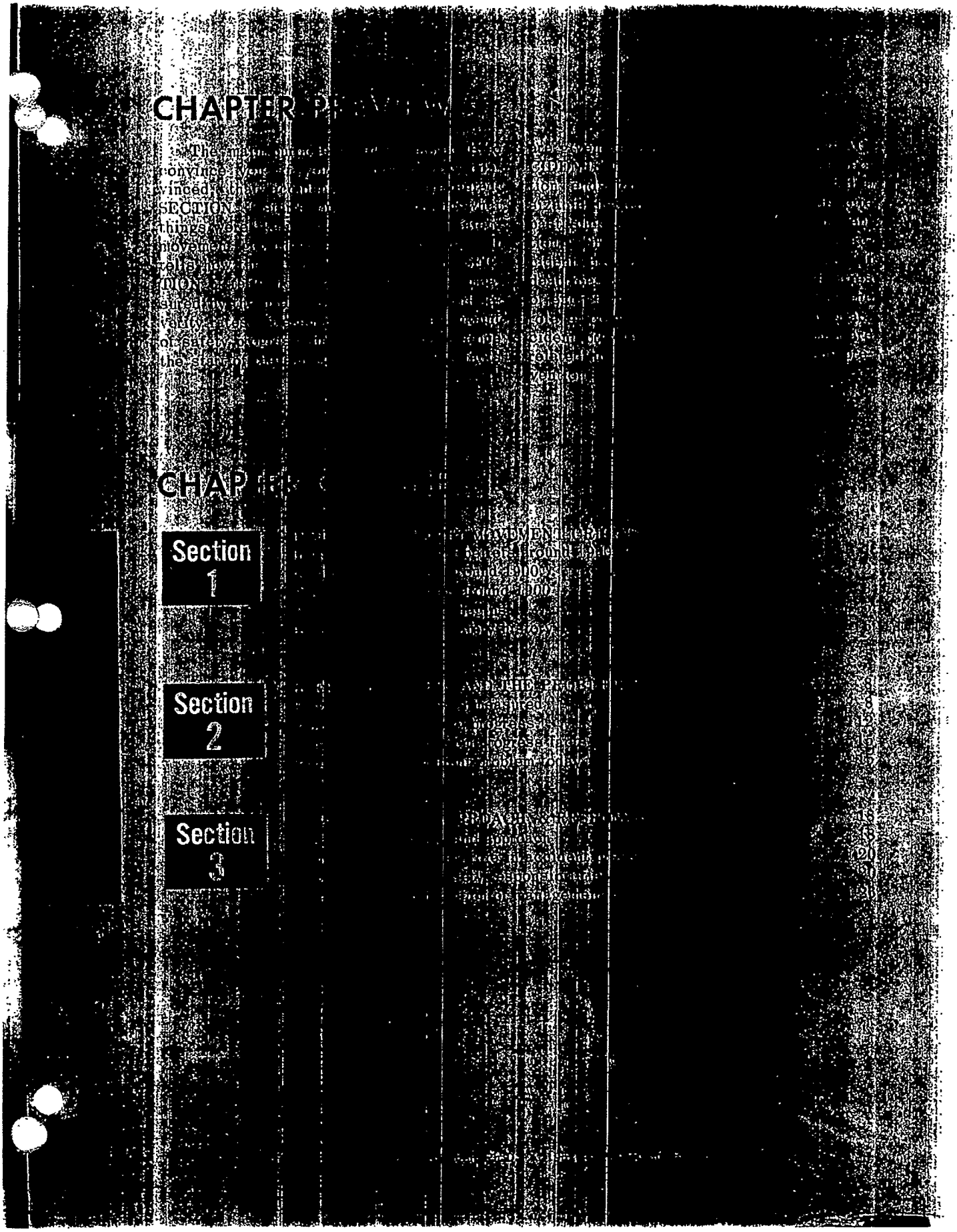
PLAINTIFF'S EXHIBIT

ARMCO

Chapter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Industrial Safety Movement Origins

ATTITUDES AND BELIEFS AROUND 1900

A single quote, taken from an old periodical tells how managers in all industries felt about accidents and accident prevention around 1900:

"Prevent accidents!? I doubt that very much. I've been a Superintendent of this plant more than 15 years, and I know one thing: Ninety-five percent of accidents are the result of carelessness. You can't stop that kind of thing Some men are just bound to get killed, no matter what you try to do for them. It's just human nature, I guess. No, I think we do about all we can do. There will always be a lot of accidents in our kind of work."

The attitudes and beliefs reflected in the above quote are typical of the thinking around 1900. Most people regarded industrial accidents as unfortunate but inevitable by-products of work. Making steel, mining coal, running railroads, manufacturing glass and chemicals—these industrial activities as well as many others were looked upon as *naturally* hazardous. People came to expect large numbers of accidents in such industries. Crippling injuries and fatalities were accepted as a normal price.

The company officials, plant managers, and department superintendents in those years did not regard themselves as having a responsibility for accident prevention. To be sure, there were exceptions but the exceptions were rare. Mostly, members of management felt there was nothing they could do about preventing accidents at work. They thought it was up to each individual workman to take care of himself and to protect himself against injury. They reasoned that no one could do the workman's thinking for him, no one could be his eyes and ears. Avoiding work injuries was an individual matter, not a problem for company officials and managers to be concerned about. Without exaggeration, that was the way management people thought about work at the turn of the century. Today, looking back, it is difficult to say how much of that kind of thinking was excuse-making to avoid responsibility, and how much was honest ignorance of what could have been done to prevent accidents. No doubt, it was mostly the latter.

The same attitude of detachment was also directed at the employee who was injured. The managers felt no particular obligation toward such employees, or to their families in the event of a fatal injury. To be sure, there were many individual acts of generosity – bags of groceries sent regularly to the home of a convalescing employee, or medical bills taken care of by an employer, or a funeral service arranged and paid for. However, even such gestures were not the general practice. It was generally expected that community charities would aid the accident-incapacitated workman and his family.

Strange as it may seem today, the great majority of workmen in those years had many of the same attitudes and beliefs about accidents as did the managers. Workmen also regarded accidents as a normal by-product of work. So many tons of steel produced, so many accidents – they accepted that as a fact. It is true that disabling injuries and deaths aroused feelings of grief, sorrow, and fear just as they do today, but they were also accepted with a superstitious kind of fatalism. Most workmen believed accidents were a matter of personal luck. They reasoned that some men were lucky, and others

were not. The lucky ones lasted, and the unlucky ones were carried out, sooner or later. Naturally, every workman counted himself among the lucky ones. It would never happen to him, he thought. Another superstitious explanation for fatal accidents that was common around 1900 was the idea that a man's time was up. Many workmen thought that when a man's time was up, that was it. Nothing could be done by anyone; the fatal accident was bound to occur, if not in one way, then in another way. Such beliefs may seem incredible today. Around 1900, that was how most workmen looked upon fatal accidents.

You can easily understand how such attitudes and beliefs, shared as they were by managers, supervisors, and workmen alike, blocked any real effort to prevent accidents. They also bred apathy, indifference, and a blindness to the seriousness of the industrial accident problem.

Question #2 ACCIDENT PREVENTION AROUND 1900

What did companies do, if anything, to prevent industrial accidents in those years? The frank and honest answer is that *very few companies did much of anything.* There was no organized effort to prevent accidents. True, there were the beginnings of organized accident prevention in the coal mining industry, spurred on by the many mine disasters that killed and crippled large numbers of men.

You have to know what things were like before the safety movement got underway in the United States in order to appreciate what the safety movement has accomplished. Therefore, let us elaborate on what the companies did *not do.*

Companies had no full-time safety personnel in those years. Safety directors, safety engineers, safety inspectors – these occupations had not even come into existence. Only here and there was someone given a part-time responsibility that related to safety. It almost goes without saying that companies had no organized safety programs.

Working conditions were extremely hazardous by today's standards. Exposed moving parts of machinery were rarely guarded. Electrical conductors were commonly exposed to accidental contact. Illumination was dingy and often the bare minimum. Toxic gases and fumes assailed the lungs of workers. Ventilation against heat and humidity was non-existent. Working areas were dangerously congested. Plant house-keeping was generally neglected. Sanitation was wretched. Tools and equipment were used to the breaking point. No one made safety inspections for unsafe conditions. In short, hazardous conditions existed everywhere. The hazards were such that they would cause a safety engineer's hair to stand up straight if he saw them today. Such conditions were accepted as normal then.

Employee safety education fared no better. There was no emphasis on job safety training. *"Keep your eyes and ears open if you don't want to get killed. Watch and do what Harry does."* That was the kind of instruction that most men got before being turned over to some Harry who was of no mind to teach anything to anybody. It was generally assumed that it was the workers own business to learn how to work safely. When instructions were given, they had to do with getting the job done, not with how to do it safely. Other methods of employee safety education were equally lacking. There were no safety posters in those days to remind men of the do's and don't of safety. Companies didn't distribute safety rule and regulations booklets. No safety literature was handed out. It never occurred to supervisors to give "safety talks".

Most of today's personal protective equipment, such as safety shoes, safety hats, and safety goggles, either did not exist or was not in common use around 1900. Companies didn't issue any kind of personal protective equipment except where the work could not be done without such equipment. Generally, companies expected the employees to provide their own protective equipment. The workmen, in turn, usually fashioned their own crude, "homemade" safety equipment.

It hardly needs saying that modern techniques of accident prevention, such as job safety analysis, accident cost analysis, and accident cause analysis, did not exist. Accidents were rarely investigated in any formal way. No accident records were kept. Indeed, most companies had no idea of the number of serious injury accidents that they incurred in a year. No one was interested in such information.

It is also true that companies had no legal obligation to aid employees who suffered disabling work injuries, or the families of men

killed. There were no workman's compensation laws in those years. The laws permitted an injured employee to file suit against his former employer, but there was little satisfaction in that. For one, few employees could afford to undertake legal action. For two, chances of winning such a suit were practically nil. It was usually impossible for an injured employee to prove gross negligence on the part of his employer. The end result was that there were no strong cost reasons for companies to become interested in accident prevention.

The companies were not alone in their disregard for preventing industrial accidents. Municipal, county, and state governments also did nothing that amounted to anything. True, there was a scattering of laws that regulated a few of the more obvious mill, mine, and factory hazards, but such laws were token laws only. They received virtually no enforcement because the necessary inspection personnel was not made available. It is even doubtful whether most plant managers knew what safety laws had a bearing on their operations. The states certainly made no effort to publicize such laws. State legislators and administrators felt that industrial accidents were none of their concern. The end result was that there were no strong legal reasons for companies to become interested in accident prevention.

