplied, and their use was mandatory in occupations for which such equipment was considered necessary. The use of safety shoes was optional. This was a large plant with over 3,400 employees. Its injury-frequency rate in 1943 was 20.2.

In Plant B there were 99 nondisabling injuries for every disabling injury. The records here indicated that each injury required an average of 2.4 treatments in the first-aid room. There were no records, however, to indicate the amount of time consumed in those treatments. As a bare minimum, it seems reasonable to assume that each visit to the infirmary would probably consume at least a half hour of the injured employee's time. On this basis, each nondisabling injury would represent the loss of about 1.2 hours. In addition to the direct cost of this time in wages, which in the aggregate reaches a substantial amount, the cost of providing a staff and facilities to administer the treatments is also involved. When the volume of treatments is large the cost of maintaining the first-aid facilities also is large.

This particular plant had no medical staff, but did have a first-aid room staffed with registered nurses and assistants who had been given special first-aid training. A plant safety committee, composed of foremen, had been organized, but there was no full-time safety engineer. Knife guards and wire-mesh gloves were mandatory in certain operations. This, also, was a large plant, with 1,850 employees. Its injury-frequency rate was 22.3.

In Plant C there were 104 nondisabling injuries for every case involving disability. This, too, was a large plant, with an injury-frequency rate of 22.2. Both a doctor and a staff of registered nurses were constantly on duty in the medical office. The plant employed a full-time safety engineer, but had no safety committee. The use of personal protective equipment, such as gloves, safety shoes, aprons, and hard hats, was optional. The medical-office records in this plant indicated an average of 1.9 treatments per injury reported.

In Plant C records were compiled by the Bureau from which it was possible to determine the nature of each of the nondisabling injuries, as well as the nature of the disabling injuries. Except for the fact that this plant had a lower proportion of disabling cuts and lacerations than prevailed in the industry sample, the pattern of its disabling injuries corresponded closely with that of the industry sample. The pattern of nondisabling injuries in Plant C, therefore, may be taken

as a reasonable approximation of the distribution probably prevailing in other plants even though the ratios of nondisabling to disabling cases may not be accepted as typical.

Among the 15,384 injuries treated in Plant C, approximately half were classified as cuts or lacerations.[9] Within this group there were 302 nondisabling injuries for every disabling case. Burns and scalds were relatively unimportant numerically among the disabling cases, but represented over 3 percent of the nondisabling injuries. Specifically, there were 234 nondisabling burns or scalds for each disabling case of this category. Industrial-disease cases (primarily dermatitis), presented a similar picture with a ratio of 457 nondisabling cases for each disabling case. A much higher proportion of the injuries classified as bruises and contusions, or as sprains or strains, was disabling. In these two groups the ratios of nondisabling to disabling injuries were, respectively, 28 to 1 and 18 to 1. Among the more serious injury classifications, two-thirds of the fractures, half of the hernia cases, and all of the amputations were reported as disabling. Eventually, when the corrective operations are performed, the rest of the hernia cases will have to be rated as disabling.

Broadly speaking, the importance of the data relating to nondisabling injuries lies in the impressive totals, which emphasize even more than the figures on disabling injuries the magnitude of the safety problem. They also lend greater emphasis to the need for increased efforts to guard against cuts, burns, and industrial diseases.

### *Repeat Injuries*

It was apparent from the large number of nondisabling injuries recorded that many individual workers must have experienced several such injuries in the course of the year. This was readily substantiated by reference to the medical-office records. In 1 plant the Bureau's representative matched the medical records with the employment records to answer the related question as to how many employees worked the entire period without experiencing any injury.[10]

The plant in which these records were obtained was a medium-sized establishment with an average employment of about 675 workers. Hog dressing and packing was the principal activity, although some beef and small-stock dressing was also carried on. The establishment had no safety engineer, but had a safety committee composed of management officials. The first-aid room was staffed from 6 a. m. to 6 p. m. by registered nurses and at other times by an employee who had been given special first-aid training. As the plant normally operated only one shift, a registered nurse was on duty during practically all the operating hours. The chairman of the safety committee reported that knife sheaths, arm guards, stomach guards, and mesh gloves were provided and that their use was mandatory in operations in which they were considered necessary. The plant injury-frequency rate was 43.7.

The personnel records were checked first, and the names of all workers who had been employed throughout the 12-month period were listed. Office and executive personnel were then eliminated from the list. The remaining 330 names were then checked against the

[9] See appendix, table 9.
[10] See appendix, table 10.

records of the first-aid room and all entries for these employees were tabulated.

This selected group of 330 employees had experienced a total of 1,279 injuries—an average of nearly 4 injuries per individual. However, 106 employees in the group had had no injuries during the year, 32 had each received treatment for only 1 injury, and 28 others had each experienced 2 injuries. In the group 82 workers had from 3 to 5 injuries each; 53, from 6 to 10 injuries; and 29, more than 10 injuries. In other words, two-thirds of the entire group were injured at least once during the year, approximately half 3 or more times, and about a fourth more than 5 times.

The largest number of injuries reported for any individual was 31. This employee worked in the shipping department. Twenty-three of his injuries were cuts or lacerations and 8 were bruises. None were disabling. Among the 23 cuts or lacerations, 15 were finger injuries, 5 were hand injuries, 2 were trunk injuries, and 1 was a foot injury. In contrast to his experience, it is pertinent to note that, out of the 55 shipping-department workers included in the group, 27 had experienced no injuries during the year.

The second largest volume of injuries to a single individual was 27. This employee worked on the killing floor. All but 1 of his injuries were cuts or lacerations, this exception having been ascribed to a foreign body in the eye. None of his injuries were disabling.

Four employees, 1 in the hog-dressing department and the others in the beef cutting and boning department, each had from 21 to 25 injuries in the year—all nondisabling. The employee working in the hog-killing department had 22 injuries, all of which were cuts or lacerations; 19 of the cuts were injuries to his fingers or thumbs. The 3 workers in the beef cutting and boning department together experienced 67 injuries, of which 53 were cuts and lacerations. One of the 3 workers, however, had 4 eye injuries, 3 of which were the result of foreign bodies lodging in his eyes. One of the other workers in this group reported 5 bruises—2 on the finger, 2 on the trunk, and 1 on his foot.

Six workers were listed as having had from 16 to 20 injuries each during the year. Their combined record included 100 nondisabling and 2 disabling injuries. Three of these individuals were employed in the hog-dressing department, 2 in the maintenance department, and 1 in the small stock dressing department. Practically all the 33 injuries reported for 2 of the 3 employees in the hog-dressing department were cuts or lacerations. The third worker, however, had a somewhat different pattern of injuries; his 17 injuries included 9 burns or scalds, 6 cuts or lacerations, 1 strain, and 1 case of a foreign body lodging in his eye. About half of the 36 injuries experienced by the 2 maintenance workers and the majority of the injuries sustained by the employee of the small stock dressing department were cuts and lacerations.

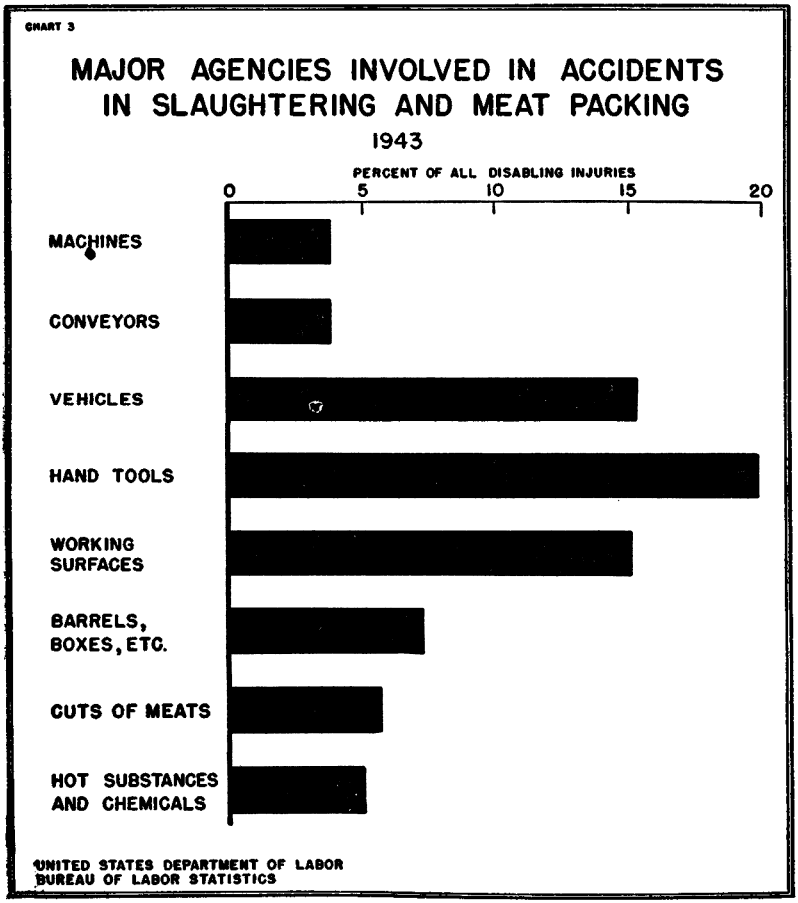
Some of the plant departments were rather thinly represented among the 330 employees for whom these records were tabulated and, therefore, no significant comparisons could be made. There were, however, 7 departments for which sufficient employment was included to furnish some indication of the probability of their workers experiencing an injury. In the hog-dressing department 11 out of every 12 workers had at least one injury during the year. In the beef

cutting and boning department 9 out of every 10 workers were injured; in the beef-dressing department, the sausage department, and the maintenance department the ratio was 4 out of 5; and in the smoked-meat and shipping departments it was 1 out of 2.

## *Agencies of Injury, and Accident Types*

### THE "AGENCIES" [11]

In many respects the determination of the particular physical items which are most commonly involved in the occurrence of injuries constitutes the fundamental step in the development of a successful




safety program. When these items are known, it becomes possible to take direct action to learn why and how they contribute to the occurrence of injuries, and then to take measures to overcome the accident-producing possibilities of these items. To permit the precise determination of these items, which are commonly termed "agencies," the American Recommended Practice for Compiling

[11] See appendix, table 11.

Industrial Accident Causes defines an agency as "the object or substance which is most closely associated with the injury, and which in general could have been properly guarded or corrected."

Analysis based upon this definition points directly to hand tools, vehicles, and working surfaces as the outstanding injury-producing agencies in the slaughtering and meat-packing industry. Hand tools were the indicated agencies in nearly 20 percent of the cases analyzed, and in more than three-fourths of these, the specific tool involved was a knife. Vehicles (primarily hand trucks) were involved in 15 percent of the accidents, and working surfaces in another 15 percent. In the latter group, slippery and rough floors were the predominating agencies. Packages and packing materials, such as barrels, boxes, kegs, cans, drums, etc., were the agencies responsible for 8.5 percent of the injuries. Projecting bones in cuts of meat accounted for 5.6 percent more. Machines, other than elevators or conveyors, were responsible for 3.7 percent of the injuries, and conveyors for another 3.7 percent. Hot substances and chemicals together were the agencies involved in 5 percent of the injury cases, stairways in 3.3 percent, and animals in 2.9 percent.

Elevators were involved in less than 1 percent of the accidents, but their importance as an injury-producing agency was magnified by the seriousness of the resulting injuries. Among the 46 disabling injuries associated with elevators, 2 resulted in death, 4 developed into permanent impairments, and the remaining 40 caused the loss of 1,040 man-days from work. The average of 26 days of lost time for each case of temporary disability associated with elevators was double that for all temporary disabilities and substantially more than the similar averages for cases involving any other agencies.

Accidents associated with machines likewise achieved a greater importance than was indicated by their number, owing to the seriousness of the resulting injuries. Among the injuries ascribed to machines there were no fatalities, but the proportion of permanent impairments in this group was very high. Among the injuries resulting from contact with the point of operation of machines, over a third resulted in permanent impairments, and among those involving contact with other parts of machines, the proportion of permanent impairments reached nearly 1 in 4.

### TYPES OF ACCIDENTS [12]

Nearly 30 percent of the injuries for which details were available resulted from accidents in which the injured person struck against some object. In nearly half of these cases the object was a knife. In a substantial number of instances, however, the object struck was a sharp bone in a piece of meat, a hand truck, or a box or barrel.

The knife accidents in this group included a considerable number of cases in which the worker's hand slipped off the handle onto the blade when the knife encountered a bone or other resistance. There were also numerous instances in which a sticker's free hand or arm was knocked against his knife by a suspended hog or by a reflex kick of an incompletely stunned steer. Most of the "striking-against" accidents involving vehicles were cases of workers bumping into hand trucks which had been left standing in walkways or in the working

[12] See appendix, table 12.

areas. Similarly, many of the accidents in this group which involved contact with boxes, barrels, etc., were cases of bumping into materials which infringed on the aisles or work spaces.

Greasy floors played an important part in some of these accidents by causing slips which threw the workers against nearby objects.

Accidents in which the injured workers were struck by moving, falling, or flying objects accounted for over 22 percent of the injuries. Hand trucks, hand tools, conveyors, and packaged materials were the agencies most commonly involved in these accidents.

Falls, which caused 17 percent of the reported injuries, constituted the third most common type of accident. About a fourth of these accidents were falls from one level to another, with those on stairways constituting half of this subgroup. Most of the falls on level surfaces occurred in the working areas, and a majority resulted from slips on wet or greasy floors.

As a group, the accidents classified as slips and overexertion accounted for 16 percent of the reported injuries. Three-fourths of these injuries were directly attributable to overexertion in lifting or moving heavy materials or equipment. The other accidents in the group were cases in which the workers slipped on wet, greasy, or irregular surfaces or stairs and suffered strains or sprains in trying to keep from falling.

Accidents caused by the workers being "caught in, on, or between" various objects were responsible for nearly 9 percent of the injuries. The majority of these involved crushing injuries, such as those of fingers and hands pinched between materials or caught in the moving parts of machinery, and of persons pinioned between vehicles and stationary objects or between elevator cars and the walls of the elevator shafts. Many of these injuries were very serious, nearly 1 in every 6 having resulted in a permanent impairment—a much higher proportion than prevailed among the injuries arising from any other type of accident.

Other types of accidents included contacts with hot substances, causing nearly 4 percent of the injuries. These injuries ordinarily were not severe, although 1 of the 8 deaths included in the cases analyzed resulted from burns caused by hot resin. Injuries resulting from the inhalation, absorption, or ingestion of chemicals, dusts, and fumes constituted about 2 percent of the reported disabilities. These were principally cases of chemical burns or of dermatitis.

### *Accident Causes*

It is generally recognized that every accident may be traced to the existence of an unsafe working condition, to the commission of an unsafe act by some individual, or to a combination of these accident-producing factors. The correction of unsafe working conditions generally is entirely within the powers of management. The avoidance of unsafe acts, on the other hand, requires cooperation and understanding by both management and workers. Management must take the lead, however, by providing safety-minded supervision and by making sure that all workers are acquainted with the hazards of their operations and are familiar with the means of overcoming them.

## UNSAFE WORKING CONDITIONS [13]

Basically, the elimination of unsafe working conditions is of no greater importance in accident prevention than the elimination of unsafe acts. However, because management can readily exercise control over unsafe working conditions, and because such situations are usually easily recognized, their correction generally takes first place in the planning of any safety program.

