

# \$AFETY FIRST

*When markets work, it pays for companies to have safer workplaces, including the coalfields of Virginia and West Virginia*

BY CHARLES GERENA

Coal mining is the heart of Logan County, W.Va. When the industry prospers, Logan prospers. And when something bad happens, everyone prays for a miracle.

On Thursday, Jan. 19, two crews of miners were working in separate sections of Alma Mine No. 1, not far from the town of Logan. Around 5:30 p.m., an atmospheric monitoring system detected high levels of carbon monoxide about two miles from the mine's entrance. The source of the toxic fumes was a fire on one of the conveyor belts that carries coal out of the mine.

According to initial reports, a dispatcher told everyone inside to get out. Among the 12 men closest to the fire, 10 managed to evacuate. Thick smoke had replaced the fresh air they were breathing, obscuring their view and choking their lungs before they

slipped on their portable oxygen packs. The miners locked hands and made their way through miles of passageways carved into the earth until they met up with the other crew and rode a diesel-powered railcar to the mine's entrance.

Amid the smoke and intense heat, two men were somehow separated from their crew. Family, friends, and co-workers gathered at a nearby church on Friday to await news of the lost souls, recalling the heart-wrenching scenes less than three weeks earlier in Tallmansville near the Sago mine explosion. It wasn't until Saturday when rescuers finally tamed the fire enough to expand their search and found two lifeless bodies.

Friction generated from a stuck or misaligned conveyor belt could have sparked the deadly fire. Or, an electrical problem in the motor that drives

the belt could have occurred. Speculation on the fire's cause will continue until the federal Mine Safety and Health Administration (MSHA) and the West Virginia Office of Miners' Health, Safety and Training complete their investigations. In the meantime, federal prosecutors are also investigating the accident for possible criminal violations.

Coal mine workers in West Virginia, Virginia, and other parts of the country face an unpredictable, challenging workplace. "By its very nature, a mine is so dynamic. It never sits still," says Patrick Graham, director of safety and human resources for Bluestone Coal Corporation in Beckley, W.Va. Every time someone tunnels into a mountain or blasts through layers of dirt and rock to reach a coal seam, miners' work conditions change geologically. If

PHOTOGRAPH: BETH GORCZYCA / THE STATE JOURNAL

nothing changed, “there would be no production.”

Graham believes coal mine operators control the conditions as best as they can and minimize risks through careful planning. But with West Virginia losing 19 mine workers in seven accidents between January and May, it might seem logical to side with union leaders, some lawmakers, and other safety advocates who say companies put profits before people and ought to invest more in safety. Aracoma Coal, owner of the Alma mine and a subsidiary of Richmond, Va.-based Massey Energy, has been cited for numerous violations related to its fire suppression systems and procedures to control the amount of coal dust and other combustible materials in the mine.

Despite these concerns, the American workplace, including mines, has become safer over the last 100 years. Textile workers no longer toil behind locked doors in poorly ventilated workshops, while coal miners use roof bolts instead of hastily placed timbers to prop up underground tunnels. The rate of work-related fatalities continues to improve, going from 5.2 deaths per 100,000 full-time workers in 1992 to 4.1 deaths in 2004. The rate of nonfatal injuries and illnesses also declined over the same period, dropping from 8.9 incidents per 100 full-time workers to 4.8 incidents.

Safety advocates credit tougher regulation on the state and federal level, especially since the creation of the U.S. Occupational Safety and Health Administration (OSHA) in 1970. Also, companies are more aware of hazards and the human toll of accidents. Executives point to technological advances that have made workplaces both safer and more productive.

Firms are profit-maximizing entities. Managers usually base their decisions on whether they benefit the bottom line. What some economists are quick to point out is that these very same financial incentives can have a positive influence on workplace safety.

An unsafe workplace is costly. Accidents result in direct costs, from

the replacement of capital equipment to higher workers’ compensation premiums. They also have indirect costs such as decreased productivity and higher wages paid to employees.

Of course, people still get hurt or killed more often than we would prefer, and certain occupations like coal mining, commercial fishing, and truck driving have their inherent dangers. Overall, government policies, in combination with private-sector initiatives, have improved workplace safety by raising the financial toll of poor safety practices and supporting the development of better practices.

### **Boom Times and Red Hats**

Safety was a significant problem in the early days of the nation’s industrialization. Over time, the economy has shifted from producing goods to producing services and substituted labor with capital. The result has been fewer workers put at risk in relatively dangerous occupations like manufacturing and fewer dangers associated with manual labor.

For example, coal mine workers use remote controls to operate massive continuous mining machines that cut into coal beds deep underground. “[The mine worker] is standing back at a considerable distance from where the machine is operating,” describes Chris Hamilton, senior vice president of the West Virginia Coal Association, a trade association representing mine operators. “He is standing within a safety zone, as opposed to being on the machine ... and being subjected to roof falls, coal bed gases, or other environmental problems.”