To sum it up, very little was done to prevent industrial accidents in those years. Partly that was because of the prevailing attitudes and beliefs about accidents. It was also partly because there were no compelling cost and legal reasons for the companies to become interested in accident prevention.

Question #3 THE ACCIDENT PROBLEM AROUND 1900

How serious was the industrial accident problem around 1900? How many men were being killed and crippled each year? No one really knew at the time. The companies didn't keep any accident records. The states required no reports of fatal or serious injury accidents. There was not a single agency anywhere that collected statistics to show the seriousness of the accident problem. Some people, to be sure, had their opinions about the seriousness of the problem, based on what they saw and heard. But the hard facts were lacking.

Then, in 1906, a history-making study was undertaken in order to assess the seriousness of the industrial accident problem. *More than any other single event, this study gave birth to the industrial safety movement in the United States.* It succeeded in documenting the terrible toll of life and limb that was being taken daily in American industry. It smashed apathy and indifference, and caused an outraged public to clamor for reforms. The study is the *Pittsburgh Survey*. It could have been done anywhere in the United States where there was heavy industry. The results would have been similar.

THE PITTSBURGH SURVEY

The Pittsburgh Survey was sponsored by the Russell Sage Foundation. Its purpose was to determine the seriousness of the accident problem, and to evaluate the shortcomings of state laws related to the problem. A team of investigators was assembled. They quickly realized that it was impractical to survey the accident problem in the entire country. They decided instead to concentrate on one industrial area. The area chosen for investigation was the Greater Pittsburgh area of Allegheny County, Pennsylvania, the heartland of America's heavy industry.

The study covered a one year period, from July 1906 through June 1907. The investigators visited steel mills, coal mines, railroad yards, and manufacturing plants in the area. In some places they were refused access once their purpose became known. Generally, however, they were permitted to see everything and to talk to anyone. They interviewed company officials, plant managers, supervisors, workmen, and also responsible people in the coal and steel communities. They studied the records of hospitals, private physicians, and the county coroner. In the end, they wrote a remarkable book, describing their findings and recommendations.

THE PITTSBURGH SURVEY FINDINGS

The findings of the Pittsburgh Survey came as a great shock to responsible people everywhere. Some of the findings are shown in Figure 1. The chart entitled *The Death Calendar of Allegheny County* was taken from the original report. It tells the story of how many men died from industrial accidents in a one year period in

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Allegheny County. Each cross on the calendar represents one accidental death. Notice that hardly a day went by without a fatality. Most days show two, three and even more fatalities.

The numbers are shocking when one realizes that these facts reflect the accident problem in only *one industrial county*. Imagine what the industrial fatality picture must have been for the entire United States!

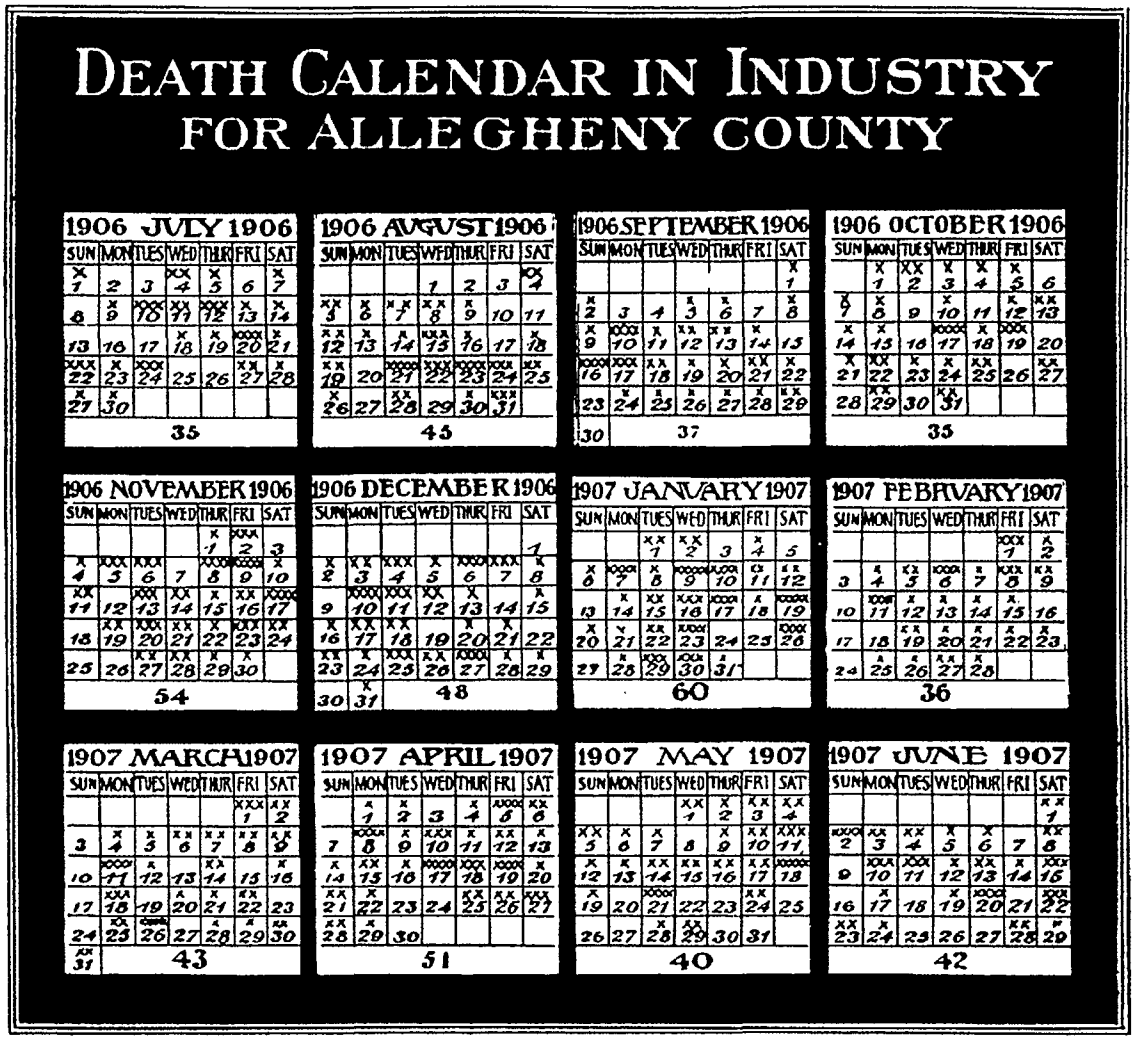

FIG. 1 THE DEATH CALENDAR. Each cross on the calendar represents one death that resulted from an industrial accident in Allegheny County during the year of the Pittsburgh Survey. Hardly a day went by without a fatality. The total came to 526 occupational fatalities for the year.

What the investigators wrote about crippling injuries is equally interesting:

> "The Pittsburgh District annually sends out of its mills, factories, railroad yards, and mines, 45 one-legged men; 100 hopeless cripples who must walk with a crutch or a cane; 15 men with a twisted useless arm, 30 men with an empty sleeve, 20 men with but one hand; 60 with half a hand gone; 70 with one eye – and so on, more than 500 human wrecks in all."

Their report continues:

> "And time goes on. There has been no respite. Each year has

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turned them out as surely as the mills ran full and the railroads prospered, as surely as times were "good". Ten years would make more than 5000, enough to make a little city of cripples."

Such facts tell only part of the story. They don't describe the physical and mental suffering that resulted. They tell nothing about the hardships that had to be endured by families deprived of their heads. They say nothing about the bitterness and resentment that grew in men who were too crippled for further work, nor about the bleakness that crowded their days.

The Pittsburgh Survey pointed out these things, and more. It made clear to all who cared to know that the industrial accident problem was indeed serious. *Something had to be done!*

THE SAFETY MOVEMENT BEGINS

The Pittsburgh Survey started the ball rolling. Similar studies were undertaken in other states. The results were the same everywhere. Invariably, an extremely high toll of life and limb was revealed, and nowhere was anything being done about it. As the facts became more widely known, the public clamor grew for corrective action. Clergymen, educators, journalists, and labor leaders pressed vigorously for reforms. State legislators were pressured to outlaw the most glaring industrial hazards. State governments were prodded into tighter enforcement of the occupational health and safety laws.

THE FEDERAL GOVERNMENT ACTS

The federal government joined the safety movement early. In 1908, one year after the Pittsburgh Survey, Congress enacted the first workman's injury compensation law. The benefits were meager, but the principle of compensation was established. For the first time in the United States, workmen and their families were assured of some measure of compensation for disabling or fatal injuries. Two years later, in 1910, the United States Bureau of Mines was established. One of its principle objectives was to reduce accidents in the mining industry. In 1913, the Bureau of Labor Statistics was organized to collect, tabulate, and disseminate facts about industrial accidents and health problems. At about the same time, the National Bureau of Standards began establishing safety standards for industrial materials and equipment. All these developments took place within six years after the Pittsburgh Survey.

THE STATES ACT

Many of the state governments acted promptly after the Pittsburgh Survey emphasized the seriousness of the accident problem. New laws were enacted to eliminate the most glaring factory and mine hazards. Law enforcement was tightened; departments of industrial hygiene and safety were established by the states to coordinate efforts at safety education and enforcement. State inspections of plants were introduced.

In 1911, New York became the first state to enact a workman's compensation law. By 1915, thirty states had similar laws. Today, all states have some type of work injury compensation laws.

Injury compensation laws vary from state to state. However, all such laws are based on the principle that employees who suffer disabling injuries from work accidents shall be paid compensation by their employers. Employee or employer responsibility for a disabling injury accident does not determine compensation payments. Even where the employee is 100% responsible for his accident, he is entitled to work injury compensation providing certain standards of injury severity are met by the case. We can't go into the details of state compensation laws here. They are too complex. But, as an Armco supervisor, there is one thing you should remember about workman's compensation: *No Armco employee jeopardizes his right to compensation by telling the truth about a work accident which occurred to him.*

The safety movement owes much to the work injury compensation laws. When such laws went into effect, many companies quickly realized it was less costly to prevent accidents than to pay compensation and disability claims for large numbers of disabling injuries.