Within individual plants the relative importance of the various types of unsafe conditions noted in the course of the survey varied widely. The broad conclusions derived from the study, therefore, may not be taken as applying in their entirety to any particular plant. It is apparent, however, that slaughtering and meat-packing establishments should carry on the following precautionary activities:

1. Take steps to reduce the hazard of slippery floors.
2. Improve housekeeping conditions, with particular attention to the piling and storage of materials and the placement of hand trucks when not in actual use.
3. Regularly inspect all tools, material, and equipment for defects, and immediately repair or replace all defective items, particularly in respect to knives, floors, hand trucks, and conveyors.
4. Provide and require the use of adequate personal safety equipment in all operations presenting hazards which such equipment can overcome.
5. Provide and require the use of guards on all machinery and elevators.
6. Provide knives which are guarded to prevent the workers' hands from sliding down over the blades.
7. Install guards on all monorails to prevent the wheels from leaving the track.
8. Provide mechanical equipment or sufficient assistance when heavy or bulky materials are to be lifted or moved.
9. Provide rules and traffic-lane markings to govern the movement of vehicles inside the plant and require supervisors to enforce these rules.

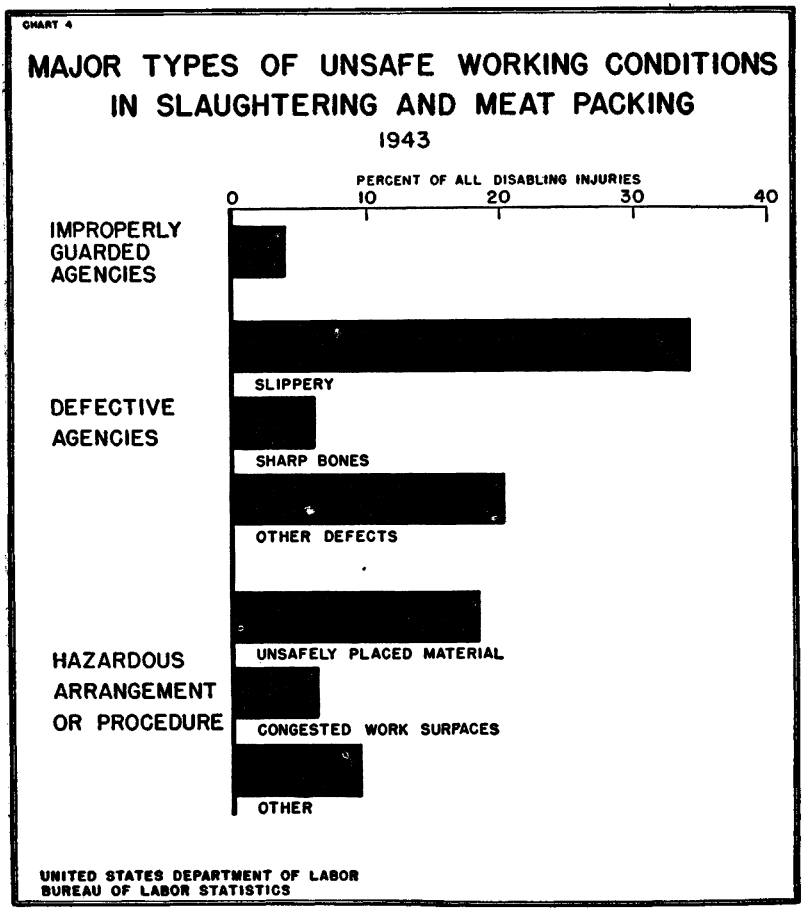
### *Defective Agencies*

Defective agencies, including such items as slippery floors, sharp projecting bones in cuts of meat, broken tools or equipment, and projecting nails in barrels or boxes, were involved in 60 percent of the accidents which were found to have occurred because of the existence of unsafe working conditions.

Slippery floors alone were the cause of more than half of the accidents in this group. In many cases the slipperiness was due to bits of fat dropped from the trimming benches or spilled from trays of trimmings as they were moved through the aisles. Water lying upon the greasy surfaces frequently accentuated this unsafe condition. This hazard prevailed in nearly all the dressing, cutting, and trimming rooms studied, but it was not limited to those areas. The most effective method used to overcome greasy floors was to wash them frequently with a water solution of a mild saponifying agent, followed by thorough rinsing. In particularly greasy areas salt was sometimes sprinkled to serve as a nonslip agent. Proper drainage to prevent

[13] See appendix, table 13.

water from lying in pools on the floor is essential. Wherever practicable, and when permitted by sanitary regulations, smooth floors should be replaced by rough-grained brick or tile. At least two companies are now producing materials especially designed for this purpose. On stairways and ramps it is particularly important that nonslip surfaces and stout handrails be provided to minimize the possibility of falls resulting from slips. In one of the plants visited it was observed that many of the employees had strips of cloth tied




around the balls of their feet; the plant superintendent commented that this practice had greatly reduced the number of slipping accidents. In another plant, however, it was reported that this procedure had been tried and discarded because it brought about an increase in such accidents caused by the cloths' absorbing and spreading the grease.

In addition to being slippery, the floors of the plants visited were frequently found to have broken, cracked, or irregular surfaces which presented tripping hazards or caused water to collect in little pools. These irregularities in many instances were sufficient to cause hand trucks to swerve and bump into nearby persons or objects. To a

considerable extent, these irregularities in the floors could be ascribed to wear resulting from the use of trucks with metal wheels. The substitution of rubber-tired wheels probably would greatly reduce this floor wear. When such defects exist, however, the obvious safety measure is to make immediate repairs. Hazards of this type are generally quite apparent, and their continued existence can be interpreted only as evidence of slack supervision or of inadequate maintenance.

A considerable volume of injuries resulted from workers' striking sharp pieces of bone as they handled cuts of meat or meat scraps. In the handling of scrap meat, a simple remedy for this hazard is to require the use of forks, rakes, or shovels rather than of hands. The use of hand coverings would also help to reduce the danger of abrasions or lacerations from sharp bones.

Pans and trays which had become broken or battered in service so that their rims or corners were sharp or rough were found to be the source of many injuries. Most of these were hand cuts or lacerations, which probably would have been avoided if the injured persons had been wearing gloves. The most effective procedure for the elimination of accidents of this type, however, is to provide for frequent inspection of pans and trays and to require the immediate removal of defective pieces, for repair or replacement.

Other defective agencies, which caused fewer but nevertheless substantial numbers of accidents, included defective switches on monorail equipment, which led to the falling of suspended materials on workers; defective hand tools, particularly knives and meathooks; loose or broken binding wire on boxes or crates; and projecting nails in opened barrels or boxes. Most of these unsafe conditions should have been apparent to the supervisors in the normal course of operations, and specifically should not have been overlooked in the course of regular safety inspections. Their frequent contribution to accidents indicates that adquate attention was not given to the detection and repair of such defective equipment.

However, it must be recognized that the seemingly general failure to maintain tools and equipment in good repair during the period covered by this survey resulted to some extent from shortages caused by the war. Labor shortage was particularly acute in respect to skilled maintenance men, and the lack of materials frequently prevented repairs or replacements which otherwise would have been made. The available evidence, however, indicates that considerable improvement in these unsafe conditions could have been accomplished despite the wartime shortages. It seems apparent, therefore, that the industry can substantially reduce its hazards through an intensified program of inspection and immediate repair of defective equipment.

#### *Hazardous Arrangements or Procedures*

The importance of careful planning for all plant operations and of maintaining strict supervision throughout such operations as a means of avoiding accidents cannot be overemphasized. When agencies which are not inherently hazardous are arranged or regularly used so as to create hazards, the unsafe conditions and the resulting accidents must be ascribed to a failure on the part of management to exercise one of its proper functions.

Fully a third of the accidents which occurred because of the existence of an unsafe working condition was due to hazardous arrangements or procedures in operations which normally can be carried on safely. More than half of these accidents occurred because materials, tools, or pieces of equipment had been placed and permitted to remain in unsafe positions.

Materials and equipment placed in irregular and unstable piles, stored materials which encroached upon aisles and workplaces, loose materials and equipment left in aisles and workplaces, and congestion of materials in small spaces were common among the poor housekeeping conditions which led to accidents. Many workers were struck by materials which fell from improperly built piles; others were struck by materials which fell from improperly loaded trucks or from unsafely loaded conveyors; and still others tripped over misplaced materials or slipped on scraps of meat which had fallen from overloaded trucks or scrap cans.

In most packing plants it is common practice to have groups of employees work together at long tables. In the interest of efficiency as well as safety it is essential that each of these workers be allowed sufficient space at the table to permit him to work freely without interference from his neighbors. It was found, however, that these spacing requirements were often ignored, with the result that there were many accidents in which employees were injured through contact with their coworkers' knives. Lack of adequate plant space to accommodate the volume of work being performed was generally the underlying reason for this type of unsafe working condition.

In many plants it was apparent that little thought had been given to the problem of controlling vehicular traffic, with the result that considerable numbers of workers were being injured by contact with the hand trucks and tractors which moved through the aisles and workplaces. It was observed that, for the most part, no attempts had been made to separate vehicular and pedestrian traffic in the aisles and passageways, and that only rarely had efforts been made to eliminate the hazards of blind corners, through the installation of mirrors or by the marking off of distinct lanes for traffic in each direction. In some plants vehicular traffic was permitted to continue when the aisles were full of workers entering or leaving the workplaces at the beginning or end of a shift. A great many of the traffic hazards could have been eliminated quite simply through the enforcement of traffic rules and the application of painted lines to guide the movement of vehicles. The fact that these precautions were not taken must be interpreted as meaning that this phase of safety has been seriously neglected.

Another common unsafe procedure was that of regularly requiring or permitting individuals to lift or move heavy materials which should have been handled mechanically or by a team of workers. To prevent strains from overlifting, supervisors should be required to see that sufficient assistance is available and that the persons doing the lifting are given a firm surface on which to stand and plenty of room in which to move.

### *Inadequately Guarded Agencies*

The volume of accidents caused by the lack of proper guards on machinery or other hazardous equipment was small, but the numerical insignificance of the group was more than overcome by the general

severity of the resulting injuries. Only about 4 percent of the accidents originating in unsafe working conditions were ascribed to inadequate guarding. One in every three of these accidents, however, resulted in an injury involving some form of permanent impairment. This tendency to produce serious injuries was even more striking in the subgroup composed only of accidents involving inadequately guarded machines. In the latter group over half the resulting injuries were permanent impairments.

It is generally recognized that the power saws used in the slaughtering and meat-packing industry are very difficult to guard because of the size and irregular shape of the materials to be cut. In no plant visited were any guards attached at the point of operation of these saws. Most of the persons interviewed stated that they knew of no practical method of applying such guards. In some plants, however, methods had been worked out to make it unnecessary for the operator to bring his hands into proximity with the saw blade. These safety methods included the use of a sliding section in the saw table on which the meat was pushed up to the saw and the use of rakes or hoes to remove the cut pieces from the vicinity of the blade.

Grinders and mixers into which it was possible for the operator to insert his hands were also the cause of a number of accidents. These machines can be and are made to be practically injury-proof simply by providing a feeding throat longer than the arm of any possible operator. The fact that such injuries were reported, therefore, indicates an indifference to safety which is difficult to understand in view of the probable cost of the serious injuries which are likely to occur in the use of unprotected machines of this type. Guillotines, or shears, and head splitters similarly are machines which generally can be guarded to protect the operators, but which were reported as having been involved in some accidents.

Inadequately guarded elevators were the source of several very severe injuries. In some instances it was reported that the cars had no gates or that the gates which were provided were ineffective to prevent passengers from extending parts of their bodies beyond the cars into the hoistway. As a result, several workers who allowed their feet to project beyond the edge of the car lost their toes or parts of their feet when they were pinched between the car floor and projections on the hoistway wall. The elimination of projections or pinch points inside elevator hoistways and the provision of adequate enclosures for the elevator cars have long been basic safety principles. The failure to provide such safeguards constitutes a definite unsafe condition.

Other reported elevator accidents included several instances in which workers had opened hoistway gates while the car was at some other level and had then fallen into the shaft, or had fallen into the shaft through a gate which had been left standing open. These cases also must be attributed to a lack of the fundamental safeguards which are universally accepted as necessary for the safe operation of elevators. Hoistway openings should always be protected by gates which cannot be opened from outside the hoistway except by means of a special key. These gates should be so constructed that they will effectually prevent a person from inserting any part of his body into the shaft when they are closed, and should be so interlocked with the car that the car cannot be moved from a landing before the gate is closed and locked.

## UNSAFE ACTS [14]

For the purpose of accident analysis an unsafe act is defined as "a violation of a commonly accepted safe procedure." [15] Literally this definition means that no personal action shall be designated as unsafe unless there was a reasonable and less-hazardous alternative method or procedure. There is, however, no implication that the alternative safe procedure must have been known to the person who acted in an unsafe manner, nor that his unsafe act was the result of a considered choice between the two possible procedures. In many instances it is apparent that the individual knew the safe procedure but consciously decided not to follow it. In other cases circumstances indicate that the person who acted unsafely did so, not as a matter of choice, but simply because he did not know the alternative safe method. The first step toward the elimination of unsafe acts, therefore, consists of making sure that all workers are thoroughly instructed in the safe methods of performing their duties and that they are familiar with the hazards connected with deviations from those safe procedures. The second essential step is to exercise strict supervision to see that unsafe procedures are prohibited.

Most of the accidents which occurred because of the commission of an unsafe act were associated with three general groups of unsafe acts: Using unsafe equipment, using hands instead of equipment, or using equipment unsafely; incorrect lifting; and assuming an unsafe position or posture. More specifically, the analysis indicated that a program of instruction and enforcement for the elimination of accident-producing unsafe acts should emphasize proper methods for the following operations: (1) Using hand tools, particularly knives, (2) handling cuts of meat and heavy packages, such as boxes, barrels, and crates, (3) loading and using hand trucks, (4) lifting heavy materials, and (5) piling or storing materials.

### *Using Unsafe Equipment or Using Equipment Unsafely*

The unsafe procedures in this group were factors in the occurrence of over half of the accidents associated with unsafe acts. Within the group the outstanding type of unsafe act was that of taking an incorrect hold or not maintaining a good grip upon objects being handled. Specifically, these included many cases in which materials or tools slipped from the worker's hands or were deflected against himself or against a coworker because he attempted to handle the material when his hands were greasy; because he grasped the material at a sharp or rough spot which caused him to release his grip; or simply because the material or tool was not held firmly enough to control its movements. Knives, hand trucks, meathooks, boxes, barrels, and crates were the agencies most commonly involved in these accidents. Cuts on the hands and pinched or crushed fingers or feet were the most common injuries resulting from these practices.

