

# ACCIDENTS

# WILL

# HAPPEN



By Carrie Conaway

Illustrations by Seth

There's more to ensuring workplace safety than installing antiskid mats and keyboard drawers.

## So what improves workplace safety?

IN EARLY January of 2003, an ugly truth was finally brought to light. McWane Inc., a manufacturer of cast iron sewer and water pipe based in Birmingham, Alabama, made headlines as one of the most dangerous places to work in North America, following a nine-month investigation by the *New York Times*, *Frontline*, and the Canadian Broadcasting Corporation's *The Fifth Estate*. The company, employing 5,000 people, had more than 4,600 documented worker injuries since 1995, including nine deaths, and had been cited by the Occupational Safety and Health Administration for

“For a McWane manager...taking time for a safety or environmental problem holds few attractions. It means slowing production to fix equipment. It means more safety training, less time to make pipe.”  
—*New York Times*  
January 9, 2003

over 400 violations of workplace safety regulations.

Pipe manufacturing is a notoriously dangerous industry to begin with, but McWane’s injury rates were far above industry averages. Employees routinely worked 16-hour shifts without breaks in a super-heated workplace where temperatures sometimes reached over 130 degrees, with dust, dirt, and grime thickening the air and coating every surface. Safety guards were removed from machinery to speed their operation. Broken machines were kept in action. Managers even went so far as to cut costs by rationing crushed ice for workers’ drinks.

The very fact that the McWane story is so shocking is testimony to the fact that we now expect our workplaces to be clean, quiet, and safe. While McWane is surely not unique, it comes across more as a recalcitrant employer of a bygone era than as a typical modern business. But the McWane experience tells us more than just that times have changed. It also highlights the important role of the work environment—workplace regulations, economic conditions, insurance incentives, and organizational culture—in encouraging firms to embrace safety. And these same environmental factors reveal a great deal about workplace safety in society as a whole.

#### WORKPLACE SAFETY IN THE INDUSTRIAL ERA

The history of the early years of industrialization abounds with stories of the injuries, illnesses, and premature deaths associated with factory and farm work. Inspections of New England textile mills in the 1870s found poor ventilation, high levels of dust, noise, heat, and humidity, and frequent injuries. Many other common occupations of the era, such as making matches, tending tannery vats, and handling wool, also resulted in injuries and disease. While no consistent statistics on workplace safety

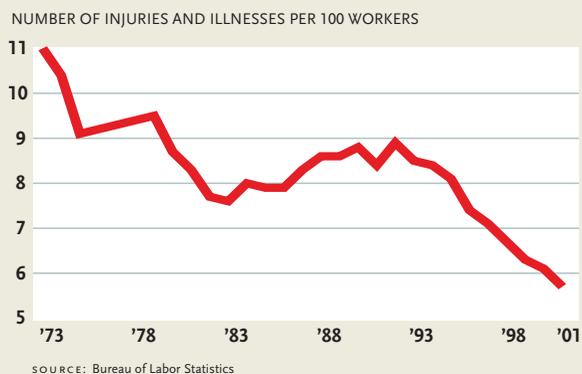
were collected at that time, accounts from the era indicate that workplaces were dangerous indeed.

But these dangers did not go unnoticed. Organizations concerned with working conditions started investigating the problems of workplace safety and health as early as the 1830s, not long after industrialization began. And beginning in 1869, when Massachusetts established the first state bureau of labor statistics, state agencies began collecting data and conducting inspections of workplaces to document both health and safety hazards and safe work practices. About a decade later, states also began to pass “factory acts” establishing regulations and inspections to ensure that workplaces had adequate ventilation, emergency exits, procedures for safe machinery repair, and so forth. Later on, Workers’ Compensation legislation spread quickly once it was first adopted in Wisconsin in 1911; 43 states had passed Workers’ Compensation laws by 1921. Even so, egregious behavior on the part of employers was not uncommon. Perhaps the best-known example is the Triangle Waist Company in New York City, where in March 1911, a fire broke out and 146 workers were trapped and killed because the exit doors were locked. But at the same time, historical research from the Bureau of Labor Statistics shows that there was less resistance from employers to the regulations than one might have expected—perhaps because making all employers comply eliminated any competitive disadvantage to improving safety.