SAFETY ORGANIZATIONS ARISE

With the awakening of interest in industrial accident prevention, safety organizations came into existence. The National Council for Industrial Safety was organized in 1913. Two years later, the Council broadened the scope of its educational activities and became the National Safety Council. Its objective was to reduce accidents in industry, homes, and schools through education. The American Society of Safety Engineers was also organized in 1915. Thus, in less than eight years after the Pittsburgh Survey, the safety engineer came into being and gained professional status.

Trade and industry associations also joined the safety movement. Through their educational efforts, they strengthened the safety movement as it took root in one industry after another. By publicizing the accomplishments of the leading companies in their respective industries, they nudged many a laggardly company to move into the mainstream of the safety movement.

THE COMPANIES ACT

The companies also moved ahead, the larger ones leading the way. Many companies, including Armco, went far beyond the requirements of the law. They established safety programs. The safety engineer came into being, and with him came improvements in machine guarding, illumination, ventilation, plant lay-out, and work methods. Here and there, safety posters appeared. Safety took its place in job instructions. Plant safety rules and regulations began to be developed. It became the practice to investigate accidents and to make accident facts a matter of record. The use of personal protective equipment gained steadily. Of course, these things did not happen overnight. Attitudes don't die that easily. The changes came slowly, but steadily over a period of many years.

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The safety movement was well underway only five years after the Pittsburgh Survey. It has never diminished. On the contrary, it has gained greater influence with each passing year. No study will ever be able to publish a death calendar of industrial accidents to match that of the Pittsburgh Survey.

HIGHLIGHTS OF ARMCO SAFETY HISTORY

Armco's concern for employee safety began almost with the founding of the company. The policy of the company's founder, George M. Verity, was safety first, quality second, and production third.

Armco was a pioneer in the provision of proper medical facilities for injured employees. It also made available the first sickness benefit program for employees in the steel industry. That was in 1903, several years before the Pittsburgh Survey. In 1910, Charles R. Hook, then Superintendent, worked through the Employees Advisory Committee to establish the first Central Safety Committee. Under it, separate plant safety committees were formed. The control committee started safety contests in which plant departments competed for cash prizes. The plant committees recommended mechanical safe guarding, safer work practices, and protective equipment. These early efforts met with considerable success.

In 1914, the first Employee Suggestion Plan among major steel producers was introduced at Armco. Safety suggestions were encouraged and accepted. A measure of Armco's success at accident prevention is reflected by the fact that Armco became the first company in the iron and steel industry to qualify for group insurance for its employees. Until then, insurance companies refused to cover steel workers under group insurance plans.

In 1916, the Middletown Works appointed Armco's first full time plant safety advisor, the forerunner of today's safety engineer. His first assignment, the records show, was to organize a plant safety program. By 1918, the Middletown Works had reduced its major injuries by fifty percent, thereby proving the value of an organized safety program.

A year later, in 1919, the Armco Policies were formally adopted. They had long been a part of top management's thinking. They were put in writing to strengthen their application at all levels of management. Today, many companies have similar policies. It was Armco's distinction to be among the first. Incidentally, a portion of those policies is printed on the backside of this booklet. Read it.

In 1920, Armco pioneered the first 8-hour day in the steel industry. This too was a great aid to safety because it reduced the problem of fatigue.

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The Armco Iron Man Contest was originated in 1925. Ashland's Blooming and Bar Mill Department was the first winner. The department completed an entire year with only one major injury, a remarkable record for those years. Mr. Verity, then President, made the award himself at a special ceremony in Middletown.

The years between 1925 and 1930 saw many milestones in Armco's safety history. First-aid training was started on a company-wide basis. Ashland started the company's first safety shoe program. Middletown innovated new types of personal protective equipment for open hearth work. Zanesville won an international first-aid contest. And in 1930, the same year of the Armco Fair Wage Plan, Armco won the first place award in the Metals Section of the National Safety Council.

The later years brought further advances. Armco plants have won more than a hundred awards for safe performance from the National Safety Council and other organizations. These awards are a tribute to Armco employees – and to George M. Verity's faith in the importance of the individual employee.

CHECK YOURSELF ON THESE QUESTIONS

1. How would you describe the attitudes and beliefs that people had about industrial accidents around 1900?

2. How did the workmen look upon industrial accidents in the years around 1900? Do you think there are workman today who believe the same way?

3. Do you think it is fair to blame the company officials and plant managers of around 1900 for thinking that nothing much could be done to prevent accidents? Why or why not? (Incidentally, who is to be blamed today for the annual average toll of 40,000 lives on our highways?)

4. What, if anything, did companies do to prevent accidents in the years before the Pittsburgh Survey? Try answering by telling what they did not do.

5. What was the Pittsburgh Survey? In general, what were the findings of the Pittsburgh Survey? What did these findings prove?

6. What did the Pittsburgh Survey have to do with the safety movement in the United States?

7. What is the basic principle of a workman's compensation law?

8. How did the workman's compensation laws stimulate the safety movement?

9. Does an employee who suffered a disabling injury jeopardize his right to compensation by admitting he was responsible for his own accident?

10. What company in the iron and steel industry was the first to quality for group insurance? What is significant about that?

11. What are some of the noteworthy "firsts" in Armco's safety history?

12. Do the Armco Policies relate to employee safety? How?

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Safety Progress And The Problem Today

HOW SAFETY PROGRESS IS MEASURED #6

The object of this section is to convince you that great safety progress has been made since the era of the Pittsburgh Survey. However, before that can be done, you must know some things about how companies measure safety progress. The two most widely used yardsticks for measuring progress in preventing accidents are:

1. Disabling injury frequency rate.

2. Disabling injury severity rate.

Let's consider first what is meant by a disabling injury. Then, we will discuss how disabling injury frequency and severity rates are calculated and interpreted to measure safety progress.

DISABLING INJURIES

There are two broad classifications of work injuries: *disabling* and *non-disabling*. Accident prevention progress is generally measured only in terms of disabling injury accidents. Put another way, only disabling injuries count on the official score boards of safety progress. In terms of their end result, there are four broad kinds of disabling injuries:

1. ***Fatality.*** Injuries that result in death are classified as a *fatality* no matter how long after the accident death occurs, providing the death is attributable to the injuries sustained and not to unrelated complications.

2. ***Permanent total disability.*** Injuries that result in a permanent condition that totally incapacitates the person for work in general industry are classified as a *permanent total disability*. An example is loss of both hands.

3. ***Permanent partial disability.*** Injuries that result in a permanent disability that is not totally incapacitating are classified as a *permanent partial disability*. An example is the loss of a finger.

4. ***Temporary total disability.*** Injuries that involve no permanent disabilities, yet incapacitate the man for work over some temporary period of days, weeks, or even months are classified as a *temporary total disability*. The loss of as little as one full day of work is sufficient to classify an injury as a temporary total disability.

Accidents resulting in any of the above four types of disabling injuries are technically *lost-time* accidents. Some plants also refer to them as *major injury* accidents. Most so-called *lost-time* injuries are temporary total disabilities. The man recovers completely, without any permanent disability, and returns to work.

Here is a puzzler for you. Can a man suffer a permanent disability, and not lose a single day's work? If so, would that be a lost-time injury?

NON-DISABLING INJURIES

Non-disabling injuries are all those that do not fall into one of the four disabling injury classifications above. They are *relatively* minor injuries. Indeed, most plants call them *minor injuries*. However, there is nothing minor about some of them. They can be quite serious and painful. It is only the technicality that the man neither loses time from work nor suffers any

permanent effect that results in some otherwise painful injuries being called non-disabling. Of course, the majority of non-disabling injuries are, *from a medical viewpoint,* minor injuries.

Non-disabling injuries can also be used as a basis for measuring safety progress. Armco plants have learned from experience that the causes of non-disabling injuries are the same ones that produce disabling injuries. That's why they keep a close eye on non-disabling or minor injury trends. Never make the mistake of thinking minor (non-disabling) injury accidents are unimportant.

DISABLING INJURY FREQUENCY RATE #7

Let's see why the simple number of disabling injuries that occur from year to year is a poor measure of progress.

Suppose a company had 20 disabling injury accidents in the past year and 25 disabling injury accidents the year before? Did the company do a better job of accident prevention last year than the year before? What would you say if you knew the company employed only half as many men last year than it did the year before? In other words, with only 50% of the men employed the year before, the company had 80% of the disabling injuries experienced the year before. Does that sound like an improvement? No, of course not! The company actually did poorer last year than the year before *even though it had five fewer disabling injuries.* Here's why. It worked only half the manhours last year than it did the year before. That means *theoretically* there was only half as much opportunity to have accidents last year than the year before. That being so, the company should have had only half as many disabling injury accidents. But instead of 50% fewer disabling injuries, the company had only 20% fewer disabling injuries. In other words, the company had more disabling injuries last year *than it should have had based on the number of men employed.*

You see now why merely comparing the number of disabling injuries from year to year is a poor way to measure progress. To be correct, any yardstick used to measure progress must take into account the number of man-hours worked each year. That is exactly what the disabling injury frequency rate does.

Calculation of the frequency rate. To calculate a disabling injury frequency rate for any given period, you need to know (1) the number of disabling injuries that have occurred, and (2) the number of man-hours that have been worked. The calculation is as follows:

$$\text{FREQUENCY RATE} = \frac{\text{NO. OF DISABLING INJURIES} \times 1{,}000{,}000}{\text{TOTAL MAN-HOURS WORKED}}$$

For example, if a plant had 10 disabling injury cases in a given period, and had accumulated 1,000,000 man-hours worked in the same period, the disabling injury frequency rate for that period would be:

$$F = \frac{10 \text{ dis. inj.} \times 1{,}000{,}000}{1{,}000{,}000 \text{ man hours}} = \frac{10{,}000{,}000}{1{,}000{,}000} = 10$$

A frequency rate can be calculated for any period of time, e.g. a week, month, quarter, year, or even longer period. The length of the time period depends upon the purpose for which the frequency rate is wanted. Most companies calculate at least an *annual* injury frequency rate.

A frequency rate can be calculated for any properly defined unit, e.g. nation, state, industry, company, division, department, or even a smaller group, *providing the necessary injury and man-hour data is available.* Thus, it is a yardstick that can be applied to any sized group for any length of time period in order to measure safety performance.

A frequency rate can be calculated for categories of injuries other than all disabling injuries combined. For example, a frequency rate can be calculated for such categories as fatalities, permanently disabling injuries, temporary disabling injuries, and even non-disabling injuries. Usually, however, when the term *frequency rate* is not qualified by specifying the type of injury it refers to, the rate is for *all disabling injuries lumped together.*

Interpretation of the frequency rate. The disabling injury frequency rate tells the number of disabling injuries that have occurred per million man-hours worked in any given period. Thus, if you heard that your company or plant had a disabling injury frequency rate of 5 for last year, you would know that there were 5 disabling injuries for every million man-hours worked last year.