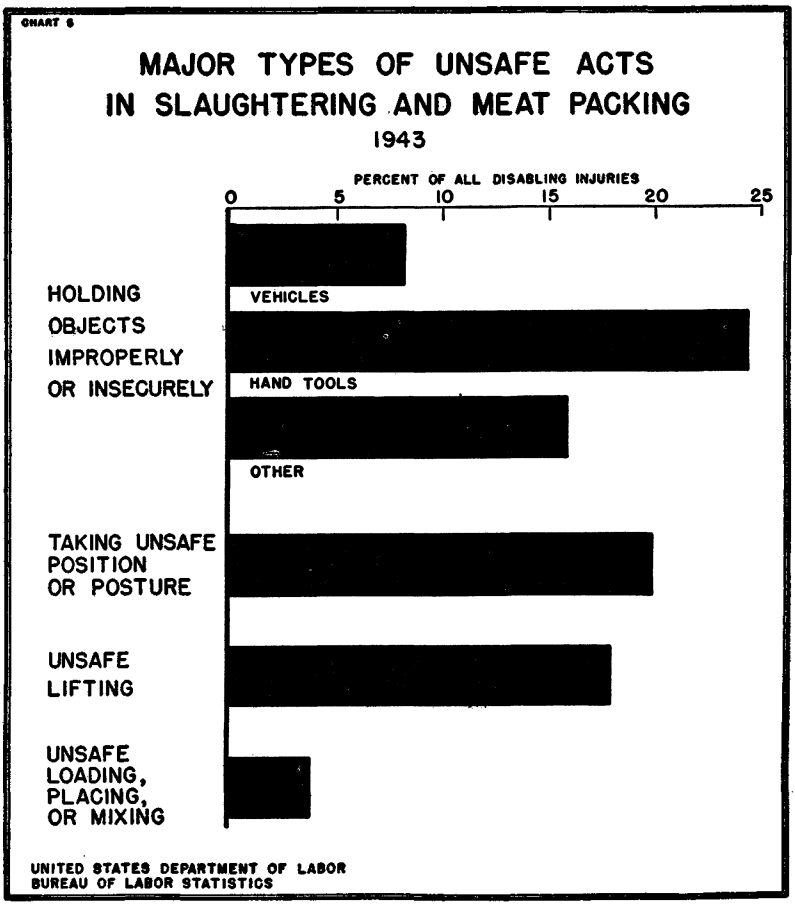
The unsafe procedure of holding on to the corners of the load or grasping the handle supports instead of holding on to the handle while pushing four-wheeled meat trucks resulted in a substantial number of injuries arising from the operators' hands being pinched

[14] See appendix, table 14.
[15] American Recommended Practice for Compiling Industrial Accident Causes, approved by the American Standards Association, August 1, 1941.

against fixed objects. Other examples of the misuse of plant vehicles resulting in accidents included such unsafe acts as the lack of care at blind corners or in congested areas and pulling hand trucks instead of pushing them.

*Unsafe Position or Posture*

Nearly 20 percent of the accidents resulting from unsafe acts were the direct outcome of the injured person's placing himself unnecessarily in an unsafe position or posture. These unsafe practices in-




cluded such actions as attempting to adjust or repair moving machines, elevators, or conveyors; working, standing, or walking in the path of moving vehicles; unnecessarily working or walking too close to other workers who were performing hazardous operations; climbing on boxes or barrels instead of using ladders; taking shortcuts instead of using the provided walkways; stepping or climbing over materials instead of walking around them; unnecessarily approaching conveyors or other moving equipment; working in cramped positions; and riding in an unsafe position on vehicles or elevators. The most prominent

unsafe act in this general category, however, was that of inattention to footing in areas known to be slippery, particularly while carrying materials.

Unsafe working conditions, particularly conditions created by poor housekeeping, were also involved in many of the accidents associated with the act of assuming an unsafe position. In these instances the correction of the unsafe working condition, which would have eliminated the possibility of the worker's exposing himself to the hazard, would have been the most effective safety measures. Nevertheless, it is apparent that workers should be more thoroughly trained to recognize the hazards of their job so that they may avoid those dangers.

### *Unsafe Lifting*

Injuries resulting from manual lifting of heavy objects present a serious problem in slaughtering and meat-packing plants. In essence, every accident of this type is a case of lifting excessive weight—that is, excessive under the existing circumstances, for the individual involved. Variations in the strength and skill of different individuals make the determination of what is a safe maximum weight to be lifted by one person very difficult if not impossible. There can be no question, however, that a knowledge of and the strict application of proper lifting procedure—lifting with the legs instead of the back—will render safe the handling of greater weights than can safely be lifted by the hit-or-miss method of "grab and jerk." In classifying the lifting accidents, an effort was made to exclude from this unsafe-act classification those cases in which individuals attempted to lift weights which obviously should have been handled mechanically or by a team. As far as possible, those included represent injuries which resulted from lifting weights ordinarily handled by individuals and normally considered to be within the lifting ability of most workers. These cases represented nearly 18 percent of all accidents resulting from unsafe acts. Although the injuries which these accidents caused were practically all of a temporary nature, they included a considerable volume of hernia cases and severe back strains which required prolonged treatment.

It is frequently impossible to specify exactly what was done incorrectly in certain lifting accidents. In most cases the injured person can report only that he was lifting when he suddenly felt pain. Only rarely is there a witness who was observing the operation with sufficient care to identify accurately the specific faulty procedure. It is well known, however, that strains, sprains, and hernias frequently result from lifting with the back muscles instead of the leg muscles; from lifting in cramped or awkward positions; or from lifting while standing on irregular or insecure surfaces. Most of the accidents in this group undoubtedly resulted from one or the other of these unsafe procedures.

### *Other Unsafe Acts*

Among the various other types of unsafe acts which produced accidents in sufficient volume to indicate that they are of fairly common occurrence were the following: Overloading or insecurely loading vehicles; operating or working at unsafe speeds, including the practice of throwing materials instead of carrying or passing them; running in the workplaces or on stairways; and jumping from vehicles or plat-

forms. Operating equipment without authority, or failing to warn others before starting equipment, and the failure to secure equipment so that it could not be put in motion while being repaired or adjusted also were common causes of accidents.

## *Typical Accidents and Suggestions for Their Prevention*

To illustrate the general types of accidents experienced by workers in slaughtering and meat-packing plants brief descriptions of a number of accidents were secured, and typical examples of these were given individual consideration.[16] In preparing the comments regarding these cases the intention was not to make all-inclusive recommendations nor to attempt to propound authoritative safety rules. On the contrary, the purpose was merely to indicate that there is a simple approach to the prevention of practically every type of accident. Many safety engineers no doubt would attack the problems involved in these accidents from a different angle and would achieve equally good or possibly better results. The method of prevention, however, is of secondary importance so long as it accomplishes its purpose. It is of prime importance to emphasize that there is some practicable method of minimizing or eliminating nearly every type of accident.

The selected accident descriptions, accompanied by suggestions as to the preventive measures which might prevent their recurrence, are given below.

### ELEVATOR AND CONVEYOR ACCIDENTS

1. An employee fell into an unguarded elevator pit. Lost 35 days.

*All openings into elevator shafts should be equipped with gates* (a) *interlocked with the controls so that the elevator will not operate when any gate is open and* (b) *interlocked with the car so that no door can be opened without a special key unless the car is stopped at its level.*

*Whenever a gate is opened with the key for repairs or for inspection while the car is at another level the area in front of the opening should be enclosed with a substantial barricade which will effectually obstruct the approach to the opening.*

2. Employee was crushed beneath elevator while he was cleaning out elevator pit. Fatal.

*No elevator repairman should be permitted to work inside the shaft unless the controls are locked or are being handled by a competent assistant who will move the car only in accordance with orders from the worker in the shaft.*

3. While operating an elevator an employee extended his foot beyond the edge of the car. The foot was caught between the elevator and a landing threshold. Foot amputated.

(a) *Projections extending inward from the general surface of the hoistway enclosure and which are opposite the car entrance should be beveled on the underside or guarded with smooth metal plates firmly attached at an angle of 60° to 75° from the horizontal.*

(b) *All elevator cars should be equipped with safety gates so designed as to prevent the operators and passengers from extending any parts of their bodies beyond the edge of the car. These gates should be interlocked with the controls so that the cars cannot be operated until the gates are closed and locked.*

4. A maintenance man was injured while painting the elevator shaft. He reached into the shaft and was caught by the descending elevator. Fractured ribs and chest injuries caused him to lose 112 days.

*No repairman should be permitted to work inside or on the shaft unless the controls have been locked or are being handled by a competent assistant who will move the car only in accordance with orders from the worker in the shaft.*

[16] D. R. Blenis and Joseph Pochop, safety engineers in the industry, assisted greatly in the analysis of these cases.

5. A tree fell through an open switch of a conveyor rail and struck a worker on the head. Lost 11 days.

*Switches should be equipped with safety lugs which will prevent the rollers from going through when the switches are open.*

6. Employee was pushing beef along on overhead track. The roller ran into an open switch and fell on the employee. Lost 2 weeks.

(a) *Switches should be equipped with safety lugs which will prevent the rollers from going through when the switches are open.*

(b) *Employees who use or work near overhead conveyors should wear safety hats.*

7. A hog fell off conveyor hook into hot rosin tank. The rosin splashed and burned an employee's face, neck, and arms. Lost 35 days.

(a) *Rosin tanks should be equipped with splash boards on each side and employees should not be permitted to work within splashing distance of the open ends.*

(b) *Frequent inspections and proper maintenance of conveyors, and careful instruction and close supervision in hooking the load are important to prevent loads from dropping from conveyors.*

8. An employee in the hog-cutting department stood on a conveyor to get his apron from a hook on which it was hanging. A co-worker started the conveyor and the employee was carried against the blades of a side-splitting machine. Lost 56 days.

(a) *Facilities for keeping work aprons and other clothing should be provided where the hazard of moving equipment does not exist.*

(b) *Standing on or climbing over conveyors should always be prohibited.*

(c) *Conveyors should not be started without advance warning for everyone to stand clear.*

(d) *The supervisor should not have permitted the employee to hang his apron where it would be necessary to stand on or to reach over the conveyor to get it.*

### HAND-TRUCK AND MOTOR-TRUCK ACCIDENTS

9. As an employee in the hog-cutting department was moving a two-wheel truck loaded with meat, one wheel came off, throwing the truck to one side. His hand was caught between the truck handle and the building. Severe cuts on two fingers caused him to lose 6 days.

(a) *Regular inspection of equipment and proper maintenance are necessary for the prevention of such accidents.*

(b) *Truck handles should be equipped with guards to protect employee's hands from injury.*

10. The coupling between a truck and trailer parted. The trailer swerved and struck a nearby worker. Lost 69 days.

*Coupling equipment which has been properly designed and kept in good condition will not uncouple of its own accord, unless the coupling has been made improperly.*

(a) *Trucks and trailers should be inspected frequently, and any which are found defective should be removed from service until repaired.*

(b) *Employees who use trucks and trailers should be trained to make couplings properly, and their procedures should be checked frequently even though they have apparently learned the proper methods.*

11. A tractor driver was driving his tractor through a doorway. He struck his head against the top of the door. Lost 2 days.

*A case of poor planning and improper traffic lay-out. When the tractor was first put in service all routes on which it would be used should have been surveyed for possible hazards. The inadequate clearance at the doorway should have been discovered and corrected at that time.*

12. An employee of the ham-house shipping department was standing behind swinging doors. A tractor coming through the doorway, forced the doors open and pushed one against the employee. He was caught between the door and a box. Lost 22 days as a result of a fractured leg.

(a) *The practice of opening doors by bumping them with a truck or tractor should be prohibited.*

(b) *Swinging doors are always dangerous and should be eliminated whenever possible. Doors through which trucks must pass should have automatic opening and closing mechanism, coupled with a warning signal, which can be operated by pulling a rope or wire or by pressing a button along the passageway.*

13. A hide-cellar employee was holding a truck loaded with hides. A co-worker put a bundle of hides on the opposite end of the truck causing the handle to fly upwards, straining the employee's shoulder. Lost 3 days.

*All trucks should be loaded evenly to prevent accidents of this kind. Employees should be thoroughly trained in the safe methods of loading, and the supervisors should frequently check the procedures in use to be sure that the instructions are understood and are being followed.*

14. The right foot of an employee was crushed while a truck was backing up to the dock. The employee had his foot hanging over back of truck and was caught between dock and truck. Lost 3 weeks.

(a) *Employees should not be permitted to ride with the load on a truck.*

(b) *Backing a motor vehicle is always a hazardous operation. Drivers should be trained never to back until they are sure that everyone is in the clear.*

15. While loading a highway truck an employee fell between the truck and the dock, bruising his leg. Lost 2 days.

(a) *Trucks should never be loaded unless they are in a safe position.*

(b) *Whenever the truck cannot be placed so that the bed is level with and tight against the dock, the space between the truck and the dock should be substantially bridged over the full width of the truck.*

16. A laborer in the pork-cutting department was using a meat hook to haul a hand truck. The hook slipped and the point struck him on the foot. Lost 4 days.

*Workers should be thoroughly instructed in the proper use of hand trucks, and supervisors should see that those instructions are followed. Meat hooks should never be used for any purpose other than that for which they are designed.*

## MISCELLANEOUS MACHINERY ACCIDENTS

17. An employee in the hog-cutting department was operating a skinning machine while wearing gloves. His glove caught in the machine. One finger amputated.

*Operators of skinning machines should not be permitted to wear gloves while working.*

18. As employee was placing muslin cloth over rollers on a casing machine; his left hand slipped between the rollers. The injury became infected and it was necessary to amputate two fingers.

(a) *Casing rollers should never be covered while the machine is in motion. The power should be off, and whatever movement of the rollers may be necessary should be accomplished by hand.*

(b) *All injuries should be treated promptly at the first-aid room to prevent infection.*

19. A defective lock on a stuffing machine permitted the cover of the machine to blow off. It struck a linker on the head. Lost 6 days.

*Frequent inspections and proper maintenance of all equipment is necessary to prevent accidents of this type.*

20. A maintenance machinist was repairing a bacon-slicing machine. He failed to pull the master switch; the operator started the machine and the machinist's hand was drawn into the gears. Lost 39 days.

*The master switch should always be locked in an open position while repair work is being done.*

21. Employee was under a "tar batter" machine making repairs. A co-worker started the machine and the man's arm was caught in the mechanism. Lost 6 days.

*The starting switch of the machine should always be locked in an open position before repair work is started.*

22. An employee in the hog-kill department was injured while turning reverse spool on the dehairing machine. The machine was accidently thrown in gear and a hand lever on the machine struck employee on chest. Lost 12 days.

*Starting levers or switches should always be locked open while machine is being repaired.*

23. An employee turned off the switch on a capping machine in the canning department. Before the machine had come to a stop, he stuck his fingers into the magazine. One finger was fractured and its use permanently impaired. Lost 35 days.

*Employees should never adjust machinery or put hands or fingers into a machine until it has come to a complete stop.*

24. Employee was operating a guillotine cutting frozen meat. His hand went beneath blade, two fingers amputated.

*A feeding table large enough to make it impossible for an employee to reach the blade should have been provided. A rake or hoe should be used to move meat in the vicinity of the knife.*

25. An employee of the box factory was operating a nailing machine. He accidently tripped the machine, which came down and smashed his fingers. Sustained permanent injury of two fingers and lost 42 days.

*The tripping mechanism should be so designed or guarded that it cannot be accidentally tripped.*

26. A wool-house employee was standing on top of bales of wool in a boxcar. His foot slipped and, in attempting to catch himself, he stuck his hand into the wheel of an operating loading machine. Hand was permanently disabled.

*Machines should be guarded to prevent accidental contact with moving parts.*

27. An employee had completed a cut on a band saw. In pulling the pieces back, his finger came into contact with the saw. One finger amputated.