The lack of reliable data on injuries and illnesses made it difficult to track the state of the nation’s safety record until 1970, when Congress passed the Occupational Safety and Health Act. In 1973, the first year for which reliable data are available, 11 out of every 100 workers were injured on the job (see chart at left). Since then, the road to a safer workplace has not been an entirely smooth one. The injury and illness rate declined from the early 1970s through the mid-1980s. Some of these gains were lost in the 1980s, with injury rates jumping 13 percent in only six years. In 1992, however, injuries turned the corner, declining to historic lows by 2001. In that year, less than 6 percent of workers were injured on the job—the lowest rate since data collection began.

#### A Picture of Health

*Workplace injuries and illnesses have declined since OSHA was created in 1970, but the road to safety has been bumpy because of changes in regulations, insurance, and the economy.*



#### FEDERAL REGULATORS STEP IN

Until 1970, safety was primarily considered a concern of businesses and state governments—not a matter for the federal government. But workplace injury rates started to creep up in the 1960s, and there were also



## States regulated workplace safety for years, but there were no federal rules until 1970

some highly visible workplace accidents at that time (most notably, a major mine explosion in Farmington, West Virginia, that killed 78 workers). Further, states were beginning to complain about the lack of consistent federal standards, as regulation discrepancies meant that employers could threaten to move to other states with more lenient and less costly Workers' Compensation regulations. Likewise, unions and worker advocates were concerned that employees' compensation for the same injury could vary dramatically from state to state.

These concerns led Congress to take the first federal-level action on workplace safety, establishing the Occupational Safety and Health Administration (OSHA) in 1970. OSHA's primary mission is to en-

act and enforce federal safety regulations. It takes both a carrot and a stick approach, offering technical assistance and information on best practices as well as inspecting firms and issuing citations and fines to offending employers. It also compiles statistics to track the country's safety record.

All these activities should help reduce workplace accidents. But since its inception, OSHA's ability to actually influence accident rates has been questioned by employers and economists alike. It is probably true that the initial drop in injuries and illnesses in the early 1970s is related to OSHA, but it is not clear whether this was a direct impact of the agency's regulatory efforts or whether it occurred because of increased employer awareness of work- >>16

**Sprains and strains, the most common type of on-the-job mishap, accounted for nearly 45 percent of workplace injuries and illnesses in 2001.**

# Why did injuries rise in the 1980s?

In the mid-to-late 1980s, the U.S. experienced its only sustained increase in workplace injuries since OSHA started keeping records in 1973. The injury rate increased from 7.6 injuries per 100 workers in 1983 to 8.9 per 100 in 1992, while the number of workers reporting injuries increased from 4.8 million to 6.8 million. What happened?

Much of the increase derived from increased attention to a newly identified workplace injury—**ergonomic, or musculoskeletal, disorders**. Up until then, most workers viewed the ganglions, tendinitis, and carpal tunnel syndrome they acquired after years of work on factory lines or in offices as a natural part of having a job. These problems were rarely reported to OSHA and therefore comprised only a small portion of reported injuries and illnesses. But in the 1980s, OSHA started levying citations and fines against major manufacturers like Hanes Knitware and Samsonite for ergonomic hazards in their workplaces, and workers and employers alike started taking ergonomic injuries more seriously. Nearly 750,000 people reported a musculoskeletal disorder due to their work environment in 1992.

A second important factor: **Health care costs** of all kinds were on the rise. In the traditional health insurance market, these trends precipitated a shift toward managed care programs that tried to curb costs by restricting access to specialists and expensive treatments. But Workers' Compensation insurers could not quickly adopt the same techniques because major changes in Workers' Compensation benefits and premiums required state legislative action. And since Workers' Compensation allowed for more flexibility and choice in treatment, more illnesses and injuries were treated under Workers' Compensation than otherwise might have been.