Sometimes, supervisors make the mistake of thinking the frequency rate equals the number of disabling injuries. The only time that is true

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is when the man-hours worked in the period for which the frequency is calculated is exactly 1,000,000 man-hours. That happens to be the case in the example calculation shown above. Notice the frequency rate is 10, the same as the number of disabling injuries. Now, see what happens when the man-hours worked are other than one million.

$$F = \frac{10 \text{ dis. inj.} \times 1{,}000{,}000}{2{,}000{,}000 \text{ man hours}} = \frac{10{,}000{,}000}{2{,}000{,}000} = 5$$

Notice, the frequency rate is not the same as the number of disabling injuries. *Don't make the mistake of interpreting a frequency rate as the number of disabling injuries.* It is the number of disabling injuries per million man-hours worked.

The equation for calculating a frequency rate also tells us this: for a given number of man-hours, the fewer the disabling injuries, the lower is the frequency rate. Zero disabling injuries means a zero frequency rate, no matter how many man-hours have been worked. A zero frequency rate, therefore, means a perfect performance. Obviously, then, *the lower the frequency rate, the better.* The best possible frequency rate is zero.

Now that you understand the basic idea of the frequency rate, let's see how it can be used to measure safety progress.

Use of the frequency rate. The basic method for measuring safety progress is to *compare the frequency rate for one period with the frequency rate for the preceding period.* For example, the comparison may be between the past year's frequency rate and the previous year's frequency rate. The question would be: did we do better last year than for the year before? If the more recent frequency rate is lower, there has been progress or improvement. If the more recent frequency rate is higher, there has been deterioration or worsening of performance. The greater the difference between the two successive frequency rates, the greater the improvement or deterioration, depending upon the direction of the difference.

The above basic method of using the frequency rate to determine whether or not there have been any progress can be extended by *comparing the frequency rates of many successive periods graphically.* To do this, we plot a series of successive injury frequency rates on graph paper. If such a plot reveals a downward *trend,* that means gradual progress or improvement is being made. If it shows an upward trend, that means a steadily poorer performance. There is also the possibility that the trend will be neither down nor up. That means a static situation; safety performance is getting neither better nor worse. The three basic trends are shown in Figure 2.

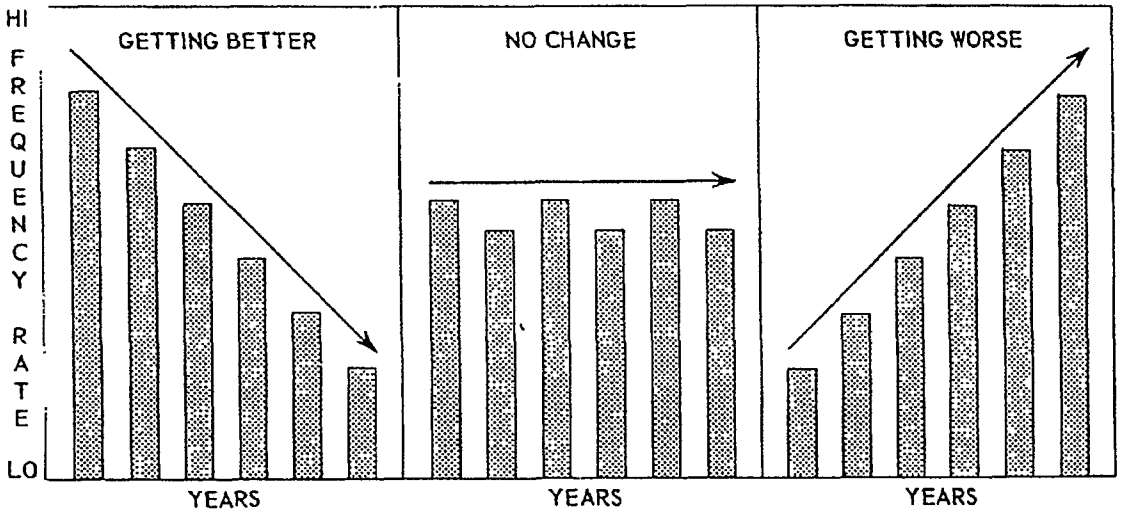

FIG. 2. THREE BASIC FREQUENCY RATE TRENDS. Each bar represents a disabling injury frequency rate. The downward trend means steady improvement. The horizontal trend means no change. The upward trend means steady deterioration. All actual trends are variations of these three basic trends.

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As a supervisor, you should be interested in the disabling injury frequency rate of your company, plant, or department. How do the current injury frequency rates compare with those of the past? That's the basic question. They say the proof of a recipe is in the eating. It is the same way with an accident prevention program. The proof of the program is in the injury frequency rate trend. A downward trend says the accident prevention program is on the right track.

DISABLING INJURY SEVERITY RATE #8

The disabling injury frequency rate tells only part of the disabling injury story. It tells how many such injuries occurred per million man-hours worked. However, it does not tell *how serious* the disabling injuries were. For example, a fatal injury carries no more weight than a two-day temporary disabling injury in the calculation of a disabling injury frequency rate.

Obviously, then, we need another yardstick to give us the *severity* picture so we can measure progress from a severity stand point as well as a frequency stand point. That brings us to the *disabling injury severity rate.*

There are some preliminaries you must understand first before we discuss how to calculate and interpret disabling injury severity rates. Whenever a disabling injury occurs, a *severity charge* of so many *days* is made against the responsible unit, e.g. the company, plant, division or department. The number of days charged for temporary total disabilities is equal to the number of full consecutive days that the injured person has lost from work. Thus, if he loses 8 days before returning to regular work, the charge is 8 days. The number of days charged for a fatality or permanent disability is determined by consulting a standard schedule of charges established by the American Standards Association. Most companies, including Armco, adhere to the A.S.A.'s schedule of charges for purposes of calculating severity rates. Ordinarily, supervisors don't need to know the schedule of charges. However, you should know the principle involved. According to the A.S.A.'s schedule, the standard charge for a fatality is 6000 days. (That's about 24 years of work if you figure a man works 5 days a week for 50 weeks a year.) The charge for the loss of an arm is 4,500 days. The charge for the loss of an eye is 1,800 days. Thus, there is a charge of so many days for each kind of permanently disabling injury. The principle is, *the more severe the injury, the greater the number of days charged.*

Day charges are totaled as the number of disabling injuries accumulate. For example, a department that has a fatality (6,000 days) and a loss of one eye case (1,800 days) has accumulated a total charge of 7,800 days. Safety personnel usually keep track of such charges, and they know what the accumulated total is as the year progresses.

Calculation of the severity rate. To calculate the severity rate, you need to know (1) the total number of days charged against the unit, e.g. company, plant, etc. and (2) the number of man hours worked. The calculation is as follows:

$$\text{SEVERITY RATE} = \frac{\text{TOTAL DAYS CHARGED} \times 1{,}000{,}000}{\text{TOTAL MAN-HOURS WORKED}}$$

For example, if a plant had a total of 200 days charged against it in a particular period in which 500,000 man-hours were worked, the severity rate would be:

$$S = \frac{\text{200 days ch'g'd} \times 1{,}000{,}000}{\text{500,000 man-hours worked}} = \frac{200{,}000{,}000}{500{,}000} = 400$$

Like a frequency rate, a severity rate can be calculated for any size unit, e.g. company, division, plant, department, or even smaller unit, and for any time period, e.g. month, quarter, or year. Frequency rates can be calculated for either disabling or non-disabling injuries. Severity rates reflect disabling injury accidents only.

Interpretation of the severity rate. The injury severity rate tells us the number of days of lost time charged against a unit per million man-hours worked. The less severe the disabling injuries incurred, the fewer the number of days charged. The fewer the number of days charged, man-hours constant, the lower the severity rate. The lower the severity rate, the better. Zero disabling injuries means zero severity rate. A zero severity rate, therefore, is a perfect performance.

The disabling injury severity rate is used to appraise injury severity progress in the same way as the frequency rate is used to appraise

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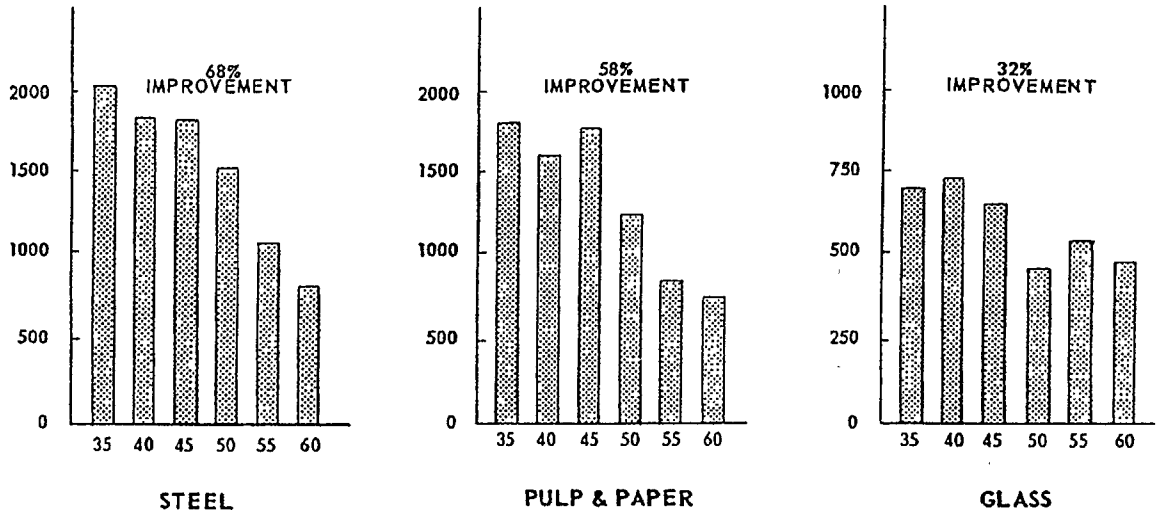

FIG. 3. THREE INDUSTRY SEVERITY RATE TRENDS. Each bar represents the average severity rate for a five year period. Which of the three industries do you think shows the most improvement in severity rate reduction? (Based on National Safety Council Data.)

injury frequency progress. The basic method is to compare the severity rates of successive periods. Figure 3 shows the severity rate trends of three industries based on National Safety Council data. Which industry do you think shows the most progress in severity rate reduction?