(a) *The point-of-operation of all powered saws should be guarded.*

(b) *A sliding saw table would have avoided the necessity of pulling the meat back by hand.*

28. Employee was operating a band saw cutting beef. He used a meat hook as a pusher. The hook slipped, allowing his finger to come into contact with the saw. Finger amputated.

(a) *The point-of-operation of all powered saws should be guarded.*

(b) *A sliding saw table to feed the saw should have been installed. Meat hooks should never be used as pushers.*

29. A laborer in the bone house was using a circular saw. He slipped on a piece of fat on the floor and struck his finger against the saw. Finger amputated.

(a) *All circular saws should be equipped with self-adjusting guards to prevent contact with the blade.*

(b) *All working surfaces should be kept free of grease, meat scraps, etc. This is particularly important in the areas adjacent to machinery.*

30. A machinist in the machine shop placed his hand on lubricator driving rod of an air compressor, which was in operation. A lacerated finger caused 10 days' lost time.

*All moving parts of machinery should be guarded to prevent accidental contact with the moving parts.*

### GRINDER ACCIDENTS

31. An employee attempted to push fat, which had packed tight, back through a power-driven meat grinder. He slipped and, while off balance, caught his arm and hand in the grinder blades. Lost one arm.

(a) *Grinders and mixers should be designed with interlocking controls which make it impossible for workers to reach into the danger zone while machines are in motion. This is possible by interlocking all covers and switch-tilting devices. During cleaning operations all movement of the machines should be by hand power.*

(b) *Floors should frequently be cleaned of grease, scraps of meat, etc., to prevent slipping accidents.*

32. While feeding meat into a grinder an employee got his hand caught in the feed. It was necessary to amputate his arm at the elbow.

(a) *Grinders should be constructed so that it is impossible for workers to reach the worms or blades. This can be accomplished by making the hopper longer than a man's arm or by providing a feeding or supply table large enough to keep the operator beyond an arm's reach of the mechanism.*

(b) *A scoop or fork should always be used in feeding grinders. If it is necessary to press the meat into the hopper, a stamper or plunger should be used. Hand feeding of these machines should be prohibited.*

33. A bone-grinder operator lost the sight of one eye when a piece of tooth flew from the grinder into his eye.

*Face shields or safety goggles should be provided and worn in work of this type.*

34. While an employee was operating a bone-shredding machine, the machine exploded, crushing the employee's legs. One leg amputated.

*Apparently this machine was defective. All grinders and meat mills should be thoroughly inspected by competent mechanics at regular, frequent intervals. When the inspection reveals any defect, the machine should be removed from service until it has been repaired.*

35. Employee was feeding bones into bone grinder when a large piece of bone flew out of the machine and struck him in the face causing double fracture of cheek bone. Lost 8 weeks.

(a) *A feeding chute should be used on this type of machine.*

(b) *Safety goggles or face shields should be worn by all emloyees feeding bone grinders.*

## POOR-HOUSEKEEPING ACCIDENTS

36. An employee in the hog-cutting department slipped on a small piece of pork and hooked his arm on a sharp rack. Lost 2 days.

(a) *Floors should frequently be cleaned of grease, scraps of meat, etc.*

(b) *Frequent inspections and proper maintenance of equipment such as racks are important to prevent accidents.*

37. Employee was lifting a barrel onto a scale in the cooler. He fell on the floor, which was slippery with blood, and turned his ankle. Lost 3 days.

(a) *Blood should not have been permitted to lie on the cooler floor; floors should be washed as often as necessary.*

(b) *Salt can be used to eliminate slippery spots.*

(c) *Floors should have rough surfaces. Wood floors should be painted with a nonslip floor paint or covered with antislip floor pads. Concrete floors should be rough-finished with carborundum particles or grit worked into the surface. Brick floors should be made of vertical-grained bricks.*

38. An employee in the beef-dressing department slipped in blood on the floor and struck his chest against the curbing of the blood pit. Lost 3 days.

(a) *Floors should be washed frequently.*

(b) *Nonslip materials should be used on the floor of blood pits.*

39. While washing and shrouding beef, an employee slipped and fell off the stand on which he was working. Fractured arm. Lost 4 weeks.

(a) *All working surfaces should frequently be cleaned of grease, meat scraps, etc.*

(b) *Guard rails should be placed on all elevated working surfaces.*

(c) *Working areas should have a rough surface. If working surface is made of wood, it should be painted with a "nonslip" floor paint or covered with grit-impregnated roofing paper or similar material. If working surface is made of concrete, it should be rough-finished with carborundum particles or grit worked into the surface.*

40. An employee slipped on a piece of fat while carrying meat to truck. He fell and injured his right side and leg. Lost 20 days.

*Poor housekeeping—all working surfaces should be kept free of grease, meat scraps, etc.*

41. Employee was pushing a hand truck. While going through a door one wheel struck a piece of beef on the floor which threw the truck to one side catching employee's hand between the truck handle and the door casing. Lost 5 days.

(a) *All working surfaces and passageways should frequently be cleaned of meat scraps, etc.*

(b) *Truck handles should be equipped with hand guards to protect employees' hands from injury.*

42. An employee was driving a tractor from one department to another. When making a sharp right-hand turn, the tractor overturned. The foreman stated that the tractor hit some round ends of paper rolls which were lying in the aisle. The driver's arm was injured and he lost 14 days.

(a) *Poor housekeeping—the paper rolls should not have been permitted to be in the aisle.*

(b) *This appears to have been a case of excessive speed on the turn or of inattention on the part of the operator. He should have seen the paper rolls and should have stopped before the tractor struck them. Better training and closer supervision of drivers is necessary.*

43. Employee fell on a slippery stairway and struck his leg against a projecting piece of steel at the bottom of the stairs. Lost 6 days.

(a) *Stairways should frequently be cleaned of fats, meat scraps, etc.*

(b) *All stairways should be equipped with hand rails.*

(c) *Treads of stairways should have a rough surface. If made of wood, they should be painted with a "nonslip" floor paint or covered with grit-impregnated roofing paper or similar material. If treads are made of concrete, they should be rough-finished with carborundum particles or grit worked into the surface.*

(d) *Walkways and stairways should be clear of all obstructions.*

## HAND-TOOL ACCIDENTS

44. Employee was sticking hogs on the bleeding rail. A hog's foreleg struck the point of the sticking knife, kicking the knife through the operator's fingers, and inflicting a severe cut between employee's thumb and forefinger. Lost 10 days.

(a) *The sticking knife should have had a guard betewen the handle of the knife and the blade to prevent the worker's hands from slipping over the blade.*

(b) *Leather loops nailed to the handle of the knife through which the fingers may be placed will also prevent the hand from slipping off the handle even if the knife is kicked.*

45. An employee's knife slipped while he was trimming hams, severing extensor tendon of left thumb.

*Mesh gloves and wrist guards should be provided and worn for work of this kind.*

46. A co-worker in the green-meats department threw a belly across the cutting table. It struck a grader's arm causing him to cut his fingers. Lost 21 days.

*Throwing cuts of meat or other material should be strictly prohibited.*

47. An employee was tying casings for bologna. When the cord broke his hand slipped over against his knife, which was sticking in the table. Lost 10 days.

(a) *Knives should never be stuck in tables where employee may strike them.*

(b) *String should be cut with a ring knife or with a guarded cutting blade, which should be permanently attached to the table.*

48. Employee was holding a hog's head for another employee to split with a cleaver. The head began to fall off the block and the employee reached for it; the co-worker struck his thumb with the cleaver. Thumb amputated.

*Employees should not be permitted to hold hog's heads while another worker uses a cleaver. If the head must be held for a co-worker, an offset or tong adapted to this kind of work should be used.*

49. A bone shattered when an employee struck it with a cleaver. A splinter from the bone struck the employee's eye. Loss of eye.

*Impact goggles should be provided and required to be worn where any danger of flying bones exists.*

50. An employee slipped on a wet floor while opening a valve with a beef hook. The beef hook ran into his left hand. He was taken to a hospital where death occurred as a result of acute dilatation of the heart and pulmonary edema.

(a) *All valves should be installed so that they can be reached from a regular working surface.*

(b) *Beef hooks are not designed for opening valves and should never be used for that purpose. When a valve is out of reach, a ladder should be used or an extension placed on the valve stem so that it can be operated from the floor level.*

(c) *Floors should have rough surfaces. Wood floors should be painted with a "nonslip" floor paint or covered with antislip floor pads. Concrete floors should be rough-finished with carborundum particles or grit worked into the surface. Brick floors should be made of vertical-grained bricks.*

51. A butcher in the sheep-kill department was cutting forequarters. The foot spreader fell out of position and struck the knife he was using. The knife severely cut his thumb. Lost 6 days.

*Close supervision and proper instruction in job procedure are necessary to prevent accidents of this type.*

52. An employee in the beef-dressing department was "dropping" hide off a carcass. The chain broke allowing the carcass to fall, hitting his knife. Forty-percent loss of use of one finger.

*Frequent inspections and proper maintenance of equipment are necessary to prevent accidents of this type. Worn or defective equipment should be discarded.*

## MISCELLANEOUS ACCIDENTS

53. As a hog was being shackled, the shackling chain caught in a grating on the floor. The hoisting apparatus lifted the grating from its position and the employee fell through the opening to a lower floor. Lost 6 weeks.

*The grating should have been constructed in such a manner that shackles could not be accidentally hooked to it.*

54. While butchering a cow, an employee was struck by the animal when it kicked loose from a shackle. The cow fell on the worker knocking him to the floor, where he struck his head. He died as a result of a fractured skull.

(a) *The cow should not have been shackled and suspended until it was completely stunned.*

(b) *Regular inspection and proper maintenance of shackles is necessary to assure that they are in good working condition.*

55. A laborer, who was working from a ladder, fell to the floor when the ladder slipped. His foot was fractured. Lost 73 days.

(a) *All ladders should be equipped with safety shoes to prevent slipping.*

(b) *Employees should be thoroughly instructed in the proper use of ladders, and supervisors should be required to see that the correct procedures are followed.*

56. When an employee climbed on a barrel to get a package from a shelf, the head of the barrel fell in. The employee fell into the barrel, straining his shoulder. Lost 4 days.

*A stepladder should have been provided. No one should be permitted to stand on barrels.*

57. While moving a barrel an employee cut his finger on a nail in the barrel. First aid was given but employee did not follow treatments. Blood poisoning resulted. Lost 82 days.

(a) *All projecting nails should be removed or bent down as soon as a barrel head is removed.*

(b) *All injuries should be treated promptly at the first-aid room to prevent infection, and the injured employee should be required to report back to the first-aid station as often as may be necessary to make sure that he has followed instructions.*

58. When the knocking-pen door was opened, a cow rolled onto the left foot of the shackler. Foot fractured. Lost 71 days.

(a) *Cattle knockers should make sure that all workers are in the clear before opening the gate of the knocking pen.*

(b) *Workers on the killing floor should stand clear of animals rolling from the knocking pen.*

59. As an employee of the canning department was walking past a cooking kettle the water in the kettle boiled over and scalded the employee's foot. Lost 3 weeks.

(a) *The kettle should not have been so full that it would boil over.*

(b) *Cooking kettles should be placed back from all walkways.*

60. A pail was hung on a leaking hot-water valve to catch the drippings. An employee brushed against the pail causing it to tip, spilling the hot water on his foot. Lost 5 days.

*Instead of hanging a bucket on the valve to catch the drops, the valve should have been repaired. Proper maintenance is necessary to prevent accidents of this type.*

61. As a female employee in the casings department passed a valve on a hot-water line, her apron caught on the valve, opening it. Both legs were scalded and as a result she lost 17 days.

*Valves should never be installed where there is a possibility that they may be accidentally opened. It is particularly important that hot-water and steam valves are not placed along regular passageways.*

62. An employee was using hot water from a hose to wash his shoes. The water went inside his shoes and burned his foot. Lost 15 days.

*Hot water should never be used to clean boots or shoes while they are being worn.*

63. A female table operator used a tank truck in which to wash her apron. A wheel was missing on the truck, and when she put her hand on the truck it tipped and struck her toe. Lost 23 days as a result of fracture.

(a) *No truck with a missing wheel should be continued in service. Frequent inspections and prompt repair of all equipment found to be defective will prevent many accidents.*

(b) *Employees should not be permitted to use tank trucks for washing their work clothes. Facilities should be provided for this purpose.*

64. An employee on an upper floor threw some pig's feet down the wrong chute. They landed on a bench, jumped, and hit a pork trimmer's knife, knocking it out of the worker's hand. The knife fell on the trimmer's foot. Lost 14 days.

*Apparently the employee who placed the material in the chute had not been properly instructed as to which chute to use. A rearrangement of the chutes or of the bench at the foot of the chute might help to avoid future accidents of this type.*

65. An employee of the ham-boning department cut his fingers on the sharp edges of the trays which he was carrying. Lost 4 days.

*All equipment should be inspected frequently. Damaged equipment should be immediately removed from service for repair. The foreman should always watch to see that no trays with sharp or broken edges or corners are in use.*

66. While lifting hogs out of the scalding tank, an employee sustained a hernia. Lost 47 days.

*A mechanical lift, or hoist, should be used to lift hogs from the scalding tank.*

67. An employee in the boiler and engine room was putting boiler compound into the hot-water return system. Some of it splashed into his eye. Lost 3 weeks.

*Goggles, or hoods, and other protective clothing to provide complete body protection should be worn by employees when handling caustic soda, acids, or any cleaning compounds which may cause burns on contact with the skin.*

68. An employee of the lard department was cleaning a pipe with caustic soda. It splashed out of the pipe onto the employee's face and chest. Lost 21 days.

(a) *Whenever possible the use of caustic soda should be eliminated.*

(b) *When caustic soda must be used the user should wear a rubber hood for complete head protection and rubber gloves, rubber jacket, rubber apron, and rubber boots to provide complete body protection.*

# Appendix.—Statistical Tables

**TABLE 1.**—*Injury Rates and Extent of Disability, by Branch of Industry, for 1,114 Slaughtering and Meat-Packing Plants, 1943*

| Branch of industry | Number of establishments | Number of employees | Employee-hours worked (thousands) | Number of disabling injuries | | | | Total days lost | Injury rates [2] | | Average days lost per temporary total disability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total | Resulting in— | | | | | | |
| | | | | | Death and permanent total disability [1] | Permanent partial disability | Temporary total disability | | Frequency | Severity | |
| All branches [3] | 1,114 | 168,904 | 391,346 | 15,272 | (2) 28 | 376 | 14,868 | 658,908 | 39.0 | 1.7 | 13 |
| Slaughtering and meat packing, integrated | 389 | 99,370 | 231,318 | 11,258 | 10 | 245 | 11,003 | 413,409 | 48.7 | 1.8 | 12 |
| Slaughtering only | 177 | 3,866 | 8,200 | 496 | 1 | 12 | 483 | 31,833 | 60.5 | 3.9 | 14 |
| Meat packing only | 400 | 18,142 | 40,744 | 1,209 | (2) 9 | 24 | 1,176 | 88,097 | 29.7 | 2.2 | 11 |
| Casings | 15 | 2,241 | 4,885 | 85 | 0 | 2 | 83 | 7,614 | 17.4 | 1.6 | 7 |
| Poultry | 83 | 4,955 | 10,028 | 317 | 1 | 3 | 313 | 10,332 | 31.6 | 1.0 | 11 |

[1] Figures in parentheses indicate the number of permanent total disabilities included.
[2] The frequency rate is the average number of disabling injuries for each million employee-hours worked. The severity rate is the average number of days lost for each thousand employee-hours worked
[3] Totals include reports for 50 establishments from which data by branch of industry were not received.