But there was also another more subtle and complicated cause for the increase. Workers' Compensation insurers now faced unexpectedly high claims because of the increase in ergonomic injuries and cost-shifting into the Workers' Compensation system. Because of regulations, however, in the short run insurers could neither increase premiums nor cut back on the types of injuries that were covered. (Prices eventually did rise—indeed, employers were paying nearly double the premiums in 1994 that they were in 1986—but costs were still increasing faster than premiums.) Insurers began to refuse to cover any companies that they expected to generate significant claims.

As a result, the **residual risk pool**—the group of employers denied traditional Workers' Compensation coverage and covered instead by the state-established insurer of last resort—grew enormously. (See chart at left.) Nationwide, the share of employers in the residual risk pool increased from about 5 percent in 1984 to nearly 30 percent in 1993, though these rates varied widely by state. (Over 90 percent of employers in Rhode Island in 1989 were in the residual risk pool.)

Though the premiums paid by employers in the residual risk pool are obviously higher than traditional Workers' Compensation rates, they are often also partially subsidized by the state and incompletely experience rated—decreasing the incentive for these already more dangerous employers to reduce their workplace risks. Furthermore, residual-market insurers themselves are less likely to encourage safe work practices since they are typically compensated by a formula that doesn't take into consideration any safety improvements they promote. Though the impact of all this on the nation's safety record might be negligible when the pool is small, it multiplies considerably when large proportions of employers are covered by the insurer of last resort.

Thus in the 1980s, injuries increased not because Workers' Compensation insurance was inherently flawed, but because the world it operated in had changed. Its regulatory structure wasn't flexible enough to handle the double whammy of increasing reported injuries and growing numbers of employers in the residual risk pool, and the nation's safety record deteriorated as a result. It's difficult to say how much these factors contributed to the increase in injuries and illnesses at that time, and other factors such as economic growth probably also played a role. But everything else in the work environment would have predicted a decline in injuries during that period, not an increase—and the trend only reversed itself once state legislatures began reforming their Workers' Compensation statutes to allow for higher premiums, reduced benefits, and more flexibility.

## Insurer of last resort

*The number of employers who could not obtain traditional Workers' Compensation insurance spiked in the late 1980s as insurers, faced with high costs, refused to cover many firms.*

PERCENT OF EMPLOYERS IN THE RESIDUAL RISK POOL



NOTE: 2002 figure is preliminary.  
SOURCE: National Council on Compensation Insurance



Falls are the third leading cause of injury and the fourth leading cause of death in the workplace.

Workers are much more likely to be injured on the job than to get sick. Acute and chronic work-related diseases, such as silicosis, hepatitis, and repetitive stress disorder, comprise only 5 percent of reported injuries and illnesses.

place safety issues. A classic study by Harvard economist Kip Viscusi examining the impact of OSHA inspections and penalties in the agency's first few years showed no effects on either injury rates or company investments in safety. Several other researchers, using both industry-wide and firm- or industry-specific data, have also found little or no measurable effect of OSHA. But this is not a universally agreed-upon result. One study shows that going through an OSHA inspection reduces the number of citations on subsequent inspections by about one-half, without accounting for any additional improvements in safety due purely to the possibility of being inspected. And a study of manufacturing plants in the early 1980s found that if an inspection led to a penalty, injuries would decline at the inspected plant by over 20 percent during the next few years.

One reason for these mixed results is measurement problems. The increased awareness that comes with new regulations leads initially to increased reporting of injuries that previously would have gone uncounted—so that the reported injury rate may be going up at the same time that the actual number of injuries may be constant or even decreasing. This makes it hard to know what proportion of any change in injuries, whether positive or negative, to attribute to regulatory efforts. Also, during most of the 1980s the agency followed a “records check” procedure whereby firms with high prior violations were more likely to be inspected again—giving employers an incentive to underreport workplace injuries and further confusing the relationship between reported and actual injuries.