Of the two yardsticks for measuring safety progress, that is, frequency rate and severity rate, the former is more widely used and gets more attention. That is partly because a reduction in frequency rate reflects a reduction in the number of disabling injury *accidents* more accurately than does a reduction in severity rate. Nevertheless, the severity rate is a useful measure for evaluating safety progress. It tells us whether we are making any improvement in reducing the severity of injuries. And that's something we would all like to see.

THE FACTS ABOUT SAFETY PROGRESS #9

The Pittsburgh Survey is several generations old. How much progress have we made in preventing industrial accidents since then? Have we appreciably reduced the rates of industrial fatalities and other disabling injuries?

Happily, the answer to these questions is favorable. Steady progress has been made through the years. True, not all industries and companies have done equally well. Some have forged ahead enthusiastically, establishing remarkable safety records and proving what can be done when management is determined to do it. Others have been slow to accept the challenge, with the result that improvement has been less dramatic. Nevertheless, there is not an industry that has been in existance for thirty or more years that has not greatly reduced its disabling injury frequency rate. Let's look at some of the facts.

First, let's take another look at Allegheny County, fifty years after the Pittsburgh Survey. What progress has been made there? Figure 4 tells the story. The death calendar of the Pittsburgh Survey has been transformed into diagonally lined bars. Each such bar represents the number of persons killed in one month in the year from July 1906 to June 1907, the year of the Pittsburgh Survey. To the right of each grey bar is a black bar. The black bars tell how many persons died from work injuries in Allegheny County for the period from July 1956 to 1957. Compare the bars month by month. Notice the tremendous reduction in industrial fatalities in the fifty year period. The progress represented by the reduced number of industrial fatalities is all the more significant when one realizes that Allegheny County's working population has almost tripled since 1907.

Allegheny County's reduction of industrial fatalities through the years is not an exception. The industrial fatality rate has been decreasing steadily for the nation as a whole. Figure 5 shows the decline in the industrial death rate. The decline in death rate represents a saving of hundreds of thousands of lives in the last thirty years.

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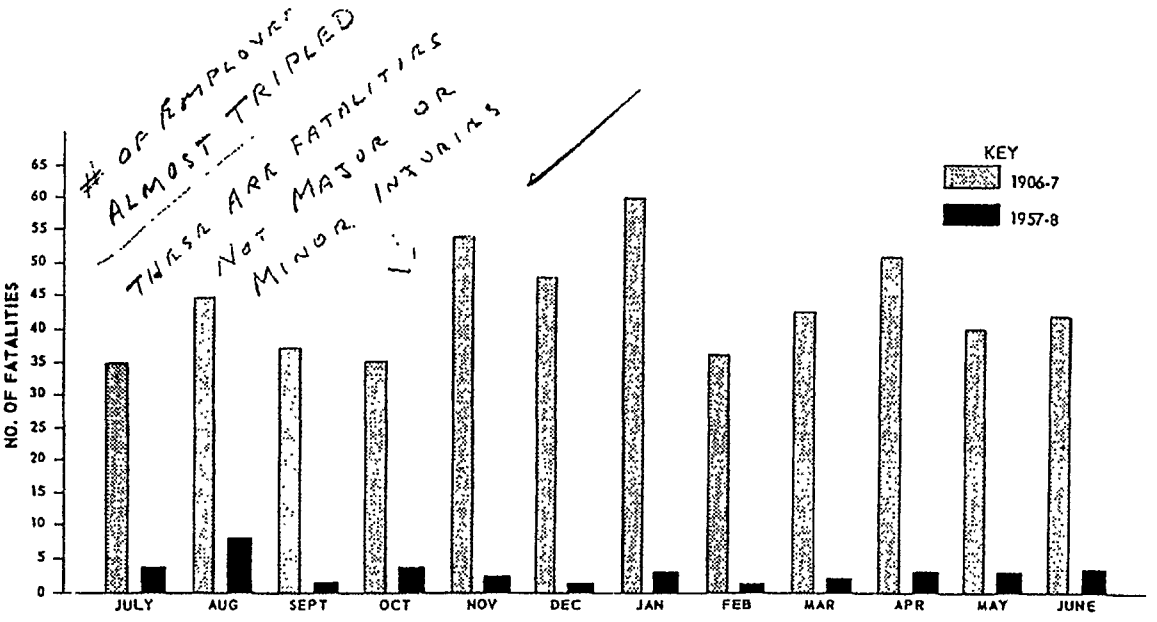

FIG. 4. FIFTY YEARS OF PROGRESS. The grey bars represent the number of industrial fatalities in Allegheny County each month of the year from July 1906 through June 1907. The adjacent black bars represent the fatalities in the same county fifty years later. Does the comparison suggest progress?

Now, let's look at the nation's progress in reducing the disabling injury frequency rate. Figure 6 tells the story for more than 7,000 companies that report their accident facts to the National Safety Council. The chart shows how disabling injury frequency and severity rates have declined since 1926. The frequency rate has been reduced by 87 percent since 1926, and the severity rate by 71 percent. Those percentages are more meaningful when you understand that the improvement represents millions of disabling injuries that did not occur because of organized accident prevention.

Our basic industries have also made notable progress. Figure 7 shows how the disabling injury frequency rates have declined in some major industries. Each bar represents the average disabling injury frequency rate for a five year period. Similar charts could be made for other industries. There is not an industry that has not made substantial progress. Even so, some industries, e.g. mining, lumbering, and marine transportation, have disabling injury frequency rates twenty to thirty times greater than the lowest industry frequency rate.

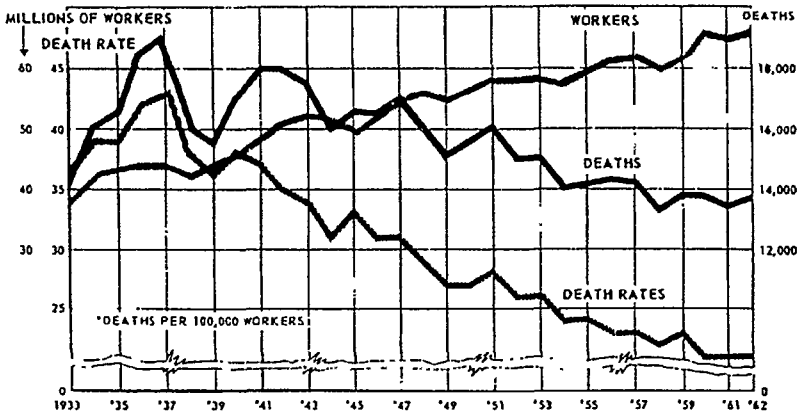

FIG. 5. THE NATIONAL DEATH RATE TREND. The striped line shows the decline in industrial fatality rates since 1933. The solid dark line shows the actual number of industrial fatalities. What conclusions can you draw about accident prevention progress? (National Safety Council Graph.)

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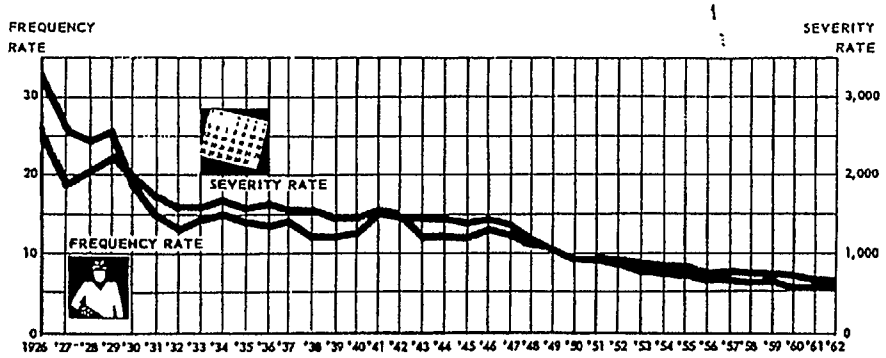

FIG. 6. THE NSC FREQUENCY AND SEVERITY RATE TREND. The solid dark line shows how the national frequency rate has declined since 1926. The striped line shows the decline of the national severity rate. What conclusions can you draw about accident prevention progress? (National Safety Council Graph.)

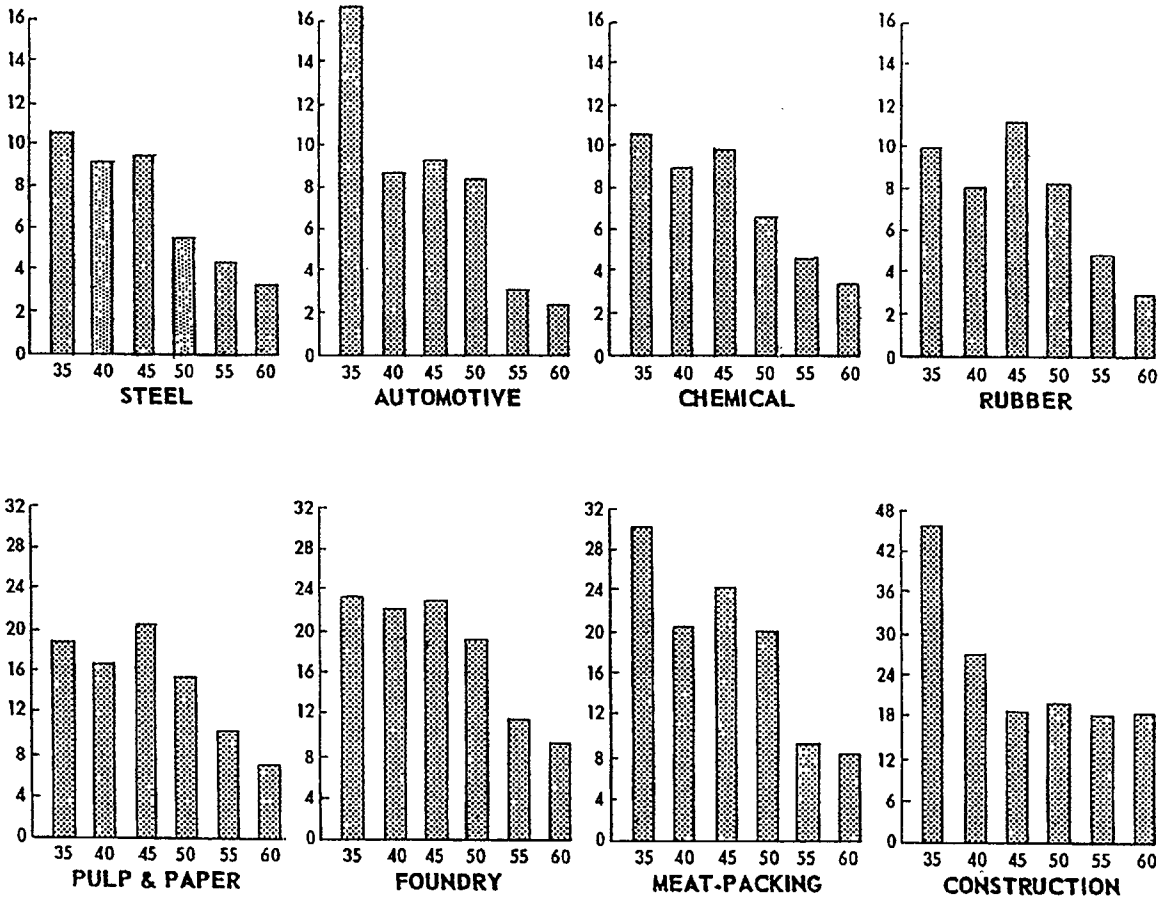

FIG. 7. SOME INDUSTRY FREQUENCY RATE TRENDS. Each bar represents the average disabling frequency rate for a five year period. Notice how the war years increased frequency rates. What conclusions can you draw from these industry frequency rate trends? (Based on National Safety Council data.)