TABLE 2.—*Injury Rates and Extent of Disability, by Branch of Industry and Department, for 1,064 Slaughtering and Meat-Packing Plants, 1943*[1]

| Branch of industry and department[2] | Number of units reporting | Number of employees | Employee-hours worked (thousands) | Number of disabling injuries | | | | Total days lost | Injury rates[4] | | Average days lost per temporary total disability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total | Resulting in— | | | | Frequency | Severity | |
| | | | | | Death and permanent total disability[3] | Permanent partial disability | Temporary total disability | | | | |
| Slaughtering and meat packing, integrated: Total | [1]389 | 99,379 | 231,318 | 11,258 | 10 | 245 | 11,003 | 413,409 | 48.7 | 1.8 | 12 |
| Livestock | 175 | 880 | 2,031 | 65 | 0 | 1 | 64 | 1,370 | 32.0 | .7 | 12 |
| Hog dressing and coolers | 257 | 8,521 | 19,886 | 1,632 | 1 | 21 | 1,610 | 37,559 | 82.1 | 1.9 | 11 |
| Hog cutting | 138 | 6,847 | 15,897 | 1,124 | 0 | 30 | 1,094 | 37,767 | 70.7 | 2.4 | 12 |
| Edible rendering | 105 | 547 | 1,581 | 64 | 0 | 4 | 60 | 9,512 | 40.5 | 6.0 | 10 |
| Beef dressing | 202 | 4,292 | 9,843 | 921 | 1 | 27 | 893 | 38,124 | 93.6 | 3.9 | 12 |
| Beef coolers | 127 | 1,272 | 3,069 | 172 | 0 | 4 | 168 | 3,741 | 56.0 | 1.2 | 12 |
| Beef cutting and boning | 160 | 3,036 | 7,165 | 508 | 0 | 11 | 497 | 10,302 | 70.9 | 1.4 | 12 |
| Oleo oil house and tallow rendering | 38 | 400 | 945 | 69 | 0 | 2 | 67 | 1,311 | 73.0 | 1.4 | 11 |
| Small stock dressing and coolers | 98 | 2,022 | 5,101 | 466 | 0 | 8 | 458 | 15,836 | 91.3 | 3.1 | 10 |
| Dressing, not classified | 43 | 1,005 | 2,388 | 273 | 0 | 2 | 271 | 3,611 | 114.3 | 1.5 | 11 |
| Curing cellars | 164 | 4,730 | 11,385 | 553 | 0 | 9 | 544 | 15,018 | 48.6 | 1.3 | 13 |
| Hide cellars | 122 | 1,321 | 3,017 | 171 | 0 | 2 | 169 | 2,415 | 56.7 | .8 | 11 |
| Inedible rendering | 158 | 2,056 | 5,027 | 352 | 2 | 5 | 345 | 23,848 | 70.0 | 4.7 | 12 |
| Sausage | 225 | 8,694 | 20,001 | 951 | 3 | 25 | 923 | 55,787 | 47.5 | 2.8 | 14 |
| Smoked meat processing and packing | 139 | 4,223 | 9,932 | 379 | 0 | 10 | 369 | 11,109 | 38.2 | 1.1 | 13 |
| Lard refinery | 52 | 987 | 2,333 | 111 | 0 | 2 | 109 | 3,354 | 47.6 | 1.4 | 12 |
| Canning | 28 | 4,296 | 9,298 | 299 | 2 | 7 | 290 | 25,777 | 32.2 | 2.8 | 14 |
| Boiler and engine room | 190 | 1,426 | 3,408 | 82 | 0 | 2 | 80 | 3,807 | 24.1 | 1.1 | 21 |
| Cooperage and box | 26 | 612 | 1,509 | 112 | 0 | 4 | 108 | 9,995 | 74.2 | 6.6 | 13 |
| Maintenance | 186 | 4,167 | 9,874 | 492 | 0 | 11 | 481 | 19,896 | 49.8 | 2.0 | 14 |
| Office (including sales) | 259 | 10,676 | 23,729 | 41 | | 1 | 40 | 4,520 | 1.7 | .2 | 13 |
| Shipping | 241 | 7,443 | 17,577 | 838 | 0 | 15 | 823 | 22,785 | 47.7 | 1.3 | 13 |
| Watchmen | 150 | 1,257 | 2,969 | 47 | 0 | 1 | 46 | 1,008 | 15.8 | .3 | 15 |
| Not elsewhere classified | 116 | 2,854 | 6,617 | 287 | 0 | 5 | 282 | 6,381 | 43.4 | 1.0 | 14 |
| Slaughtering only: Total | [1]177 | 3,866 | 8,200 | 496 | 1 | 12 | 483 | 31,833 | 60.5 | 3.9 | 14 |
| Hog dressing and coolers | 33 | 588 | 1,247 | 142 | 0 | 4 | 138 | 4,151 | 113.9 | 3.3 | 11 |
| Beef dressing and coolers | 136 | 1,028 | 2,119 | 161 | 0 | 2 | 159 | 6,425 | 76.0 | 3.0 | 13 |
| Not elsewhere classified | 508 | 2,250 | 4,834 | 193 | 1 | 6 | 186 | 21,257 | 39.9 | 4.4 | 16 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Meat packing only: Total | [4]00 | 18,142 | 40,744 | 1,209 | (2) 9 | 24 | 1,176 | 88,097 | 29.7 | 2.2 | 11 |
| Hog cutting, including coolers | 41 | 498 | 1,148 | 51 | 0 | 1 | 50 | 740 | 44.4 | .6 | 9 |
| Beef cutting and boning, including coolers | 122 | 729 | 1,539 | 89 | 0 | 3 | 86 | 1,988 | 57.8 | 1.3 | 13 |
| Curing cellars | 72 | 439 | 947 | 49 | 0 | 0 | 49 | 365 | 51.7 | .4 | 7 |
| Sausage | 244 | 4,583 | 10,326 | 297 | (1) 2 | 4 | 291 | 21,659 | 28.8 | 2.1 | 10 |
| Smoked meat processing and packing | 108 | 1,172 | 2,677 | 52 | 0 | 2 | 50 | 1,682 | 19.4 | .6 | 13 |
| Canning | 43 | 2,843 | 5,682 | 197 | 0 | 7 | 190 | 8,206 | 34.7 | 1.4 | 12 |
| Office (including sales) | 215 | 1,995 | 4,512 | 7 | 1 | 0 | 6 | 6,037 | 1.6 | 1.3 | 6 |
| Shipping | 160 | 1,428 | 3,313 | 88 | 0 | 2 | 86 | 3,779 | 26.6 | 1.1 | 9 |
| Not elsewhere classified | 272 | 1,306 | 3,000 | 91 | (1) 5 | 2 | 84 | 31,525 | 30.3 | 10.5 | 11 |
| Casings | 15 | 2,241 | 4,885 | 85 | 0 | 2 | 83 | 7,614 | 17.4 | 1.6 | 7 |
| Poultry | 83 | 4,955 | 10,028 | 317 | 1 | 3 | 313 | 10,332 | 31.6 | 1.0 | 11 |

[1] Does not include reports for 50 establishments from which figures by branch of industry and department were not received.
[2] Totals include figures for items not shown separately because of insufficient data.
[3] Figures in parentheses indicate the number of permanent total disability cases included.
[4] The frequency rate is the average number of disabling injuries for each million employee-hours worked. The severity rate is the average number of days lost for each thousand employee-hours worked.
[5] Number of plants reporting.

TABLE 3.—*Injury Rates and Extent of Disability, by Geographic Area, State, and Branch of Industry, for 1,064 Slaughtering and Meat-Packing Establishments, 1943*[1]

| Geographic area, State, and branch of industry [2] | Number of establishments | Number of employees | Employee-hours worked (thousands) | Number of disabling injuries | | | | Total days lost | Injury rates [4] | | Average days lost per temporary total disability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total | Resulting in— | | | | Frequency | Severity | |
| | | | | | Death and permanent total disability [3] | Permanent partial disability | Temporary total disability | | | | |
| **New England: Total** | 71 | 4,657 | 11,330 | 544 | 1 | 8 | 535 | 24,249 | 48.0 | 2.1 | 14 |
| Slaughtering and meat packing, integrated | 12 | 2,779 | 7,056 | 402 | 0 | 2 | 400 | 7,897 | 57.0 | 1.1 | 12 |
| Meat packing only | 49 | 1,763 | 4,026 | 132 | 1 | 5 | 126 | 12,093 | 32.8 | 3.0 | 17 |
| Connecticut: Total | 9 | 413 | 995 | 47 | 0 | 1 | 46 | 1,059 | 47.3 | 1.1 | 10 |
| Maine: Total | 6 | 456 | 1,228 | 27 | 0 | 4 | 23 | 4,320 | 22.0 | 3.5 | 31 |
| Meat packing only | 5 | 440 | 1,194 | 27 | 0 | 4 | 23 | 4,320 | 22.6 | 3.6 | 31 |
| Massachusetts: Total | 45 | 3,458 | 8,388 | 412 | 0 | 2 | 410 | 8,128 | 49.1 | 1.0 | 13 |
| Slaughtering and meat packing, integrated | 8 | 2,332 | 6,022 | 348 | 0 | 1 | 347 | 6,681 | 57.8 | 1.1 | 12 |
| Meat packing only | 31 | 1,044 | 2,186 | 59 | 0 | 1 | 58 | 1,364 | 27.0 | .6 | 18 |
| **Middle Atlantic: Total** | 259 | 16,785 | 36,980 | 1,499 | (2) 7 | 44 | 1,448 | 113,209 | 40.5 | 3.1 | 13 |
| Slaughtering and meat packing, integrated | 84 | 9,340 | 19,743 | 990 | 1 | 32 | 957 | 62,427 | 50.1 | 3.2 | 12 |
| Slaughtering only | 43 | 646 | 1,400 | 70 | 0 | 5 | 65 | 3,251 | 50.0 | 2.3 | 21 |
| Meat packing only | 120 | 5,980 | 13,935 | 398 | (2) 5 | 7 | 386 | 41,078 | 28.6 | 2.9 | 14 |
| Poultry | 5 | 718 | 1,694 | 40 | 1 | 0 | 39 | 6,433 | 23.6 | 3.8 | 11 |
| New Jersey: Total | 30 | 2,303 | 5,361 | 149 | (1) 2 | 5 | 142 | 16,616 | 27.8 | 3.1 | 19 |
| Slaughtering and meat packing, integrated | 3 | 513 | 1,199 | 27 | 0 | 0 | 27 | 487 | 22.5 | .4 | 18 |
| Meat packing only | 18 | 1,366 | 3,218 | 58 | (1) 2 | 0 | 56 | 12,968 | 18.0 | 4.0 | 17 |
| New York: Total | 80 | 4,505 | 9,546 | 501 | 1 | 26 | 474 | 47,307 | 52.5 | 5.0 | 13 |
| Slaughtering and meat packing, integrated | 17 | 2,625 | 5,562 | 371 | 0 | 24 | 347 | 38,756 | 66.7 | 7.0 | 12 |
| Meat packing only | 47 | 1,430 | 2,943 | 118 | 1 | 2 | 115 | 8,334 | 40.1 | 2.8 | 12 |
| Pennsylvania: Total | 149 | 9,977 | 22,073 | 849 | (1) 4 | 13 | 832 | 49,286 | 38.5 | 2.2 | 12 |
| Slaughtering and meat packing, integrated | 64 | 6,202 | 12,982 | 592 | 1 | 8 | 583 | 23,184 | 45.6 | 1.8 | 12 |
| Meat packing only | 55 | 3,184 | 7,774 | 222 | (1) 2 | 5 | 215 | 19,776 | 28.6 | 2.5 | 13 |
| **East North Central: Total** | 272 | 42,221 | 98,522 | 4,137 | 5 | 57 | 4,075 | 131,104 | 42.0 | 1.3 | 12 |
| Slaughtering and meat packing, integrated | 112 | 33,340 | 79,382 | 3,558 | 3 | 50 | 3,505 | 102,393 | 44.8 | 1.3 | 13 |
| Slaughtering only | 46 | 846 | 1,719 | 91 | 1 | 1 | 89 | 7,192 | 52.9 | 4.2 | 10 |
| Meat packing only | 103 | 5,739 | 12,382 | 333 | 1 | 4 | 328 | 13,423 | 26.9 | 1.1 | 7 |
| Casings | 5 | 2,048 | 4,479 | 81 | 0 | 2 | 79 | 7,550 | 18.1 | 1.7 | 7 |

| | | | |
|---|---|---|---|
| Illinois: Total | 79 | 20,652 | 47,545 |
| Slaughtering and meat packing, integrated | 20 | 14,193 | 33,883 |
| Slaughtering only | 5 | 492 | 948 |
| Meat packing only | 48 | 3,790 | 7,970 |
| Casings | 4 | 2,036 | 4,447 |
| Indiana: Total | 30 | 5,231 | 12,248 |
| Slaughtering and meat packing, integrated | 23 | 4,889 | 11,475 |
| Michigan: Total | 33 | 3,744 | 9,066 |
| Slaughtering and meat packing, integrated | 13 | 3,097 | 7,574 |
| Meat packing only | 16 | 601 | 1,382 |
| Ohio: Total | 95 | 5,594 | 13,612 |
| Slaughtering and meat packing, integrated | 50 | 4,800 | 11,839 |
| Meat packing only | 14 | 642 | 1,445 |
| Wisconsin: Total | 35 | 7,000 | 16,052 |
| Slaughtering and meat packing, integrated | 6 | 6,361 | 14,611 |
| Meat packing only | 24 | 501 | 1,116 |
| **West North Central: Total** | **161** | **41,200** | **93,389** |
| Slaughtering and meat packing, integrated | 52 | 36,409 | 83,105 |
| Slaughtering only | 23 | 977 | 2,048 |
| Meat packing only | 29 | 1,127 | 2,495 |
| Poultry | 47 | 2,687 | 5,721 |
| Iowa: Total | 42 | 12,033 | 27,054 |
| Slaughtering and meat packing, integrated | 13 | 10,792 | 24,648 |
| Poultry | 19 | 875 | 1,627 |
| Kansas: Total | 34 | 6,049 | 13,489 |
| Slaughtering and meat packing, integrated | 12 | 4,939 | 10,976 |
| Poultry | 14 | 706 | 1,611 |
| Minnesota: Total | 16 | 8,585 | 19,328 |
| Slaughtering and meat packing, integrated | 5 | 8,023 | 18,326 |
| Missouri: Total | 32 | 7,780 | 18,127 |
| Slaughtering and meat packing, integrated | 14 | 6,742 | 15,637 |
| Poultry | 3 | 685 | 1,778 |
| Nebraska: Total | 11 | 3,224 | 7,862 |
| Slaughtering and meat packing, integrated | 4 | 2,735 | 6,753 |
| South Dakota: Total | 12 | 3,440 | 7,337 |
| Slaughtering and meat packing, integrated | 3 | 3,170 | 6,747 |
| **South Atlantic: Total** | **85** | **6,494** | **15,339** |
| Slaughtering and meat packing, integrated | 34 | 4,476 | 10,627 |
| Meat packing only | 30 | 1,218 | 2,960 |
| Poultry | 6 | 617 | 1,325 |
| Delaware: Total | 5 | 823 | 1,805 |
| Poultry | 3 | 532 | 1,150 |
| Georgia: Total | 5 | 1,510 | 3,622 |
| Slaughtering and meat packing, integrated | 3 | 1,395 | 3,294 |
| Maryland: Total | 23 | 1,607 | 4,273 |
| Slaughtering and meat packing, integrated | 8 | 1,001 | 2,812 |
| Meat packing only | 9 | 533 | 1,298 |
| Virginia: Total | 12 | 1,337 | 2,896 |
| Slaughtering and meat packing, integrated | 4 | 1,084 | 2,320 |