A second reason for these results is the constraints under which OSHA operates. OSHA inspects just a small number of employers—in 2002, only about 100,000 out of the approximately 8 million work-

place establishments in the U.S. And when it does find violations, the fines are often quite small. The fine for a typical, nonnegligent violation cannot exceed \$7,000, and overall the agency meted out a total of only \$73 million in penalties in 2002. Finally, it does not have regulations for all the potential causes of workplace injuries; for example, there is no OSHA standard for ergonomic or musculoskeletal injuries, which account for one-third of all injuries on the job. It is difficult for the agency to have a large impact under these circumstances.

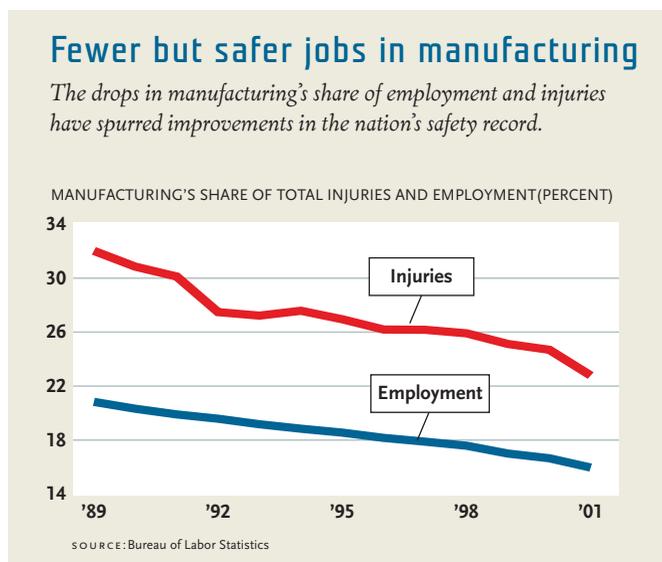
On the other hand, compliance appears to be better than one might expect given the small probability of actually being inspected, a result that economist David Weil attributes in part to employers making compliance decisions “on the basis of potential, rather than actual, penalties” and in part to employers learning about the cost savings they can reap by following OSHA regulations. Nonetheless, it seems clear that while OSHA may help improve safety, the agency cannot be solely responsible for the overall decline in injuries since the 1970s. Though the story of the trend in workplace safety may begin with OSHA, it cannot end there.