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The progress shown by the basic industries is, of course, also reflected in the frequency performance of the companies that make up the industries. There are no nationally known companies that have failed to show steady gains in accident frequency reduction. Figure 8 shows the progress made by Armco. The pattern of the declining frequency rate trend is fairly typical of the steel industry. Notice the sharp reduction in frequency rates during the early years of safety effort, followed by a more gradual reduction. Notice also the irregularity of the downward trend. Each succeeding year did not bring about a reduction. Sometimes there were temporary setbacks. Notice finally how the frequency rates went up during the years of World War II. Why do you suppose accidents increased during the war years?

CONCLUSIONS DRAWN FROM PROGRESS FACTS #11

We have seen how the injury frequency and severity rates have declined more or less steadily through the years. What important conclusions can you draw from these facts of progress? Three major conclusions that can be drawn:

ACCIDENTS CAN BE PREVENTED

The steadily decreasing frequency rates of Armco and other safety-minded companies prove beyond a doubt that accidents can be prevented. They also testify to the effectiveness of organized accident prevention. The amount by which the national disabling injury frequency rate has been reduced since the rate was first compiled has meant annual savings of tens of thousands of lives and millions of crippling injuries. Those are the savings of prevented accidents.

IMPROVEMENT HAS NO LIMIT

Throughout the years, there have always been some people who have argued that the limit of improvement had been reached or was in sight. Such people hold to the theory that there is an "irreducible minimum" frequency rate for every type of industry beyond which no further improvement can be made. The facts of progress have always proven such people wrong. It is true that industries as well as companies have had periods of several years without showing improvement. Frequency rates do sometimes appear to level off. However, time after time, such periods have given way to the achievement of record-breaking, low frequency rates. Therefore, the only sensible conclusion is that *there is no limit to improvement.* Continued reduction of frequency and severity rates is largely a matter of how much determination, imagination, and effort is applied to the problem.

IMPROVEMENT IS SLOWING UP

In addition to demonstrating steady improvement, the frequency rate trends also indicate that the amount of improvement per year is getting smaller as the years go by. That suggests it is more difficult to reduce frequency rates today than a generation or so ago. Why should that be? Perhaps it is because the worst hazards of yesteryear have been eliminated. Safety engineering has accomplished much in bringing about safe working environments. The area of greatest challenge today is not the workman's environment but the workman himself. Perhaps that is why it is increasingly difficult to demonstrate further improvement in some industries and companies. It is a lot easier to design a machine guard or to improve illumination than to develop cooperative attitudes and safety mindedness in men.

The fact that improvement has slowed up at Armco means only one thing. We have to apply more effort and greater imagination to reach new lows. There is no "irreducible minimum" as far as Armco management is concerned. We can do better. We will do better.

DO NEW & OLD THINGS BETTER

THE INDUSTRIAL ACCIDENT PROBLEM TODAY 12

Now that you are aware of the tremendous progress made in reducing industrial accidents, you may draw the conclusion that the industrial accident problem today is no longer serious. Here are some facts from the National Safety Council. Think about them, and judge for yourself whether or not we still have a serious industrial accident problem.

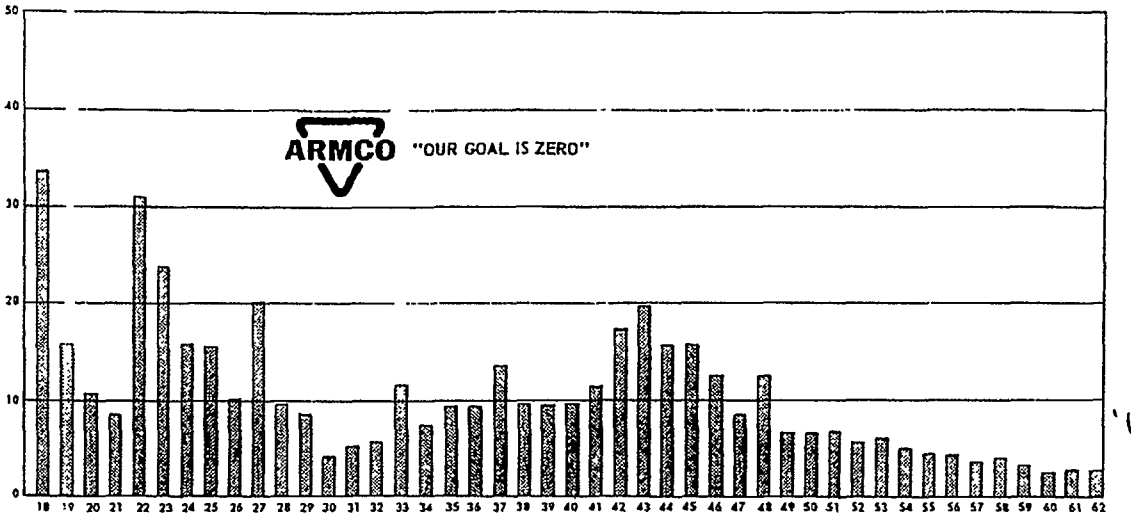

Fig. 8. ARMCO SAFETY PERFORMANCE THROUGH THE YEARS. The graph shows the progress that Armco has made in reducing disabling injury frequency rates. Incidentally, how does Armco's recent performance compare with the steel industry average shown in Figure 7?

A RECENT FIVE YEAR PERIOD

In the five year period from the beginning of 1956 to the end of 1960 about 70,000 persons were killed or died as a result of injuries suffered in occupational accidents. While that is considerably less than the 185,000 motor vehicle fatalities that occurred in the same period, it is still an awesome and tragic toll. Who can calculate the heartache and misery that lies behind such figures? What will the next five year period (1961-1965) show?

In the same five year period almost 400,000 persons suffered various degrees of permanent disabling injuries as a result of occupational accidents. That is a jarring figure when you stop to think that permanent disabilities include such conditions as blindness, amputations, paralyzed body parts, and other forms of incapacity.

In the same five year period more than 9,100,000 temporary disabling injuries were reported. Those 9,100,000 people recovered fully from their injuries, but only after days, weeks, and even months of convalescence. Their losses in earnings ran into hundreds of millions of dollars.

There is no count of the number of non-disabling injuries that occurred in the 1956-'60 five year period. A conservative estimate would be about 750,000,000 non-disabling injuries. While these are relatively minor injuries, they nevertheless represent millions upon millions of lost productive man-hours through job interference and minor medical attention.

Now, here is one last figure to think about. The National Safety Council estimates the total cost of all occupational accidents for the above five year period to be about $19,350,000,000. That total cost includes compensation costs, medical and surgical costs, hospitalization costs, insurance costs, legal costs, lost production costs, equipment damage costs, and a host of lesser costs. There is no question about it – accidents are costly.

Now you have the facts. Do you think our industrial accident problem is still serious? Can anyone argue that we don't have a problem when in five years so many people are killed, maimed, and otherwise injured at so great a cost?

A RECENT FIVE YEAR PERIOD AT ARMCO

Despite Armco's tremendous safety improvement over the years, there is still need for greater improvement. Here are some figures that tell why. In the five year period 1958-1962, twenty-five Armco employees lost their lives. Three more suffered permanent total disabilities. Two hundred and nine others were permanently partially injured, such as the loss of an eye, a foot, or a hand. Another 798 lost time from work,

ranging from days to many months, because of temporary total disabilities.

The record also shows there were 91,000 non-disabling injury accidents in this five year period. Armco was charged with 348,000 days of lost time because of disabling injuries. With those facts, can anyone doubt the need for further improvement at Armco?

CHECK YOURSELF ON THESE QUESTIONS

1. What are the four kinds of disabling injury? What is a non-disabling injury?

2. Why can't a company's safety progress be evaluated by merely comparing the number of accidents it has each year?

3. How is an injury frequency rate calculated? Can an injury frequency rate be calculated for a period more or less than a year? Can it be calculated for organizational units smaller than a company, such as plants, divisions, departments, etc.?

4. Can a frequency rate be calculated for non-disabling injuries? Why would anyone want to establish the frequency rate for minor injuries?

5. What does the disabling injury frequency rate tell us? What is a perfect injury frequency rate?

6. How are frequency rates used to measure accident prevention progress? What does it mean when we say a frequency rate has an upward trend?

7. What does a disabling injury severity rate tell us? How is a severity rate calculated? What is the principle that governs the number of days charged against a company for a disabling injury?

8. How would you describe the progress that has been made in preventing accidents since the days of the Pittsburgh Survey? In what direction have the frequency and severity rates gone?

9. What three major conclusions can be drawn from the declining frequency and severity rates?

10. If some one told you there was no longer much of an industrial accident problem, what would you say? Could you cite any facts to prove he was wrong?