While economic progress has helped improve workplace safety, that progress hasn’t been uninterrupted. Workplace safety deteriorated during the 1960s, according to Mark Aldrich, former senior economist at OSHA and a professor emeritus at Smith College. Unions clamored for the federal government to do something, which it did by creating OSHA, but Aldrich believes the real culprit was the business cycle. “It wasn’t that American industry was getting worse. There was

a long boom beginning in the Kennedy-Johnson years, and you could see the injury rates pick up in manufacturing.”

As companies ramped up production, many new employees entered the work force. “When the economy is booming, labor turnover goes up,” Aldrich explains. So, even the best safety program becomes overwhelmed by a flood of inexperienced new hires, diluting the effectiveness of training.

Yet fatalities and accidents in the coal mining industry fell to an all-time low in 2005 despite recent growth in demand. Production levels have been fairly steady and payrolls have picked up in the last few years, but neither has accelerated at a pace that would endanger safety, in Aldrich’s view.

What if the price of coal remains high and mine operators keep facing pressure to staff reopened sites? “That is a recipe for trouble,” Aldrich says. “The companies are going to hire people who don’t have much experience. Unless they have really good safety procedures,” the level of workplace safety could decline.

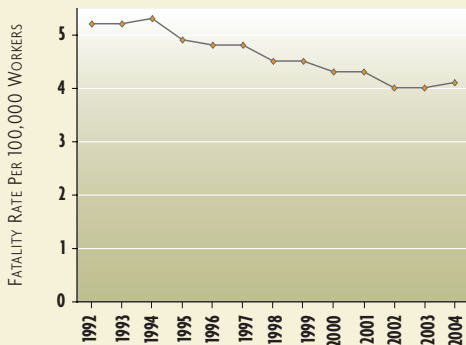
Experienced workers are already harder to find. Judy Steele Horne, a certified mine safety instructor based in Cedar Bluff, Va., says a lot of seasoned miners couldn’t handle the instability in the industry and retired or moved. This has left fewer veterans to call upon, forcing mine operators to hire a lot of people who aren’t accustomed to working together or at a mine.

These inexperienced workers, also known as “red hats,” must face the rigors of the job and pressure from companies eager to boost production. “They have to be fast learners,” Horne adds.

The miners who died in the Alma fire weren’t red hats, however. Don Bragg had spent almost half of his adult life in coal mining — nine and a half years — while Ellery Hatfield was a miner for 11 and a half years. Other recent mining accidents have involved experienced workers. Horne says that when miners move to a new site, it is a time of transition. Plus, there is peer

## Getting Safer

The annual fatality rate for American workers declined 21 percent between 1992 and 2004, despite occasional upticks.



SOURCE: Bureau of Labor Statistics

pressure to perform, so workers may put themselves in situations that compromise safety.

### Accidents Have a Price

Beyond shifts in the overall economy, a more significant influence on workplace safety is the expense of occupational injuries and fatalities to individual firms. Companies will invest more in equipment upgrades, better training, and other safety improvements as long as these investments are less than the cost of work-related accidents that are avoided.

For example, accidents result in lost output. Production comes to a halt, equipment has to be repaired or replaced, and new workers have to be hired and trained. The closure of the Alma mine reportedly cost Massey Energy \$18.5 million in labor and lost sales during the first quarter of 2006. (Some areas of the mine are now open except for the section damaged by the fire.)

“Safety improves the regularity of the production process,” notes Peter Dorman, an economist at Evergreen State College who authored a 1996 book on occupational safety.

Along these lines, reducing the number of accidents may also increase a company’s productivity. However, some safety measures can slow down the pace of production, such as the use of manually operated machine guards

on power saws and other equipment. Therefore, the net effect of safety investments on productivity varies from company to company.

Patrick Graham says safety improvements like coal dust controls and automatic temporary roof supports, which protect workers as they install bolts to support the ceiling of a mine tunnel, have benefited Bluestone Coal. “You can’t have a productive, profitable mine if something is unsafe,” he insists. “Either you move that mountain safely or you’ve lost a \$1.5 million bulldozer.”

Premiums for workers’ compensation insurance are another cost associated with work-related accidents. Before states began introducing workers’ compensation in the 1910s, injured workers could sue for damages. But they had to prove that the employer’s negligence was solely to blame, which was difficult to do. Workers rarely won their lawsuits and, when they did succeed, only a few settlements were large enough to cover lost wages and medical expenses.