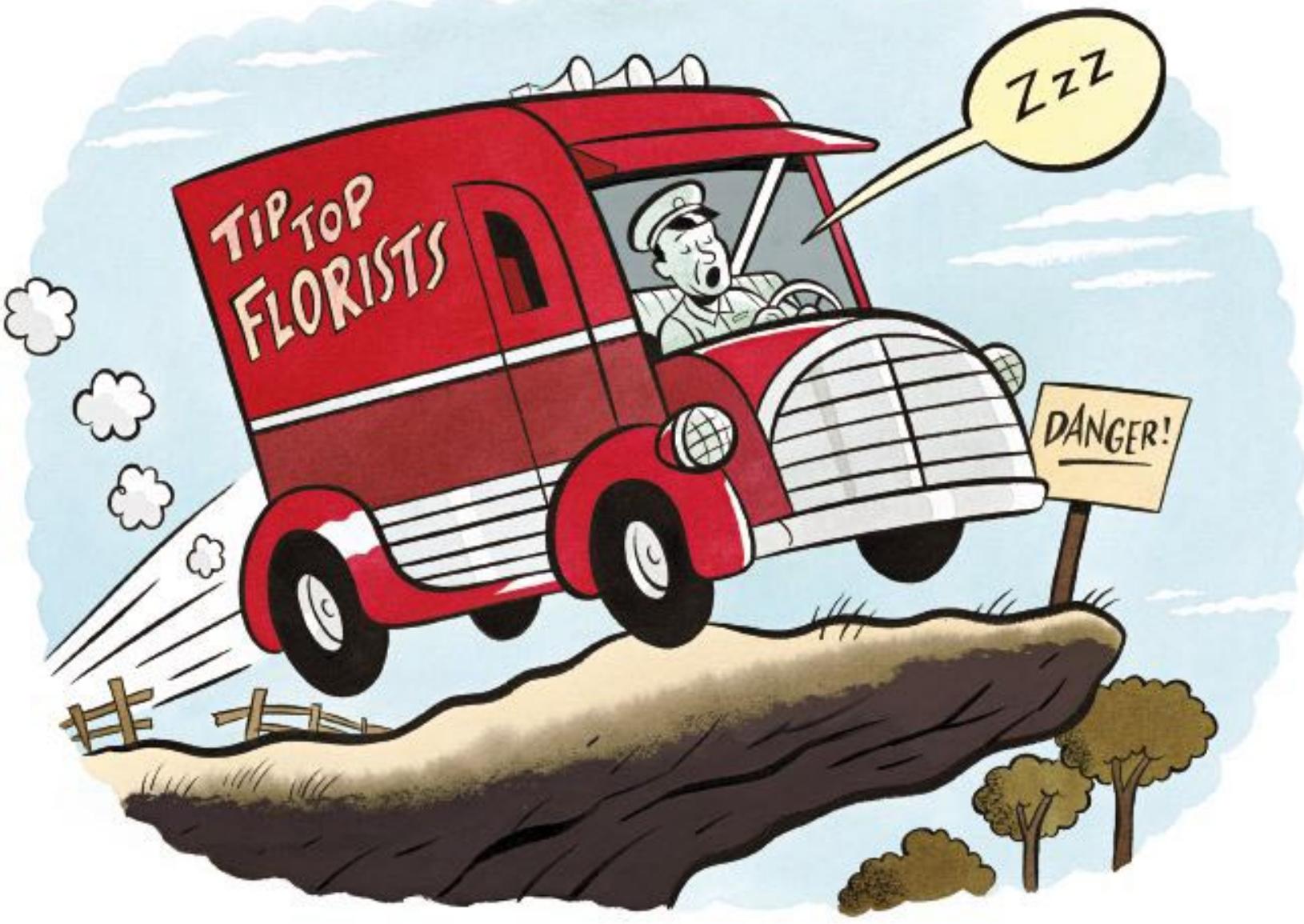
#### THE CHANGING ECONOMY

Another element in the story is the state of the economy. Historically, economists have thought that workplace injuries are more likely to happen in periods of fast employment growth, when workers are often either less experienced or working harder than usual. This may have been part of the problem at McWane in the 1990s; the *New York Times* reported that some McWane plants' worker turnover rates exceeded 100 percent per year. Inexperience may also have been a factor in the overall increase in injuries in the late 1980s, an era of economic expansion that drew many new workers into the labor

market. But the next expansionary period, the mid-to-late 1990s, saw declines in injuries and illnesses even as the economy grew; so the relationship between growth and injuries is now less clear. Whether other factors trumped the pro-cyclical effects of the economy or whether growth no longer affects safety has not yet been determined.

A more important economic factor is shifts in the mix of jobs in the economy, since the most hazardous occupations and industries are far less common in the United States than they were a generation ago. Though some dangerous jobs, like truck driving and nursing, continue





## Jobs today are safer, and fewer people work in the most dangerous occupations

to be well represented, many of the most unsafe jobs (like timber cutting and deep-sea fishing) have become less so. Meanwhile, employment in safer occupations such as computer specialist and desktop publisher is expected to grow faster than average. Indeed, if the industry mix in the U.S. had not changed since 1973, there would have been about 10 percent more workplace injuries in 2001 than actually occurred.