See footnotes at end of table.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1,970 | 2 | 20 | 1,948 | 53,278 | 41.4 | 1.1 | 12 |
| 1,560 | 0 | 16 | 1,544 | 30,726 | 46.0 | .9 | 14 |
| 30 | 1 | 0 | 29 | 6,253 | 31.7 | 6.6 | 9 |
| 235 | 1 | 2 | 232 | 8,403 | 29.5 | 1.1 | 6 |
| 81 | 0 | 2 | 79 | 7,550 | 18.2 | 1.7 | 7 |
| 471 | 0 | 17 | 454 | 22,975 | 38.5 | 1.9 | 13 |
| 443 | 0 | 17 | 426 | 22,643 | 38.6 | 2.0 | 14 |
| 524 | 2 | 2 | 520 | 19,762 | 57.8 | 2.2 | 14 |
| 506 | 2 | 2 | 502 | 19,582 | 66.8 | 2.6 | 14 |
| 16 | 0 | 0 | 16 | 164 | 11.6 | .1 | 10 |
| 470 | 1 | 11 | 458 | 23,709 | 34.5 | 1.7 | 13 |
| 427 | 1 | 9 | 417 | 18,953 | 36.1 | 1.6 | 13 |
| 34 | 0 | 2 | 32 | 4,462 | 23.5 | 3.1 | 5 |
| 702 | 0 | 7 | 695 | 11,380 | 43.7 | .7 | 9 |
| 622 | 0 | 6 | 616 | 10,489 | 42.3 | .7 | 10 |
| 33 | 0 | 0 | 33 | 334 | 29.6 | .3 | 10 |
| 4,227 | 5 | 124 | 4,098 | 178,054 | 45.3 | 1.9 | 12 |
| 3,800 | 4 | 118 | 3,678 | 165,317 | 45.7 | 2.0 | 12 |
| 189 | 0 | 0 | 189 | 1,924 | 92.3 | .9 | 10 |
| 64 | 1 | 3 | 60 | 7,787 | 25.7 | 3.1 | 15 |
| 174 | 0 | 3 | 171 | 3,026 | 30.4 | .5 | 12 |
| 1,159 | 0 | 24 | 1,135 | 29,404 | 42.8 | 1.1 | 11 |
| 1,027 | 0 | 24 | 1,003 | 28,311 | 41.7 | 1.1 | 11 |
| 39 | 0 | 0 | 39 | 293 | 24.0 | .2 | 8 |
| 510 | 2 | 8 | 500 | 23,865 | 37.8 | 1.8 | 14 |
| 418 | 1 | 6 | 411 | 16,352 | 38.1 | 1.5 | 14 |
| 67 | 0 | 1 | 66 | 1,017 | 41.6 | .6 | 11 |
| 944 | 0 | 43 | 901 | 48,979 | 48.8 | 2.5 | 16 |
| 870 | 0 | 43 | 827 | 48,128 | 47.5 | 2.6 | 16 |
| 970 | 2 | 22 | 946 | 44,047 | 53.5 | 2.4 | 12 |
| 897 | 2 | 19 | 876 | 41,990 | 57.4 | 2.7 | 12 |
| 46 | 0 | 2 | 44 | 1,445 | 25.9 | .8 | 19 |
| 453 | 0 | 14 | 439 | 9,316 | 57.6 | 1.2 | 9 |
| 421 | 0 | 13 | 408 | 8,370 | 62.3 | 1.2 | 8 |
| 177 | 1 | 12 | 164 | 21,597 | 24.1 | 2.9 | 10 |
| 162 | 1 | 12 | 149 | 21,485 | 24.0 | 3.2 | 10 |
| 984 | 0 | 9 | 975 | 20,473 | 64.2 | 1.3 | 7 |
| 804 | 0 | 7 | 797 | 14,657 | 75.7 | 1.4 | 7 |
| 162 | 0 | 0 | 162 | 752 | 54.7 | .3 | 5 |
| 11 | 0 | 0 | 11 | 76 | 8.3 | .1 | 7 |
| 17 | 0 | 1 | 16 | 4,201 | 9.4 | 2.3 | 13 |
| 6 | 0 | 0 | 6 | 65 | 5.2 | .1 | 11 |
| 429 | 0 | 2 | 427 | 4,152 | 118.4 | 1.1 | 8 |
| 423 | 0 | 2 | 421 | 4,128 | 128.4 | 1.3 | 8 |
| 302 | 0 | 3 | 299 | 5,502 | 70.7 | 1.3 | 5 |
| 209 | 0 | 3 | 206 | 5,106 | 74.3 | 1.8 | 6 |
| 93 | 0 | 0 | 93 | 396 | 71.6 | .3 | 4 |
| 113 | 0 | 1 | 112 | 2,348 | 39.0 | .8 | 5 |
| 103 | 0 | 0 | 103 | 391 | 44.4 | .2 | 4 |

TABLE 8.—*Injury Rates and Extent of Disability, by Geographic Area, State, and Branch of Industry, for 1,064 Slaughtering and Meat-Packing Establishments, 1943*[1]—Continued

| Geographic area, State, and branch of industry [2] | Number of establishments | Number of employees | Employee-hours worked (thousands) | Number of disabling injuries | | | | Total days lost | Injury rates [4] | | Average days lost per temporary total disability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total | Resulting in— | | | | Frequency | Severity | |
| | | | | | Death and permanent total disability [3] | Permanent partial disability | Temporary total disability | | | | |
| **East South Central: Total** | 31 | 2,919 | 6,728 | 429 | 0 | 14 | 415 | 12,502 | 63.8 | 1.9 | 12 |
| Slaughtering and meat packing, integrated | 18 | 2,586 | 6,016 | 408 | 0 | 12 | 396 | 11,193 | 67.8 | 1.9 | 12 |
| Alabama: Total | 10 | 443 | 1,014 | 42 | 0 | 0 | 42 | 500 | 41.4 | .5 | 12 |
| Kentucky: Total | 10 | 490 | 1,159 | 58 | 0 | 2 | 56 | 1,462 | 50.0 | 1.3 | 10 |
| Slaughtering and meat packing, integrated | 5 | 412 | 1,039 | 53 | 0 | 1 | 52 | 1,084 | 51.0 | 1.0 | 9 |
| Tennessee: Total | 10 | 1,964 | 4,532 | 329 | 0 | 12 | 317 | 10,540 | 72.6 | 2.3 | 12 |
| Slaughtering and meat packing, integrated | 8 | 1,802 | 4,170 | 313 | 0 | 11 | 302 | 9,609 | 75.1 | 2.3 | 12 |
| **West South Central: Total** | 51 | 5,237 | 12,554 | 576 | 2 | 12 | 562 | 28,526 | 45.9 | 2.3 | 12 |
| Slaughtering and meat packing, integrated | 29 | 3,932 | 9,781 | 493 | 1 | 11 | 481 | 19,593 | 50.4 | 2.0 | 11 |
| Slaughtering only | 6 | 483 | 1,069 | 38 | 0 | 0 | 38 | 539 | 35.6 | .5 | 14 |
| Meat packing only | 14 | 742 | 1,634 | 44 | 1 | 1 | 42 | 8,374 | 26.9 | 5.1 | 14 |
| Louisiana: Total | 11 | 741 | 1,609 | 31 | 0 | 0 | 31 | 408 | 19.3 | .3 | 13 |
| Meat packing only | 7 | 399 | 931 | 15 | 0 | 0 | 15 | 198 | 16.1 | .2 | 13 |
| Texas: Total | 28 | 4,109 | 9,980 | 514 | 2 | 11 | 501 | 27,307 | 51.5 | 2.7 | 11 |
| Slaughtering and meat packing, integrated | 15 | 3,370 | 8,447 | 449 | 1 | 10 | 438 | 18,659 | 53.2 | 2.2 | 11 |
| **Mountain: Total** | 27 | 2,476 | 5,046 | 263 | 0 | 9 | 259 | 17,588 | 53.1 | 3.5 | 9 |
| Slaughtering and meat packing, integrated | 12 | 1,753 | 4,105 | 241 | 0 | 7 | 234 | 10,878 | 58.7 | 2.6 | 8 |
| Colorado: Total | 11 | 1,666 | 3,156 | 148 | 0 | 6 | 142 | 14,696 | 46.9 | 4.7 | 10 |
| Slaughtering and meat packing, integrated | 2 | 1,026 | 2,384 | 128 | 0 | 4 | 124 | 8,062 | 53.7 | 3.4 | 10 |
| Utah: Total | 9 | 546 | 1,267 | 89 | 0 | 1 | 88 | 1,193 | 70.2 | .9 | 7 |
| Slaughtering and meat packing, integrated | 3 | 463 | 1,099 | 82 | 0 | 1 | 81 | 1,117 | 74.6 | 1.0 | 6 |
| **Pacific: Total** | 116 | 6,566 | 15,233 | 698 | 1 | 9 | 688 | 25,555 | 45.8 | 1.7 | 13 |
| Slaughtering and meat packing, integrated | 36 | 4,764 | 11,502 | 562 | 1 | 6 | 555 | 19,054 | 48.9 | 1.7 | 13 |
| Slaughtering only | 26 | 494 | 1,035 | 77 | 0 | 2 | 75 | 5,511 | 74.4 | 5.3 | 16 |
| Meat packing only | 36 | 912 | 1,953 | 39 | 0 | 1 | 38 | 715 | 20.0 | .4 | 11 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| California: Total | 93 | 5,573 | 12,955 | 506 | 1 | 6 | 499 | 19,400 | 39.1 | 1.5 | 15 |
| Slaughtering and meat packing, integrated | 24 | 3,925 | 9,545 | 386 | 1 | 5 | 380 | 13,581 | 40.4 | 1.4 | 15 |
| Slaughtering only | 23 | 451 | 933 | 76 | 0 | 1 | 75 | 5,211 | 81.5 | 5.6 | 16 |
| Meat packing only | 29 | 806 | 1,745 | 24 | 0 | 0 | 24 | 333 | 13.8 | .2 | 14 |
| Oregon: Total | 13 | 512 | 1,211 | 105 | 0 | 1 | 104 | 1,099 | 86.7 | .9 | 8 |
| Slaughtering and meat packing, integrated | 8 | 468 | 1,133 | 104 | 0 | 0 | 104 | 799 | 91.8 | .7 | 8 |
| Washington: Total | 10 | 481 | 1,067 | 87 | 0 | 2 | 85 | 5,056 | 81.5 | 4.7 | 9 |

[1] Does not include reports from 50 establishments from which figures by State and branch of industry were not received.
[2] Totals include figures for items not shown separately because of insufficient data.
[3] Figures in parentheses indicate the number of permanent total disability cases included.
[4] The frequency rate is the average number of disabling injuries for each million employee-hours worked. The severity rate is the average number of days lost for each thousand employee-hours worked.

TABLE 4.—*Injury Rates and Extent of Disability, by Branch of Industry and Size of Establishment, for 966 Slaughtering and Meat-Packing Plants, 1943*[1]

| Branch of industry and size of plant | Number of units reporting | Number of employees | Employee-hours worked (thousands) | Number of disabling injuries | | | | Total days lost | Injury rates[3] | | Average days lost per temporary total disability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total | Resulting in— | | | | Frequency | Severity | |
| | | | | | Death and permanent total disability[2] | Permanent partial disability | Temporary total disability | | | | |
| Slaughtering and meat packing, integrated: Total | 389 | 99,379 | 231,318 | 11,258 | 10 | 245 | 11,003 | 413,409 | 48.7 | 1.8 | 12 |
| 1 to 24 employees | 143 | 1,662 | 3,561 | 112 | 0 | 8 | 104 | 11,343 | 31.5 | 3.2 | 13 |
| 25 to 49 employees | 72 | 2,544 | 5,705 | 257 | 0 | 7 | 250 | 15,380 | 45.0 | 2.7 | 10 |
| 50 to 99 employees | 56 | 3,898 | 8,979 | 379 | 0 | 9 | 370 | 11,955 | 42.2 | 1.3 | 13 |
| 100 to 249 employees | 52 | 8,252 | 19,509 | 1,149 | 0 | 21 | 1,128 | 32,676 | 58.9 | 1.7 | 12 |
| 250 to 499 employees | 22 | 8,925 | 20,634 | 1,179 | 0 | 10 | 1,169 | 20,856 | 57.1 | 1.0 | 11 |
| 500 to 749 employees | 10 | 6,276 | 14,687 | 1,119 | 1 | 15 | 1,103 | 23,951 | 76.2 | 1.6 | 11 |
| 750 to 999 employees | 11 | 9,651 | 22,444 | 893 | 2 | 10 | 881 | 29,364 | 39.8 | 1.3 | 10 |
| 1,000 to 2,499 employees | 14 | 23,452 | 55,291 | 2,891 | 6 | 73 | 2,812 | 142,742 | 52.3 | 2.6 | 12 |
| 2,500 employees and over | 9 | 34,719 | 80,508 | 3,279 | 1 | 92 | 3,186 | 125,142 | 40.7 | 1.6 | 14 |
| Slaughtering only: Total | 177 | 3,866 | 8,200 | 496 | 1 | 12 | 483 | 31,833 | 60.5 | 3.9 | 14 |
| 1 to 24 employees | 131 | 944 | 1,898 | 74 | 0 | 3 | 71 | 8,803 | 39.0 | 4.6 | 21 |
| 25 to 49 employees | 26 | 851 | 1,833 | 115 | 0 | 4 | 111 | 11,667 | 62.7 | 6.4 | 14 |
| 50 to 99 employees | 11 | 743 | 1,598 | 143 | 0 | 5 | 138 | 3,564 | 89.5 | 2.2 | 12 |
| 100 employees and over | 9 | 1,328 | 2,871 | 164 | 1 | 0 | 163 | 7,799 | 57.1 | 2.7 | 11 |
| Meat packing only: Total | 400 | 18,142 | 40,744 | 1,209 | (2) 9 | 24 | 1,176 | 88,097 | 29.7 | 2.2 | 11 |
| 1 to 9 employees | 124 | 573 | 1,168 | 10 | 0 | 2 | 8 | 836 | 8.6 | .7 | 30 |
| 10 to 24 employees | 112 | 1,789 | 4,036 | 76 | 1 | 0 | 75 | 6,721 | 18.8 | 1.7 | 10 |
| 25 to 49 employees | 73 | 2,536 | 5,382 | 124 | 1 | 3 | 120 | 9,677 | 23.0 | 1.8 | 8 |
| 50 to 99 employees | 52 | 3,579 | 7,802 | 316 | 2 | 4 | 310 | 18,581 | 40.5 | 2.4 | 11 |
| 100 to 249 employees | 30 | 4,530 | 9,909 | 290 | (1) 2 | 5 | 283 | 24,038 | 29.3 | 2.4 | 11 |
| 250 to 499 employees | 6 | 1,914 | 4,802 | 191 | 0 | 6 | 185 | 6,000 | 39.8 | 1.2 | 10 |
| 500 employees and over | 3 | 3,221 | 7,645 | 202 | (1) 3 | 4 | 195 | 22,244 | 26.4 | 2.9 | 12 |

[1] Does not include figures for 50 establishments from which information on branch of industry and size of plant were not received.
[2] Figures in parentheses indicate the number of permanent total disability cases included.
[3] The frequency rate is the average number of disabling injuries for each million employee-hours worked. The severity rate is the average number of days lost for each thousand employee-hours worked.