Now, companies must pay a fixed percentage of an employee’s wage for injuries or deaths in the workplace, regardless of who is at fault. In addition, they have to purchase insurance or self-insure in order to cover future claims. The premium is usually the payroll multiplied by a base rate calculated for the firm’s industry and an “experience modification factor” based on the company’s claim history. As a result, an unsafe work environment should affect a company’s bottom line, thus providing an incentive to make conditions safer.

### Hazard Pay

Perhaps the most noteworthy financial impact of accidents is the higher salary that relatively riskier companies may have to offer. Economists like W. Kip Viscusi at Harvard University believe that the desire to avoid these additional labor costs is a strong incentive for firms to invest more in workplace safety, while others question how often this happens in real life.

The idea is that less desirable jobs, including those with relatively high acci-

dent rates, pay better wages in order to attract and retain workers. But there are always risk-averse people who would never set foot in an underground mine regardless of the salary — they want lower-paying, safer work. Therefore, firms that are relatively more dangerous theoretically have a choice. They can spend more on safety, saving the money they would have spent trying to entice workers. Or they can continue paying a risk premium, also known as a compensating wage differential.

“They are two sides to the same coin,” notes Devra Golbe, an economist at Hunter College who specializes in finance and industrial organization. For each company, “there is a balance that is struck” between the wages and safety that it offers in order to generate a given level of profit.

In theory, labor markets should match up companies that are offering different combinations of wages and safety with workers looking for similar conditions. Those who care more about maximizing their income should end up in relatively riskier, higher-paying occupations, while those who want to maximize their comfort and safety should get what they want.

Research by Viscusi and others shows that risk premiums do account for differences between safe and unsafe industries. For instance, the average salary of a mining machine operator was \$20.31 an hour in 2004 compared with a shoe salesman’s salary of \$8.80 an hour, partly reflecting the fact that the mining industry has a higher number of occupational fatalities per capita than the retail sector.

The question is how well risk premiums reflect varying levels of safety at companies within an industry, notes Price Fishback, a University of Arizona economist who has studied workplace safety in coal mining and other industries. “Can workers identify which are the safe and unsafe mines, and do they see a premium for being in an unsafe mine? There is still some premium [paid by companies within industries], but it’s harder to detect.”

The theory underlying risk

premiums has other caveats. It assumes that employees are fully aware of workplace risks, can adequately factor those risks into their decision-making, and have job mobility.

In fact, information asymmetries exist in labor markets. For example, OSHA regulations require chemical producers to disseminate safety information to employers that use their products in the workplace. In addition, companies must train their employees on how to access and apply this information. According to a 2002 article by researchers at Harvard University's Transparency Policy Project, these rules have helped ill workers figure out what chemicals may have harmed them and secure proper treatment and compensation. But the descriptions for chemical products are complex and hard to understand and apply, limiting their usefulness in accident prevention.

In addition to the challenges of obtaining information on risks, people don't always evaluate that information accurately. "Depending upon the way a risk is perceived, you can respond in all kinds of ways. People don't process information like computers," notes Mark Aldrich at Smith College. So, while workers might be properly compensated for their perceived risks, how well those perceptions meet reality is an open question.

Even when people accurately gauge the risks of the work they perform, they have to be able to act upon that information. This isn't always easy to do, especially during times of rising unemployment or for individuals with limited alternatives in the job market.

"You make the best choices you can, based on the opportunities you have," economist Devra Golbe notes. "It may be that the alternatives are poor and people have only relatively risky, low-paying jobs to choose from based on their education, where they live, or other constraints."

There is evidence that competition for labor and job mobility was sufficient at the turn of the 20th century for coal miners and other workers to

switch jobs when work conditions proved too hazardous, according to Fishback's research. But rather than improve safety, companies initially paid some risk premium to their employees instead. By the 1920s, high turnover in certain sectors like coal mining prompted companies to begin improving work conditions.

### All in a Day's Work

Today, coal mining is a lot safer than it used to be. But it's still a risky enterprise that commands a wage premium, making it attractive for small-town residents in southwest Virginia and West Virginia. Generations of miners have developed a thick skin when it comes to risks, so they likely accept higher wages over greater safety.

This attitude was evident among the students at a recent safety certification class taught by Lindell Goode, a part-time instructor at Triangle Safety Services in Pineville, W.Va. Workers must take the course and pass a test before setting foot in a mine, plus they have to take an eight-hour refresher class annually.

On day four of the five-day class, Goode reviews proper blasting procedures for surface miners. As he describes how to mix ammonium nitrate pellets with diesel fuel to make an explosive, several students asked if they could do the same thing with fertilizer from Wal-Mart.

"We need to have a demonstration right here," jokes one student, who has been chewing the fat with his classmates at the rear of the blue cinderblock classroom. Goode jokes right back that everyone is welcome to experiment in their basement or backyard. "No, I want to blow up a mountain," the guy replies.