Employment shifts out of manufacturing are a particularly important driver of this trend. Manufacturing is one of the most dangerous ways to earn a living in the U.S.; more than 8 out of every 100

manufacturing workers were injured on the job in 2001. But manufacturing's share of overall employment has declined from 30 percent to 16 percent since 1973 (see chart on page 16). So one would expect the overall injury rate to be declining also. And in fact, rough calculations show that shifts out of manufacturing jobs account for at least half of the 10 percent decline in injuries resulting from the changing industry mix.

### THE INSURANCE INCENTIVE

For the most part, changes in regulations and the economy have improved the nation's safety record.

New Englanders are just as likely to be injured on the job as workers in other regions, but our fatality rate is one of the lowest in the nation.

# What is the deadliest job in America?

The U.S. Bureau of Labor Statistics reported 5,524 fatalities in civilian workplaces in 2002. But which jobs are the deadliest? By number of deaths, commercial truck driving is the deadliest occupation. 808 truck drivers (out of 3.2 million total) were killed on the job last year—80 percent of them on the road. Many other common occupations also experience a large number of deaths: for example, farm workers, construction laborers, police and detectives, and electricians. Measuring the number of deaths is particularly useful for regulators and insurers who want to cut overall fatalities; a small improvement in safety for an occupation with a large number of workers can have a major bottom-line effect.

Which occupation had the highest fatality rate? The fatality rate, calculated as deaths per 100,000 people, accounts for the fact that some occupations are much more common



CORBIS

## Selected occupations with the highest number of fatalities

OCCUPATION	FATALITIES	FATALITY RATE
Truck drivers	808	25.0
Farm occupations	519	28.0
Construction laborers	302	27.7
Non-construction laborers	181	14.3
Store owners and managers	162	3.4
Groundskeepers and gardeners	146	15.0
Police and detectives	140	11.6
Retail sales workers	132	1.9
Electricians	116	13.5
Vehicle mechanics	115	6.3
Top ten (17.5 percent of workforce)	2,621	10.9
All occupations	5,524	4.0

## Selected occupations with the highest fatality rates

OCCUPATION	FATALITIES	FATALITY RATE
Timber cutters and loggers	72	133.3
Fishers	33	73.3
Airplane pilots and navigators	90	69.8
Structural metalworkers	39	58.2
Drilling and mining workers	58	50.4
Sailors and ship officers	27	46.6
Driver-sales workers	58	37.9
Roofers	87	37.0
Electrical power installers & repairers	41	32.5
Farm occupations	519	28.0
Top ten (2.1 percent of workforce)	1,024	36.1
All occupations	5,524	4.0

NOTE: Data are for 2002 SOURCE: Bureau of Labor Statistics

than others. For example, 162 store owners and managers were killed on the job in 2002, making it the fifth most deadly occupation as measured by number of deaths. But since nearly 5 million people work as sales supervisors, only 3.4 store supervisors per 100,000 died on the job—a rate better than the national average.

Fatality rates are preferable when trying to compare the risk of death across occupations. By this measure, truck driving and construction are still deadly, but they no longer top the list. Instead, timber cutters lead the index, with a fatality rate more than 30 times the national average. Last year about one out of every 750 lumberjacks died on the job, a staggering figure. Many of the occupations that people think of as hazardous have lower rates. Construction workers are eleventh on the list (28 deaths per 100,000 workers), fire-fighters are thirteenth (20 per 100,000), and police are eighteenth (12 per 100,000). But the jobs with the highest fatality rates account for a very small fraction of workers nationwide. Only one—farm occupations—employs more than 0.2 percent of the labor force, while teachers, for comparison, clock in at 4.1 percent.

On the flip side, what is the safest occupation? It is difficult to say, but a major contender is: economist. None has died on the job since the government started keeping records.

—Brad Hershbein

But Workers' Compensation has had mixed results. Workers' Compensation was the nation's first social insurance program. Before it was instituted, reparation for workplace injuries and deaths was based on establishing legal liability for the accident. Injured workers had to demonstrate in court that their employers were the sole cause of their injury. This led to unpredictable and capricious legal outcomes for both sides. Workers rarely won, but when they did, they typically received large settlements.