11. Does Armco still have a considerable accident problem? Can you cite any facts?



PERSONNEL SERVICES

SAFETY AUDITS

CORRECTIVE DISCIPLINE

GOOD HOUSEKEEPING

PURCHASING CONTROLS

PERSONAL PROTECTIVE EQUIPMENT

JOB SAFETY ANALYSES

FORECAST CHARTING

SAFETY STAFF SERVICES

ACCIDENT DATA ANALYSIS

SAFETY RULES AND REGULATIONS

EMPLOYEE SAFETY CONTACTS

PLANNED SAFETY INSPECTION

HUMAN RELATIONS SKILLS

ENGINEERING LAYOUT AND DESIGN

PLANNED SAFETY OBSERVATION

NEW EMPLOYEE SAFETY ORIENTATION

SUPERINTENDENT SAFETY MEETINGS

ACCIDENT INVESTIGATION AND REPORTING

REGULAR SUPERVISORY SAFETY MEETINGS

"Use these tools and STOP ACCIDENTS"

FIG. 9. – ARMCO'S BASIC TOOLS FOR ORGANIZED ACCIDENT PREVENTION

accident and injury frequency rates. For example, he may establish frequency rate goals. They may also relate to plant safety activities, such as establishing a target date for the completion of some phase of the safety program.

4. *Provision of the necessary means.* The manager must also see that the necessary means are provided for carrying out the plant safety program. That means he must provide the personal time, money, and materials needed to make the program work. Unless he does so, all expressions of policy, program, and objectives become meaningless.

5. *Stimulation of earnest efforts.* Here is a key responsibility. The manager must motivate all members of plant management to make an earnest effort in carrying out responsibilities. He must convince all concerned that he is serious about achieving plant safety objectives, and that he expects all levels of plant management to do their assigned part in the program. One of the best ways for him to stimulate others is to demonstrate his willingness to devote personal time and effort to promote accident prevention.

6. *Evaluation of progress made.* The manager is responsible for establishing the necessary controls to audit the safety program and to evaluate its effectiveness. He must hold his superintendents responsible and accountable. He must discuss the results of his evaluations with the superintendents under him. If necessary, he must be willing to speak frankly and firmly where there has been a lack of progress. Only by doing so, can he stimulate the efforts of subordinates whose pace has fallen off.

7 *Adherence to federal, state, and local safety codes.* The manager is responsible for his plant's adherence to federal, state, and local safety codes. He must make certain his superintendents are aware of the codes that apply to their operations, and he must establish the necessary control procedures to ensure compliance with the codes.

The above responsibilities do not mention the specific safety activities in which managers should engage. Such details are best left to their individual judgment. The manager who seeks guidance on such specifics will find it in this manual.

RESPONSIBILITIES OF THE SUPERINTENDENT*

The department superintendent's responsibilities in connection with accident prevention are as follows:

1. *Management of plant program.* The superintendent is responsible for the management of the plant accident prevention program as it applies to his area or department. He is also expected to take action to supplement the plant program according to the specific needs of his department.

2. *Safety meetings with supervisors.* He should establish and *personally* conduct a program of regular safety meetings with his supervisors. The meeting should be a two-way communication for the discussion of safety problems and accident prevention activities. As needed, the meeting should stress such topics as recent accidents, inspection findings, safety contacts and observations, progress in JSA work, and similar matters.

3. *Accident investigation.* The superintendent is responsible for the prompt investigation of all injury-producing accidents, as well as major accidents involving no injuries. He is expected to participate personally in the investigation of disabling injury accidents, and review and sign the reports of such accidents when prepared by those under his supervision. He must act to have poorly written reports corrected at their source.

When he sees the need for corrective action to prevent recurrence of an accident, he should promptly order such corrections.

4. *Safety inspections.* He is also responsible for installing and controlling a planned safety inspection program in his area or department. He is expected to analyze the inspection requirements of his department, assign areas of inspection responsibility to his supervisors, and see that the inspection program is carried out.

In addition, he is expected to conduct a formal inspection of his departmental areas at least once a month, giving particular attention to fire, explosion, and housekeeping

* Has reference to area and department superintendents.

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hazards. He is also expected to develop a control procedure to assure that hazardous conditions are corrected.

5. *Job safety analysis.* The superintendent is responsible for installing and managing a job safety analysis program in his department. He is expected to approve jobs selected for analysis, establish schedules for the completion of job safety analyses, and review those completed by his supervisors.

In addition, he is responsible for seeing that job safety analyses are used for the instruction of employees.

6. *Planned safety observations.* He is also responsible for installing and managing a planned safety observation program in his department. This includes planning, organizing, leading, and controlling the program.

7. *Planned safety contacts.* The superintendent is responsible for installing and managing a planned employee safety contact program. This includes planning, organizing, leading, and controlling the program so as to achieve the maximum benefits.

8. *Development of safety rules.* The superintendent is expected to establish and implement a procedure for developing *departmental* safety rules and regulations. Such rules may supplement, but not conflict with plant safety rules. They must be put in writing, and communicated to the employees to whom they apply.

9. *Initial safety orientation and job instruction.* The superintendent is responsible for establishing and managing a program for the initial safety orientation and job instruction of employees new to a particular job. He is expected to see that the program is effectively carried out by his first-line supervisors.

10. *Maintenance of safety discipline.* He is also responsible for the maintenance of safety discipline in his employees. He should see that his supervisors apply approved measures of preventive and corrective discipline to ensure employee compliance with safety rules and regulations and recommended safe job procedures.

11. *Analysis of accident data.* The superintendent's responsibility includes establishing and implementing a procedure for cumulative analysis of accident report data in order to identify repetitive causes of accidents where safety personnel are not available to provide such service.

12. *Adherence to federal, state and local safety codes.* The superintendent is responsible for adherence to federal, state, and local safety codes in the operations under his supervision. Particular attention must be paid to licensing requirements.

13. *Interdepartmental cooperation on safety matters.* He must cooperate with other departments where there is a material responsibility for the safety of employees. Major repair, maintenance, or construction work should always be preceded by interdepartmental consultation and planning.

14. *Development of proper safety attitudes.* The superintendent is responsible for the development of attitudes of safety mindedness in his supervisory and non-supervisory employees. He is expected to convey a personal concern for employee safety, and to back up that concern by personal example.

SHOULD ANY BE ELIMINATED? Discussion

RESPONSIBILITIES OF GENERAL SUPERVISORS*

The general supervisor's responsibilities in connection with accident prevention are as follows:

1. *Management of plant and departmental safety program.* The general supervisor is responsible for managing the plant and departmental safety program as it applies to his section. He is expected to take additional steps beyond the requirements of these programs as required by the operations he supervises.

2. *Supervisory safety training.* He is also responsible for supplementing the basic accident prevention training given to his supervisory force with personal and group instruction as required. He must see that they have the know-how and skill necessary to carry out their assigned safety duties.

* Has reference to middle-line supervisors such as general foremen, master mechanics, maintenance supervisors, and others who directly supervise first-line foremen.

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3. *Supervisory safety meetings.* The general supervisor is expected to conduct regular safety meetings with his supervisors to keep them informed on safety matters originating with higher management and to discuss safety problems concerning his operations.

4. *Accident investigation.* He is expected to participate in the investigation of all disabling injury and near-injury accidents that occur to employees under his general supervision. He should review all accident reports originating in his section, and take steps if needed to upgrade the quality of accident investigation and reporting.

He is also responsible for following-up on corrective actions ordered to prevent recurrence of an accident.

5. *Planned safety inspections.* The general supervisor is responsible for controlling the departmental planned safety inspection program. This includes conducting his own planned inspections, reviewing safety inspection records, and spot-checking recently inspected facilities and equipment. In general, he is expected to prevent and if necessary correct unsafe conditions in his section.

6. *Job safety analyses.* He is also responsible for administering the job safety analysis program in his department. This includes scheduling and assigning jobs to be analyzed, establishing job safety analyses completion dates, reviewing drafts, getting job safety analyses approved, and arranging for their reproduction and distribution.

7. *Planned safety observations.* The general supervisor is responsible for seeing that his supervisors meet the minimum requirements of the planned safety observation program. He is expected to review observation records and check as needed with men who have been recently observed.

He is also expected to conduct planned safety observations of his own to assure that employees are following recommended safe job procedures.

8. *Planned safety contacts.* His responsibility includes seeing that his supervisors meet the minimum requirements of the planned safety contact program. He is expected to review contact records, and check now and then with men who have been recently contacted.

He is also expected to audit group safety contacts made by his supervisors to determine their quality.

9. *Initial safety orientation and job instruction.* General supervisors are expected to see that their supervisors properly orient and instruct employees who have been assigned to a new job position.

10. *Development of safety discipline.* The general supervisor must see that his supervisors understand and apply approved methods for developing a sense of safety discipline in their men. When necessary, he is expected to assume an active role in the handling of a disciplinary problem. He is also expected to correct any employee seen acting unsafely where there is an immediate danger. Otherwise, he should bring such matters to the attention of the appropriate supervisor.

11. *Personal protective equipment.* He is also expected to administer the departmental program of required personal protective equipment. This includes seeing that his supervisors enforce the use of such equipment where required. He is also expected to correct any employee seen not using required equipment.

RESPONSIBILITIES OF THE FIRST LINE SUPERVISOR* #21

The activities of the first-line supervisor are of major importance in accident prevention. If accidents are to be prevented, employees must be trained to work safely. They must be made more safety-minded by regular safety contacts. Their tools, equipment and work areas must be inspected regularly for unsafe conditions. Their accidents must be investigated to determine causes and corrective actions.

All such activities require direct contact with employees and their work environment. The first-line supervisor, more than other members of plant management, has day-in, day-out contact with employees and their work areas. He has the best opportunity to train, guide, and influence employees to work safely. That's why he has such a key role in accident prevention.

* Has reference to members of plant management who directly supervise the activities of non-management employees. Included are foremen and turnforemen.

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The attitudes of the first-line supervisor toward safety and accident prevention have a great influence on the safety attitudes of his men. He represents management to his men. Consequently, what he says and does is often taken as a reflection of plant management views. If he acts lukewarm or indifferent to his own safety responsibilities, he will convey the idea that management is indifferent to safety. Conversely, if he meets his responsibilities with enthusiasm and concern, his men are more likely to be cooperative and less likely to take unnecessary risks. The result is fewer accidents.

Let's now consider the basic responsibilities of the first-line supervisor with respect to accident prevention. They are as follows:

1. ***Responsibility for assigned personnel.*** The first-line supervisor is responsible for the safety of all employees regularly assigned to him. This means that he is authorized to take any reasonable action required to prevent an accident where an immediate danger exists. It also means he is expected to carry out the responsibilities described hereafter.

2. ***Responsibility for nonassigned personnel.*** He also shares a responsibility for personnel not assigned to him who may be working in his area. He should acquaint himself with the nature of their work, and see that they take precautions to protect departmental employees from hazards associated with their work.