TABLE 5.—*Distribution of Injury Rates in 966 Slaughtering and Meat-Packing Plants, by Branch of Industry and Size of Establishment, 1943*

| Branch of industry and size of plant | Total number of establishments | Number of establishments with frequency rates of— | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 to 10 | 11 to 20 | 21 to 30 | 31 to 40 | 41 to 50 | 51 to 60 | 61 to 70 | 71 to 80 | 81 to 90 | 91 to 100 | 101 to 200 | 201 and over |
| Slaughtering and meat packing, integrated: | | | | | | | | | | | | | | |
| Total | 389 | 134 | 9 | 27 | 36 | 21 | 31 | 25 | 19 | 12 | 12 | 21 | 35 | 7 |
| 1 to 24 employees | 143 | 91 | | 1 | 6 | 5 | 5 | 3 | 3 | 3 | 3 | 9 | 10 | 4 |
| 25 to 49 employees | 72 | 24 | | 6 | 10 | 7 | 7 | 3 | 1 | 2 | | 3 | 7 | 2 |
| 50 to 99 employees | 56 | 14 | 2 | 8 | 5 | 1 | 5 | 6 | 5 | | 1 | 5 | 3 | 1 |
| 100 to 249 employees | 52 | 5 | 4 | 3 | 4 | 3 | 8 | 4 | 3 | 4 | 4 | 3 | 7 | |
| 250 to 499 employees | 22 | | 1 | 2 | 5 | 1 | 3 | 2 | 2 | 1 | 1 | | 4 | |
| 500 to 749 employees | 10 | | | 1 | 1 | | 1 | 1 | 2 | | 1 | | 3 | |
| 750 to 999 employees | 11 | | 2 | 2 | 1 | 2 | | 1 | | 1 | 1 | 1 | | |
| 1,000 to 2,499 employees | 14 | | | 2 | 1 | 1 | 1 | 5 | 1 | 1 | 1 | | 1 | |
| 2,500 employees and over | 9 | | | 2 | 3 | 1 | 1 | | 2 | | | | | |
| Slaughtering only: Total | 177 | 108 | | 5 | 4 | 7 | 7 | 5 | 1 | 4 | 4 | 4 | 19 | 9 |
| 1 to 24 employees | 131 | 99 | | | 2 | | 4 | 1 | | 2 | 2 | 2 | 13 | 6 |
| 25 to 49 employees | 26 | 5 | | 4 | | 4 | 2 | 3 | | 2 | 1 | | 3 | 2 |
| 50 to 99 employees | 11 | 1 | | | 2 | 2 | | | 1 | | 1 | 1 | 2 | 1 |
| 100 employees and over | 9 | 3 | | 1 | | 1 | 1 | 1 | | | | 1 | 1 | |
| Meat packing only: Total | 400 | 248 | 7 | 20 | 29 | 23 | 9 | 15 | 16 | 7 | 1 | 7 | 15 | 3 |
| 1 to 9 employees | 124 | 116 | | | | | | 1 | 2 | | | 1 | 3 | 1 |
| 10 to 24 employees | 112 | 75 | | | 10 | 9 | 1 | 4 | 6 | 2 | 1 | 1 | 2 | 1 |
| 25 to 49 employees | 73 | 39 | 2 | 4 | 6 | 5 | 4 | 3 | 3 | 1 | | 1 | 5 | |
| 50 to 99 employees | 52 | 15 | 2 | 4 | 7 | 3 | 2 | 6 | 4 | 2 | | 2 | 4 | 1 |
| 100 to 249 employees | 30 | 3 | 2 | 11 | 3 | 4 | 2 | 1 | 1 | 1 | | 1 | 1 | |
| 250 to 499 employees | 6 | | 1 | 1 | 1 | 1 | | | | 1 | | 1 | | |
| 500 employees and over | 3 | | | | 2 | 1 | | | | | | | | |

TABLE 6.—*Disabling Injuries and Extent of Disability, by Nature of Injury, for 30 Slaughtering and Meat-Packing Establishments, 1943*

| Nature of injury | Number of disabling injuries | | | | | Average number of days lost per temporary total disability |
|---|---|---|---|---|---|---|
| | Total | | Resulting in— | | | |
| | Number | Percent [1] | Death | Permanent partial disability | Temporary total disability | |
| All disabling injuries | 5,239 | 100.0 | 8 | 181 | 5,050 | 13 |
| Dust particles in eye | 79 | 1.5 | 0 | 0 | 79 | 6 |
| With infection | 2 | (2) | 0 | 0 | 2 | 10 |
| Without infection | 77 | 1.5 | 0 | 0 | 77 | 6 |
| Amputations | 65 | 1.2 | 0 | 64 | 1 | 62 |
| With infection | 1 | (2) | 0 | 1 | 0 | 0 |
| Without infection | 64 | 1.2 | 0 | 63 | [3] 1 | 62 |
| Burns and scalds | 240 | 4.6 | 1 | 0 | 239 | 13 |
| With infection | 17 | .3 | 0 | 0 | 17 | 13 |
| Without infection | 223 | 4.3 | 1 | 0 | 222 | 13 |
| Cuts and lacerations | 1,798 | 34.4 | 1 | 55 | 1,742 | 11 |
| With infection | 465 | 8.9 | 1 | 8 | 456 | 12 |
| Without infection | 1,333 | 25.5 | 0 | 47 | 1,286 | 10 |
| Strains and sprains | 1,045 | 20.0 | 0 | 3 | 1,042 | 12 |
| Bruises | 1,424 | 27.2 | 0 | 13 | 1,411 | 11 |
| With infection | 58 | 1.1 | 0 | 0 | 58 | 18 |
| Without infection | 1,366 | 26.1 | 0 | 13 | 1,353 | 11 |
| Fractures | 380 | 7.3 | 4 | 44 | 332 | 31 |
| Hernia | 102 | 1.9 | 0 | 0 | 102 | 50 |
| Industrial disease | 59 | 1.1 | 0 | 0 | 59 | 22 |
| Dislocations | 14 | .3 | 0 | 2 | 12 | 21 |
| Other | 26 | .5 | 1 | 0 | 25 | 7 |
| Unknown | 7 | ---------- | 1 | 0 | 6 | 10 |

[1] Percent based on known cases only.
[2] Amputation of part of toe other than great toe.
[3] Less than 0.05.

TABLE 7.—*Disabling Injuries and Extent of Disability, by Location of Injury, for 30 Slaughtering and Meat-Packing Establishments, 1943*

| Location of injury | Number of disabling injuries | | | | | Average days lost per temporary total disability |
|---|---|---|---|---|---|---|
| | Total | | Resulting in— | | | |
| | Number | Percent [1] | Death | Permanent partial disability | Temporary total disability | |
| All disabling injuries | 5,239 | 100.0 | 8 | 181 | 5,050 | 13 |
| Head | 372 | 7.1 | 4 | 3 | 365 | 10 |
| Eye | 146 | 2.8 | 0 | 3 | 143 | 7 |
| Brain or skull | 58 | 1.1 | 3 | 0 | 55 | 22 |
| Other | 168 | 3.2 | 1 | 0 | 167 | 9 |
| Trunk | 1,224 | 23.4 | 1 | 5 | 1,218 | 16 |
| Chest, lungs, ribs, etc | 205 | 3.9 | 1 | 0 | 204 | 14 |
| Back | 578 | 11.1 | 0 | 2 | 576 | 14 |
| Abdomen | 185 | 3.5 | 0 | 0 | 185 | 33 |
| Hip(s) | 47 | .9 | 0 | 3 | 44 | 13 |
| Shoulder(s) | 167 | 3.2 | 0 | 0 | 167 | 11 |
| Other | 42 | .8 | 0 | 0 | 42 | 13 |
| Upper extremities | 2,294 | 43.8 | 1 | 149 | 2,144 | 12 |
| Finger(s) and thumb(s) | 1,359 | 25.9 | 0 | 133 | 1,226 | 11 |
| Hand(s) (including wrist) | 616 | 11.8 | 1 | 12 | 603 | 12 |
| Arm(s) | 319 | 6.1 | 0 | 4 | 315 | 12 |
| Lower extremities | 1,290 | 24.6 | 0 | 24 | 1,266 | 14 |
| Toe(s) | 230 | 4.4 | 0 | 9 | 221 | 13 |
| Foot (including ankle) or feet | 579 | 11.0 | 0 | 6 | 573 | 14 |
| Leg(s) | 481 | 9.2 | 0 | 9 | 472 | 16 |
| General | 55 | 1.1 | 2 | 0 | 53 | 24 |
| Unknown | 4 | ---------- | 0 | 0 | 4 | 11 |

[1] Percent based on known cases only.

TABLE 8.—*Disabling Injuries, by Location and Nature of Injury, for 30 Slaughtering and Meat-Packing Establishments, 1943*

| Location of injury | Total disabling injuries | | Nature of injury | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Percent[1] | Dust particles in eyes | Amputation | Burns and scalds | Cuts and lacerations | Strains and sprains | Bruises | Fractures | Hernia | Industrial diseases | Dislocations | Other | Unknown |
| Total disabling injuries: | | | | | | | | | | | | | | |
| Number | 5,239 | | 79 | 65 | 240 | 1,798 | 1,045 | 1,424 | 380 | 102 | 59 | 14 | 26 | 7 |
| Percent[1] | | 100.0 | 1.5 | 1.2 | 4.6 | 34.4 | 20.0 | 27.2 | 7.3 | 1.9 | 1.1 | 0.3 | 0.5 | |
| Head | 372 | 7.1 | 79 | | 46 | 110 | 6 | 112 | 9 | | 4 | | 4 | 2 |
| Eye(s) | 146 | 2.8 | 79 | | 22 | 24 | | 16 | | | | | 4 | 1 |
| Brain, skull | 58 | 1.1 | | | | 23 | | 27 | 8 | | | | | |
| Other | 168 | 3.2 | | | 24 | 63 | 6 | 69 | 1 | | 4 | | | 1 |
| Trunk | 1,224 | 23.4 | | | 1 | 20 | 677 | 349 | 53 | 102 | 2 | 8 | 3 | 1 |
| Chest, lungs, ribs, etc | 205 | 3.9 | | | 2 | 6 | 42 | 110 | 41 | | 1 | | 3 | |
| Back | 578 | 11.1 | | | 4 | | 483 | 89 | 2 | | | | | |
| Abdomen | 185 | 3.5 | | | | 7 | 47 | 27 | | 102 | 1 | | | 1 |
| Hip(s) | 47 | .9 | | | | 4 | 12 | 28 | 3 | | | | | |
| Shoulder(s) | 167 | 3.2 | | | 1 | 2 | 92 | 58 | 6 | | | 8 | | |
| Other | 42 | .8 | | | 2 | 1 | 1 | 37 | 1 | | | | | |
| Upper extremities | 2,294 | 43.8 | | 63 | 86 | 1,507 | 105 | 345 | 137 | | 40 | 5 | 4 | 2 |
| Finger(s), thumb(s) | 1,359 | 25.9 | | 62 | 13 | 1,032 | 16 | 139 | 83 | | 4 | 5 | 3 | 2 |
| Hand(s) | 616 | 11.8 | | | 32 | 345 | 56 | 116 | 37 | | 29 | | 1 | |
| Arm(s) | 319 | 6.1 | | 1 | 41 | 130 | 33 | 90 | 17 | | 7 | | | |
| Lower extremities | 1,290 | 24.6 | | 2 | 79 | 159 | 256 | 607 | 181 | | 1 | 1 | 3 | 1 |
| Toe(s) | 230 | 4.4 | | 2 | 1 | 7 | 1 | 115 | 103 | | | | 1 | |
| Foot (including ankle) or feet | 579 | 11.0 | | | 55 | 61 | 170 | 241 | 49 | | | | 2 | 1 |
| Leg(s) | 481 | 9.2 | | | 23 | 91 | 85 | 251 | 29 | | 1 | 1 | | |
| General | 55 | 1.1 | | | 19 | 1 | | 11 | | | 12 | | 12 | |
| Unknown | 4 | | | | 1 | 1 | 1 | | | | | | | 1 |

[1] Percent based on known cases only.

TABLE 9.—*Nature of Injury for All Reported Injuries of 1 Large Slaughtering and Meat-Packing Establishment, 1943*

| Nature of injury | Number of injuries reported | | | | Ratio of nondisabling to disabling |
|---|---|---|---|---|---|
| | Total | | Nondisabling | Disabling | |
| | Number | Percent [1] | | | |
| All injuries | 15,384 | 100.0 | 15,238 | 146 | 104.0 |
| Amputations | 5 | (2) | 0 | 5 | 0 |
| Burns and scalds | 471 | 3.3 | 469 | 2 | 234.5 |
| Lacerations, cuts, etc. | 6,964 | 48.9 | 6,941 | 23 | 301.8 |
| Sprains and strains | 548 | 3.8 | 520 | 28 | 18.6 |
| Bruises and contusions | 874 | 6.1 | 844 | 30 | 28.1 |
| Fractures | 22 | .2 | 7 | 15 | .5 |
| Hernia | 14 | .1 | 7 | 7 | 1.0 |
| Industrial disease | 458 | 3.2 | 457 | 1 | 457.0 |
| Unknown | 1,114 | | 1,088 | 26 | |
| Other | 4,914 | 34.4 | 4,905 | 9 | 545.4 |

[1] Percent of known cases.
[2] Less than 0.05.