To solve this problem, states began enacting Workers' Compensation statutes based on the principles of the German system of compensation, which had been established several decades prior. Neither side had to establish liability for a workplace injury. Instead, employers were required to carry insurance to cover all injuries in the workplace, regardless of fault. Insurance premiums were "experience rated" so that more dangerous firms and industries paid higher rates.

The safety incentives that Workers' Compensation creates are complicated. On the one hand, insurance provides employers with a clear reason to reduce safety hazards; their premiums should decrease when they implement safer work practices. On the other hand, it may discourage workers from working safely, since they are guaranteed at least some replacement of their wages if they are injured on the job. As a result, the early years after Workers' Compensation was implemented were spent working out kinks in the system that had led, for example, to increased injury rates in the mining industry. (A guarantee of income meant that miners, paid by the ton rather than by the hour, had less incentive to spend time on safety precautions.) Most industries, however, experienced injury declines.

Nearly a century later, several studies by economist Richard Butler and colleagues indicate that as Workers' Compensation benefits rise, workers are likely both to take more risks while working and to report claims on injuries that they might have let go at a lower benefit rate. To combat some of these effects, state legislatures have tweaked their Workers' Compensation statutes in recent years. States have introduced changes like increased deductibles for employers, increased waiting times before benefits kick in, increased penalties for fraud, and greater incentives to return employees to work as quickly as possible after an injury. But in the end, the incentives that Workers' Compensation insurance creates today are not much different than they were nearly 100 years ago.

What has become more complicated in recent years, however, is how those incentives interact with events outside the insurance system and how those interactions affect workplace safety. In the 1980s, for

instance, a spike in reported injury rates led to increasing insurance costs, which led to more employers being covered by the state insurer of last resort—both of which ultimately resulted in the only sustained increase in workplace injuries since OSHA began keeping records. (See sidebar on page 14.) Market forces caused these changes, not Workers' Compensation—but the economic structure of Workers' Compensation compounded their effects.

#### INSIDE THE ORGANIZATION

In the end, though, these factors affect safety because of the policies and procedures of particular organizations. Safety-conscious employers may, for example, follow OSHA's recommendations by organizing health and safety committees: groups of employees who work together to ferret out and eliminate safety risks in the workplace. Others may get involved with OSHA programs that outline best practices for their industry, or they may help develop voluntary compliance programs aimed at improving safety.

Likewise, employers in a period of industry or firm growth may reduce risks by providing more safety training to their workers or hiring a new safety manager. Or they may adapt to the pressures of Workers' Compensation by installing antiskid mats in restaurants, ergonomically designed keyboards and chairs for typists, or safety guards on production machinery—all of which can help to cut claims costs. While employers may be making these changes partially due to the incentives they face—the carrot of reduced Workers' Compensation premiums or the stick of potential OSHA citations—these incentives also create an environment in which promoting safety is the easy, economically rational thing to do.

What's more, many employers enact stricter safety protocols than what is statutorily required of them. One example is McWane's cross-town rival, the American Cast Iron Pipe Company (ACIPCO). ACIPCO faces the same regulations, economic conditions, and insurance restrictions as McWane. But rather than making headlines as one of the nation's most unsafe employers, ACIPCO instead has made *Fortune's* list of the best employers in the country. And the *New York Times* reports that ACIPCO has one-fortieth the number of OSHA citations as McWane. ACIPCO has apparently found a better way to do business, perhaps in part because it is worker owned (the company was willed to its workers in 1924 by its original owner) or perhaps for other reasons. In any case, they have been able to do what McWane has not—operate within the constraints of their environment to create a workplace that is both productive and healthy. \*

#### FOR MORE INFORMATION

Occupational Safety and Health Administration  
[www.osha.gov](http://www.osha.gov)

Bureau of Labor Statistics  
[www.bls.gov](http://www.bls.gov)

National Safety Council  
[www.nsc.org](http://www.nsc.org)

National Council on Compensation Insurance  
[www.ncci.com](http://www.ncci.com)