When such employees work without supervision of their own, the supervisor is responsible for their adherence to safe working procedures.

3. ***Initial safety orientation and job instructions.*** The supervisor is responsible for seeing that his assigned personnel know plant and departmental safety rules and regulations, established safe job procedures, and all major hazards associated with their work and work areas. Toward this objective, he is responsible for the initial safety orientation and job instruction of employees newly assigned to job positions under his supervision. (See Chapter 9 for details of this responsibility.)

4. ***Employee safety attitudes.*** He is also expected to develop a cooperative safety attitude in his men through the application of approved methods of preventive and corrective discipline. It is expected that he will rely primarily on education and friendly persuasion plus setting the right example for his men.

Employees who are chronically noncooperative in safety matters must be dealt with firmly in accordance with approved plant procedures. (See Chapters 10 and 11 for details of this responsibility.)

5. ***Job safety analyses.*** The first-line supervisor is expected to carefully prepare all Job Safety Analyses assigned to him. He is responsible for using the approved results of such studies in his planned safety contacts and safety observations. He is also expected to enforce the recommended safe job procedures resulting from Job Safety Analyses. (See Chapter 5 for details of this responsibility.)

6. ***Planned safety observations.*** He is also responsible for conducting planned safety observations in accordance with plant minimum requirements. The purpose of such observations is to determine whether or not his men are working safely. He is expected to correct promptly all observed unsafe practices. (See Chapter 6 for the details of this responsibility.)

7. ***Planned safety contacts.*** The first-line supervisor is responsible for conducting regular planned safety contacts in accordance with plant minimum requirements. The purpose of such contacts is the continuing education of all employees in safety matters. The primary emphasis should be on personal safety contacts that are related to the employee's work. (See Chapter 9 for the details of this responsibility.)

8. ***Planned safety inspections.*** He is also responsible for conducting planned safety inspections in his assigned area of responsibility. He is expected to maintain approved inspection records. When confronted with an unsafe condition, he must order correction or report the condition together with his recommendations to his line superiors. If necessary, he must take suitable temporary precautions to remedy unsafe conditions until

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higher supervision has acted to correct such conditions. (See Chapter 7 for details of this responsibility.)

9. *Area housekeeping.* The first-line supervisor has responsibility for maintaining satisfactory standards of housekeeping in his assigned area. (See Chapter 7 for a general description of housekeeping standards.)

10. *Employee medical care.* He is expected to see that his men receive prompt medical treatment for all injuries, no matter how slight. He should prohibit self-treatment of injuries by his men, and should not himself give such treatment except where emergency first-aid is required.

11. *Accident investigation.* The first-line supervisor must investigate all accidents to personnel and equipment brought to his attention. He is also expected to investigate potentially serious near-accidents that occur in his area.

Accidents must be reported on the approved accident report form in accordance with published instructions. (See Chapter 8 for details of this responsibility.

12. *Employee fitness to work.* The first-line supervisor is expected to be alert for temporary or chronic physical or mental conditions in the employees under his supervision which may cause such employees to be safety risks. When such conditions are spotted, they are to be dealt with according to plant approved methods. (See Chapter 11 for details of this responsibility.)

A FINAL WORD. Sometimes a supervisor makes the mistake of thinking that the safety program implied by the above responsibilities is someone else's program. Don't make the same mistake. These responsibilities are *your* program of action to prevent accidents to *your* men. If every supervisor recognizes that, Armco will reach its objective: *To achieve a year by year reduction in frequency and severity rates until they stand at zero.*

RESPONSIBILITIES OF THE #23 SAFETY SUPERVISOR

The major responsibilities of the plant safety supervisor are as follows:

1. *Plant safety inspection program.* The plant safety supervisor is responsible for developing and implementing a departmental safety inspection program so that each department gets the benefit of at least two planned inspections per year. Such formal inspections are to be over and above the day to day informal inspections conducted by safety staff personnel. Inspection findings are to be reported to the responsible department heads.

2. *Departmental safety audits.* The safety supervisor or a member of his staff is expected to participate in departmental safety audits. Where they are not yet part of the plant program, the safety supervisor is responsible for initiating a program of departmental safety audits to be carried out by his office. Findings are to be reported to the responsible department heads.

3. *Accident data analysis.* He is also responsible for establishing and maintaining a procedure for analyzing data accumulated in accident reports. The main emphasis of the analysis should be to identify jobs that repetitively produce accidents and the underlying causes of such accidents. Each department should be provided with an annual analysis of its accident data.

4. *Safety performance and activities statistics.* The safety supervisor shall develop and report monthly to plant management those essential statistics which describe both plant accident performance and supervisor safety activities.

5. *Divisional and corporate accident data reports.* He is also responsible for reporting all disabling injury accidents to divisional and corporate headquarters within 24 hours after the occurrence of a disabling injury has been established.

6. *Special safety studies.* The safety supervisor is responsible for conducting special studies of major plant hazards that come to his attention, and reporting his findings and recommendations to plant management. He is expected to make such studies on his own initiative when the facts warrant.

7. *Participation in accident investigation.* He is also expected to participate in the investigation of disabling injury and serious near-disabling injury accidents. Such in-

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vestigations are to be conducted jointly with other members of plant management in accordance with the established plant procedure.

8. *Review of non-disabling injury accident reports.* The safety supervisor and his staff are responsible for reviewing non-disabling injury accident reports submitted to his office. He is expected to follow up on cases that warrant further investigation or a reconsideration of reported corrective actions to prevent recurrence. Where the facts suggest that departments are not doing a quality job of completing the accident reports, he is expected to take steps to improve the quality of accident reporting.

9. *Communication of federal, state, or local safety codes.* The safety supervisor is expected to keep abreast of changes in federal, state, and local safety codes, and to communicate such information to plant management.

10. *Advisory services.* He and his staff are expected to provide advisory services on technical and other safety matters at the request of members of plant management. To increase his capability for providing such services, he should maintain an up-to-date library of technical safety literature. He is also expected to keep himself abreast with new developments in the industrial safety field.

11. *Plant safety rules and regulations.* He is expected to advise the plant manager on the need to revise or add to published plant safety rules and regulations.

12. *Personal protective equipment.* The safety supervisor is also responsible for evaluating and approving the types of personal protective equipment required by plant policy. He is expected to recommend the use of special protective equipment where there is a need for such. His responsibility includes the purchase, storage, and distribution of protective equipment issued or sold to employees.

13. *Planned safety observations.* The safety supervisor is expected to correlate a program of planned safety observations with his program of departmental safety inspections. Findings as to unsafe practices are to be included in his departmental inspection reports.

14. *Coordination with engineering.* Safety supervisors should work closely with plant engineering departments during the development and construction phase of new facilities. Similar coordination should be maintained with maintenance departments when major facility repairs or revision are undertaken.

15. *Coordination with purchasing.* The safety supervisor is expected to establish a procedure to ensure that only safe tools, equipment, and supplies are purchased for plant use. He shall advise the purchasing department on prohibited supplies and materials.

16. *Chargeability of major injuries.* It is the safety supervisor's responsibility to advise the plant manager on whether or not an injury is to be classified as a chargeable disabling case. He is expected to be guided by the ASA Z-16 Code to which Armco adheres.

A FINAL WORD ABOUT RESPONSIBILITIES

The foregoing responsibilities of managers, superintendents, general supervisors, first-line supervisors, and safety supervisors constitute the basic Armco accident prevention program. Their strength lies in their collective application. Only if all members of a plant management accept their responsibilities with conviction and willingness will the plant achieve its objective: TO ACHIEVE A YEAR BY YEAR REDUCTION IN INJURY FREQUENCY AND SEVERITY RATES UNTIL THEY STAND AT ZERO.

SAFETY AND THE PROFESSION OF MANAGEMENT.

The basic functions of a manager are to PLAN, ORGANIZE, LEAD, and CONTROL. The details of these functions have been covered in Armco's *Profession of Management* program. In this manual, these functions are discussed in terms of their application to managing an accident prevention program. Each of the basic tool chapters of the manual ends with a discussion of how managers, superintendents, and general supervisors should plan, organize, lead, and control the application of the tool. Thus, for example, there is a section on managing a job safety analysis program at the end of the chapter on job safety analysis.

Invariably, where a plant or department is weak in the *application* of a safety program, it is because the functions of planning, organizing, leading and controlling have been inadequately exercised. The principles of management are just as applicable to the problem of preventing accidents as they are to production and product quality problems. That is so because basically production, product quality, and safety are only different aspects of the same problem - managing an efficient and effective organization.

CHECK YOURSELF ON THESE QUESTIONS

1. What is Armco's basic safety objective?
2. What is the Armco approach to accident prevention?
3. What are the four requirements for an organized accident prevention program?
4. What is Armco general management's role in accident prevention?
5. What are the basic accident prevention responsibilities of a works or plant manager?
6. What responsibilities does a department superintendent have in terms of (1) safety meetings, (2) accident investigation, (3) safety inspections, (4) job safety analysis, (5) safety observations, (6) employee safety contacts, (7) safety rules, (8) safety discipline, (9) analysis of accident data, and (10) federal, state, and local codes?
7. What responsibilities does a general supervisor have for (1) supervisor safety training, (2) supervisor safety meetings, (3) accident investigation, (4) safety inspections, (5) job safety analyses, (6) planned safety observations, (7) planned safety contacts, (8) initial employee safety orientation and job instruction, (9) development of safety discipline, and (10) use of personal protective equipment?
8. Why does the first line supervisor have such a key role in accident prevention?
9. Why are the attitudes of the first-line supervisor on accident prevention so all-important?
10. What responsibilities does the first line supervisor have for (1) assigned personnel, (2) non-assigned personnel, (3) safety orientation of new employees, (4) employee safety attitudes, (5) new employee job instruction, (6) job safety analyses, (7) planned safety observations, (8) planned safety contacts, (9) planned safety inspections, (10) area housekeeping, (11) employee medical care, (12) accident investigation, (13) employee fitness to work, and (14) personal example?
11. What responsibilities does the plant safety supervisor have for (1) plant safety inspections, (2) departmental safety audits (3) accident data analysis, (4) safety statistics, (5) corporate accident reports, (6) accident investigation, (7) review of non-disabling accident reports, (8) federal state and local safety codes, (9) plant safety rules, (10) personal protective equipment, (11) planned safety observations, and (14) coordination with engineering and purchasing?
12. Does the Profession of Management program have anything to contribute to accident prevention? What?