TABLE 10.—*Number of Injuries Sustained by Each Full-Year Employee in 1 Large Slaughtering and Meat-Packing Establishment, November 1943 to October 1944*

| Number of injuries to same worker | Number of employees | | | Number of injuries | | |
|---|---|---|---|---|---|---|
| | Number | Cumulative number | Cumulative percent | Number | Cumulative number | Cumulative percent |
| Total | 330 | 330 | 100.0 | 1,279 | 1,279 | 100.0 |
| Over 25 | 2 | 2 | .6 | 58 | 58 | 4.5 |
| 21 to 25 | 4 | 6 | 1.8 | 89 | 147 | 11.5 |
| 16 to 20 | 6 | 12 | 3.6 | 102 | 249 | 19.5 |
| 11 to 15 | 17 | 29 | 8.8 | 212 | 461 | 36.0 |
| 10 | 6 | 35 | 10.6 | 60 | 521 | 40.7 |
| 9 | 16 | 51 | 15.5 | 144 | 665 | 52.0 |
| 8 | 10 | 61 | 18.5 | 80 | 745 | 58.2 |
| 7 | 7 | 68 | 20.6 | 49 | 794 | 62.1 |
| 6 | 14 | 82 | 24.8 | 84 | 878 | 68.6 |
| 5 | 18 | 100 | 30.3 | 90 | 968 | 75.7 |
| 4 | 31 | 131 | 39.7 | 124 | 1,092 | 85.4 |
| 3 | 33 | 164 | 49.7 | 99 | 1,191 | 93.1 |
| 2 | 28 | 192 | 58.2 | 56 | 1,247 | 97.5 |
| 1 | 32 | 224 | 67.9 | 32 | 1,279 | 100.0 |
| None | 106 | 330 | 100.0 | 0 | | |

TABLE 11.—*Disabling Injuries and Extent of Disability, by Agency and Part, for 29 Slaughtering and Meat-Packing Establishments, 1943*

| Agency and part | Number of disabling injuries | | | | | Average days lost per temporary total disability |
|---|---|---|---|---|---|---|
| | Total | | Resulting in— | | | |
| | Number | Percent [1] | Death | Permanent partial disability | Temporary total disability | |
| All agencies | 5,053 | 100.0 | 8 | 169 | 4,876 | 13 |
| Machines | 185 | 3.7 | 0 | 56 | 129 | 17 |
| Point of operation | 94 | 1.9 | 0 | 36 | 58 | 19 |
| Other parts | 91 | 1.8 | 0 | 20 | 71 | 16 |
| Elevators | 46 | .9 | 2 | 4 | 40 | 26 |
| Conveyors | 185 | 3.7 | 1 | 6 | 178 | 14 |
| Vehicles | 759 | 15.3 | 0 | 14 | 745 | 14 |
| Motor | 65 | 1.3 | 0 | 5 | 60 | 17 |
| Hand-operated | 658 | 13.3 | 0 | 9 | 649 | 14 |
| Other | 36 | .7 | 0 | 0 | 36 | 25 |
| Animals | 146 | 2.9 | 0 | 5 | 141 | 13 |
| Hand tools | 983 | 19.8 | 1 | 45 | 937 | 10 |
| Meat hooks | 57 | 1.1 | 0 | 1 | 56 | 11 |
| Knives | 753 | 15.2 | 1 | 34 | 718 | 10 |
| Other | 173 | 3.5 | 0 | 10 | 163 | 11 |
| Chemicals | 83 | 1.7 | 0 | 0 | 83 | 12 |
| Hot substances | 166 | 3.3 | 1 | 0 | 165 | 13 |
| Working surfaces | 750 | 15.1 | 0 | 3 | 747 | 16 |
| Floors | 640 | 12.9 | 0 | 2 | 638 | 15 |
| Platforms | 64 | 1.3 | 0 | 1 | 63 | 16 |
| Other | 46 | .9 | 0 | 0 | 46 | 15 |
| Miscellaneous | 1,654 | 33.6 | 1 | 35 | 1,618 | 13 |
| Barrels, boxes, kegs, etc | 359 | 7.2 | 0 | 11 | 348 | 13 |
| Benches, tables | 51 | 1.0 | 0 | 2 | 49 | 15 |
| Cans and drums | 63 | 1.3 | 0 | 0 | 63 | 9 |
| Cuts of meat (projecting bones) | 276 | 5.6 | 0 | 1 | 275 | 14 |
| Foreign bodies (eye injuries) | 60 | 1.2 | 0 | 0 | 60 | 6 |
| Lumber stock | 50 | 1.0 | 0 | 0 | 50 | 8 |
| Metal stock | 92 | 1.9 | 0 | 5 | 87 | 14 |
| Stairways | 164 | 3.3 | 0 | 4 | 160 | 14 |
| Other | 539 | 11.1 | 1 | 12 | 526 | 14 |
| Unknown | 96 | -------- | 2 | 1 | 93 | 17 |

[1] Percent based on known cases only.

TABLE 12.—*Disabling Injuries and Extent of Disability, by Type of Accident, for 29 Slaughtering and Meat-Packing Establishments, 1943*

| Type of accident | Number of disabling injuries | | | | | Average days lost per temporary total disability |
|---|---|---|---|---|---|---|
| | Total | | Resulting in— | | | |
| | Number | Percent [1] | Death | Permanent partial disability | Temporary total disability | |
| All types of accident | 5,053 | 100.0 | 8 | 169 | 4,876 | 13 |
| Striking against | 1,475 | 29.7 | 1 | 55 | 1,419 | 11 |
| Machines | 53 | 1.1 | 0 | 18 | 35 | 15 |
| Point of operation | 27 | .6 | 0 | 15 | 12 | 17 |
| Other parts | 26 | .5 | 0 | 3 | 23 | 15 |
| Conveyors | 29 | .6 | 0 | 0 | 29 | 10 |
| Vehicles | 99 | 2.0 | 0 | 0 | 99 | 13 |
| Hand tools | 775 | 15.6 | 1 | 31 | 743 | 10 |
| Knife | 646 | 13.0 | 1 | 27 | 618 | 10 |
| Meat hook | 46 | .9 | 0 | 0 | 46 | 11 |
| Other | 83 | 1.7 | 0 | 4 | 79 | 12 |
| Miscellaneous | 519 | 10.4 | 0 | 6 | 513 | 10 |
| Barrels, boxes, kegs | 57 | 1.1 | 0 | 0 | 57 | 12 |
| Cuts of meat (projecting bones) | 114 | 2.3 | 0 | 1 | 113 | 9 |
| Projecting nails | 35 | .7 | 0 | 0 | 35 | 11 |
| Other | 313 | 6.3 | 0 | 5 | 308 | 10 |
| Struck by | 1,113 | 22.3 | 1 | 28 | 1,084 | 12 |
| Conveyors | 120 | 2.4 | 1 | 4 | 115 | 15 |
| Load | 66 | 1.3 | 1 | 3 | 62 | 16 |
| Other parts | 54 | 1.1 | 0 | 1 | 53 | 13 |
| Vehicles | 258 | 5.2 | 0 | 3 | 255 | 13 |
| Hand-operated | 227 | 4.6 | 0 | 1 | 226 | 11 |
| Other | 31 | .6 | 0 | 2 | 29 | 25 |
| Hand tools | 168 | 3.4 | 0 | 11 | 157 | 12 |
| Knife | 101 | 2.1 | 0 | 7 | 94 | 13 |
| Meat hook | 11 | .2 | 0 | 1 | 10 | 13 |
| Other | 56 | 1.1 | 0 | 3 | 55 | 11 |
| Miscellaneous | 567 | 11.3 | 0 | 10 | 557 | 12 |
| Barrels, boxes, kegs | 110 | 2.2 | 0 | 5 | 105 | 15 |
| Cuts of meat (projecting bones) | 46 | .9 | 0 | 0 | 46 | 12 |
| Foreign bodies (eye injuries) | 59 | 1.2 | 0 | 0 | 59 | 6 |
| Other | 352 | 7.0 | 0 | 5 | 347 | 12 |
| Caught in, on, or between | 435 | 8.7 | 1 | 68 | 366 | 16 |
| Machines | 95 | 1.9 | 0 | 37 | 58 | 21 |
| Elevators | 21 | .4 | 1 | 2 | 18 | 26 |
| Vehicles | 194 | 3.9 | 0 | 11 | 183 | 15 |
| Hand-operated | 170 | 3.4 | 0 | 8 | 162 | 15 |
| Other | 24 | .5 | 0 | 3 | 21 | 17 |
| Other | 125 | 2.5 | 0 | 18 | 107 | 14 |
| Falls | 849 | 17.0 | 1 | 13 | 835 | 16 |
| On same level | 619 | 12.4 | 0 | 6 | 613 | 15 |
| Working surfaces | 538 | 10.8 | 0 | 1 | 537 | 15 |
| Floors | 499 | 10.0 | 0 | 1 | 498 | 15 |
| Other | 39 | .8 | 0 | 0 | 39 | 12 |
| Other | 81 | 1.6 | 0 | 5 | 76 | 16 |
| To different level | 230 | 4.6 | 1 | 7 | 222 | 19 |
| From stairways | 116 | 2.3 | 0 | 3 | 113 | 15 |
| Other | 114 | 2.3 | 1 | 4 | 109 | 23 |
| Slips (not falls) and overexertion | 801 | 16.0 | 0 | 4 | 797 | 15 |
| Lifting, pulling, pushing | 601 | 12.0 | 0 | 2 | 599 | 16 |
| Barrels, boxes, etc | 155 | 3.1 | 0 | 1 | 154 | 13 |
| Cuts of meat | 109 | 2.2 | 0 | 0 | 109 | 21 |
| Hand trucks | 154 | 3.1 | 0 | 0 | 154 | 15 |
| Other | 183 | 3.6 | 0 | 1 | 182 | 16 |
| Slips (not falls) | 200 | 4.0 | 0 | 2 | 198 | 14 |
| On working surfaces | 145 | 2.9 | 0 | 2 | 143 | 15 |
| Floors | 120 | 2.4 | 0 | 1 | 119 | 16 |
| Other | 25 | .5 | 0 | 1 | 24 | 12 |
| On stairways | 25 | .5 | 0 | 0 | 25 | 12 |
| Other | 30 | .6 | 0 | 0 | 30 | 11 |
| Contact with temperature extremes | 181 | 3.6 | 1 | 0 | 180 | 13 |
| Inhalation, absorption, or ingestion | 97 | 1.9 | 0 | 0 | 97 | 19 |
| Chemical burns | 39 | .8 | 0 | 0 | 39 | 14 |
| Other | 58 | 1.1 | 0 | 0 | 58 | 22 |
| Other | 40 | .8 | 0 | 0 | 40 | 11 |
| Unknown | 62 | ------- | 3 | 1 | 58 | 15 |

[1] Percent based on known cases only.

TABLE 13.—*Disabling Injuries and Extent of Disability, by Unsafe Working Condition, in 29 Slaughtering and Meat-Packing Establishments, 1943*

| Unsafe working condition | Number of disabling injuries | | | | | Average days lost per temporary total disability |
|---|---|---|---|---|---|---|
| | Total | | Resulting in— | | | |
| | Number | Percent [1] | Death | Permanent partial disability | Temporary total disability | |
| Total | 5,053 | 100.0 | 8 | 169 | 4,876 | 13 |
| Improperly guarded agencies | 68 | 3.9 | 1 | 22 | 45 | 22 |
| Machines | 37 | 2.1 | 0 | 21 | 16 | 21 |
| Other | 31 | 1.8 | 1 | 1 | 29 | 22 |
| Defects of agencies | 1,061 | 60.2 | 0 | 12 | 1,049 | 14 |
| Slippery | 601 | 34.1 | 0 | 7 | 594 | 16 |
| Working surfaces | 500 | 28.4 | 0 | 2 | 498 | 16 |
| Other | 101 | 5.7 | 0 | 5 | 96 | 16 |
| Sharp-edged bones in meat cuts and carcasses | 106 | 6.0 | 0 | 1 | 105 | 9 |
| Other | 354 | 20.1 | 0 | 4 | 350 | 12 |
| Hazardous arrangement or procedure in, on, or around selected agency | 594 | 33.7 | 2 | 14 | 578 | 14 |
| Unsafely stored or piled tools, materials, etc. | 322 | 18.3 | 1 | 9 | 312 | 12 |
| Unsafely loaded conveyors | 52 | 3.0 | 1 | 3 | 48 | 13 |
| Unsafely loaded vehicles | 53 | 3.0 | 0 | 0 | 53 | 12 |
| Other | 217 | 12.3 | 0 | 6 | 211 | 12 |
| Congestion of working surfaces | 108 | 6.1 | 0 | 2 | 106 | 12 |
| Other | 164 | 9.3 | 1 | 3 | 160 | 18 |
| Lack of proper safety equipment | 29 | 1.6 | 0 | 0 | 29 | 13 |
| Other | 10 | .6 | 1 | 0 | 9 | 17 |
| Unknown [2] | 3,291 | ------- | 4 | 121 | 3,166 | 13 |

[1] Percent based on number of injuries resulting from accidents in which an unsafe working condition was known to exist.

[2] Includes cases in which no unsafe working condition existed.

TABLE 14.—*Disabling Injuries and Extent of Disability, by Unsafe Act, for 29 Slaughtering and Meat-Packing Establishments, 1943*

| Unsafe act | Number of disabling injuries | | | | | Average days lost per temporary total disability |
|---|---|---|---|---|---|---|
| | Total | | Resulting in— | | | |
| | Number | Percent [1] | Death | Permanent partial disability | Temporary total disability | |
| Total | 5,053 | 100.0 | 8 | 169 | 4,876 | 13 |
| Operating without authority; failure to secure or warn | 52 | 1.7 | 0 | 5 | 47 | 24 |
| Operating or working at unsafe speed | 67 | 2.2 | 0 | 1 | 66 | 13 |
| Using unsafe equipment, hands instead of equipment, or equipment unsafely | 1,599 | 52.1 | 1 | 85 | 1,513 | 11 |
| Unsafe use of equipment | 114 | 3.7 | 0 | 13 | 101 | 15 |
| Gripping objects insecurely or taking wrong hold of objects | 1,485 | 48.4 | 1 | 72 | 1,412 | 11 |
| Machines | 57 | 1.9 | 0 | 17 | 40 | 14 |
| Vehicles | 247 | 8.1 | 0 | 8 | 239 | 12 |
| Hand-operated | 235 | 7.7 | 0 | 8 | 227 | 11 |
| Other | 12 | .4 | 0 | 0 | 12 | 13 |
| Hand tools | 753 | 24.4 | 1 | 34 | 718 | 10 |
| Knife | 619 | 20.0 | 1 | 26 | 592 | 10 |
| Meat hooks | 42 | 1.4 | 0 | 1 | 41 | 8 |
| Other | 92 | 3.0 | 0 | 7 | 85 | 11 |
| Miscellaneous | 417 | 13.6 | 0 | 13 | 404 | 13 |
| Barrels, boxes, kegs | 108 | 3.5 | 0 | 6 | 102 | 13 |
| Meat cuts | 40 | 1.3 | 0 | 0 | 40 | 13 |
| Other | 269 | 8.8 | 0 | 7 | 262 | 13 |
| Other | 11 | .4 | 0 | 0 | 11 | 18 |
| Unsafe loading, placing, mixing | 113 | 3.7 | 0 | 2 | 111 | 13 |
| Arranging or placing objects or materials unsafely | 100 | 3.3 | 0 | 2 | 98 | 13 |
| Other | 13 | .4 | 0 | 0 | 13 | 9 |
| Failure to use proper safety equipment | 22 | .7 | 0 | 1 | 21 | 18 |
| Taking unsafe position of posture | 609 | 19.9 | 2 | 25 | 582 | 14 |
| Inattention to footing | 331 | 10.8 | 1 | 5 | 325 | 15 |
| Other | 278 | 9.1 | 1 | 20 | 257 | 13 |
| Lifting incorrectly or lifting too heavy loads | 549 | 17.9 | 0 | 2 | 547 | 16 |
| Barrels, boxes, kegs, etc | 139 | 4.5 | 0 | 1 | 138 | 12 |
| Meat cuts | 99 | 3.2 | 0 | 0 | 99 | 22 |
| Vehicles, hand-operated | 147 | 4.8 | 0 | 0 | 147 | 16 |
| Other | 164 | 5.4 | 0 | 1 | 163 | 16 |
| Other | 54 | 1.8 | 0 | 8 | 46 | 14 |
| Unknown | 1,988 | ---- | 5 | 40 | 1,943 | 14 |

[1] Percent based on known cases only.

U. S. GOVERNMENT PRINTING OFFICE: 1946