Later, when Goode covers what can happen to a miner's lungs without proper protection, the guys in the back start muttering to one another. Goode admits that he didn't like to wear a respirator either, but he also didn't want to be one of those retired miners who can barely catch their breath when they walk. "You can either do it now, or pay for it later."

With the training that miners receive today, not to mention the media blitz that usually follows an accident, it would be hard for a red hat to plead ignorance about the dangers that lie ahead. It wasn't always that way. Most of what Don Cook knew about coal mining came from his father and grandfather, both of whom were miners. He didn't have the information that new miners receive today in courses like the ones he teaches at Triangle Safety.

When Cook started mining in the 1970s, the only thing new employees had to do was visit the safety director's office. "The guy gave you a little book and a brass tag for your belt that had

### The Price of Danger

The premiums charged by BrickStreet Mutual Insurance, a private firm that took over West Virginia's workers' compensation program in 2006, generally reflect industry differences in workplace safety.

	Workers' Comp Premium, 2005*	Nonfatal Injury/Illness Rate, 2004**
Timbering	\$52.20	14.8
Underground Coal Mining	\$39.86	9.3
Surface Coal Mining	\$12.98	3.2
Street and Road Construction	\$10.89	4.6
Chemical Manufacturing	\$2.80	2.1

\* Per \$100 in payroll

\*\* Number of occupational injuries and illnesses per 100 full-time workers. It is the most recent data available and was selected to closely match categories used by BrickStreet Mutual Insurance.

SOURCES: BrickStreet Mutual Insurance; West Virginia Bureau of Employment Programs

your name and Social Security Number,” he recalls. “He’d say, ‘Put that on your belt so if you get killed, we’ll be able to identify the body.’ [Then] he’d talk to you for about 30 minutes and ... you’d go to work.”

### Rules of the Road

Safety training is just one component of the regulatory structure that state and federal legislators have created to protect workers. A combination of rigorous standards and strict enforcement are supposed to provide an incentive for improving safety. In order to avoid the wrath of agencies like OSHA, companies are expected to invest more in protecting their workers.

Many economists contend that while OSHA inspections and interventions can jolt specific companies into addressing safety problems, their ability to influence these firms diminishes over time and their effect on the aggregate level of workplace injuries and illnesses across all industries is limited.

One reason is the low probability of being caught red-handed. Despite efforts to increase the pace of inspections, it would take 117 years for OSHA to check each workplace under its jurisdiction at least once, according to the AFL-CIO. The probability of a follow-up visit to check on a company’s compliance is also low.

Another reason is that many safety regulations merely codify what are already common practices that address obvious hazards, notes the University of Arizona’s Price Fishback.

“Where regulations are really helpful is in identifying issues and preventing things that are really hard to detect or might not show up for several years.”

A separate federal entity handles workplace safety in the coal mining industry: the Mine Safety and Health Administration. MSHA is a product of legislation passed in 1977, five years after a fire killed 91 workers at a silver mine in Idaho. Increased government regulation of mining followed other major mining accidents in 1940 and 1968.

Most mine penalties are based on six criteria outlined in the 1977 Mine Act, including the size of the mine, its financial condition, and its history of violations and remediating those problems. Still, “most fines are so small that they are seen not as deterrents, but as the cost of doing business,” argued Wes Addington, a lawyer with the Appalachian Citizens Law Center, in a *New York Times* article (March 2, 2006).

Since the Sago incident in January, there has been a concerted effort to improve mining safety. Federal lawmakers have made several proposals and West Virginia passed several new regulations in a special session. But some question how effective those proposals would be in bettering working conditions.

Some businesspeople believe that the best way to make workplaces safer is to target proven “bad apples” for government scrutiny instead of inspecting everyone the same way. Since 1997, OSHA has operated an

inspection program that targets companies which have reported 12 or more injuries or illnesses resulting in days away from work, restricted work activity, or job transfer for every 100 full-time workers.

Research by Golbe and economist Randall Filer suggests that firms with the thinnest operating margins and in danger of bankruptcy have more dangerous workplaces. This implies that safety regulators should focus on the companies closest to the financial edge. Currently, financially troubled mines can have a fine reduced if they can prove that it would be a hardship.

Industry officials have also asked for tax incentives or grants to help pay for improvements beyond current safety standards. But economists caution against subsidies that would not yield benefits to safety in excess of their cost to taxpayers or would add another layer to an already complex tax system.

Others have also called for greater federal spending on basic research and development. Generally, incremental advancements over time can enable companies to improve safety at a lower direct cost without hurting productivity. “Very often, safety comes into workplaces with new factories and equipment,” Mark Aldrich notes.

Time appears to be the best ally of occupational safety. As the human and financial toll rises, politicians rally to protect workers while companies realize the bottom-line value of improving safety and pursue new technologies. **RF**

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