

An hourglass-shaped graphic with a globe in the top bulb and a hand holding a globe in the bottom bulb. The hourglass is light blue and the globe is dark blue. The top bulb is filled with a dark blue globe, and the bottom bulb is filled with a light blue globe. The hourglass is centered on the page.

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Coal Mine Safety

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Abstract. Dramatic mine accidents early in 2006 have led to passage of the first major amendment to federal mine safety law since 1977. The Mine Improvement and New Emergency Response Act (MINER, P.L. 109-236) requires each mine to have an emergency plan, increased supplies of oxygen, and improved rescue teams. Penalties for violations have also been increased. Although the bill had wide support in Congress, some Members have characterized it as only a "first step," to be followed by additional measures that would include a lower maximum limit on dust concentrations, underground refuges, communications and tracking devices, and greater emphasis on enforcement of standards.

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Coal Mine Safety

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Summary

Dramatic mine accidents early in 2006 have led to passage of the first major amendment to federal mine safety law since 1977. The Mine Improvement and New Emergency Response Act (MINER, P.L. 109-236) requires each mine to have an emergency plan, increased supplies of oxygen, and improved rescue teams. Penalties for violations have also been increased. Although the bill had wide support in Congress, some Members have characterized it as only a “first step,” to be followed by additional measures that would include a lower maximum limit on dust concentrations, underground refuges, communications and tracking devices, and greater emphasis on enforcement of standards.

On January 2, 2006, the nation was reminded of the dangers of underground mining, as 12 miners died in an explosion and fire in the Sago mine in West Virginia. Subsequently, the Mine Safety and Health Administration (MSHA) issued new regulations; Congress has passed the first major revision of the mine safety law since 1977 and has taken further bills under consideration; and state legislatures in West Virginia, Kentucky, and Illinois have tightened their own laws. These responses have emphasized factors thought to have played a part in the Sago tragedy, including emergency oxygen supplies, tracking and communication systems, and deployment of rescue teams. There have also been proposals to increase the penalties for violations of safety standards.

This report reviews the safety and health record of the mining industry, describes the regulatory regime, and analyzes current legislative and regulatory initiatives.

The Record — Past and Present

Injuries

Safety in the coal industry has undergone a steady trend of improvement since 1925, an era when hundreds of miners could be lost in a single incident. In that year, there were a total of 2,518 fatalities in accidents, whereas the number has since fallen almost continually, down to 22 in 2005. Some of this trend is explained by a decrease in coal industry employment (from 749,000 in 1925 to 110,000 currently) and other structural changes in the industry, but much of it by real safety improvement.¹ Thus, the overall annual fatality rate decreased over the period from 3.36 per thousand workers to 0.20 per thousand. Nevertheless, mining of coal and other minerals remains one of the most dangerous sectors in which to work, with its fatality rate being more than seven times the average for all private industry, and exceeding that of many industries generally thought to be dangerous, such as construction and trucking. In terms of more ordinary accidents (non-fatal), mining is not far from the all-industry average, and indeed there is less variation overall among these industry groups. In what follows, the concentration is on fatal accidents.

Statistically, most of the 7.6% per year reduction in fatalities per ton (the average rate of improvement over the period 1980 to 2004) can be attributed to productivity (i.e., fewer workers on the job), most of the rest coming from a reduction in fatalities per actual worker. Some is also attributable to an ongoing shift from underground to surface mining. In truth, what lies behind all these factors is mechanization. New machinery such as longwall systems have not only reduced the total number of workers needed, but done so especially at the most dangerous spots (e.g., the active cutting face). Other measures, which have prevented many large-scale accidents, include controlling coal dust, monitoring methane gas (which is both explosive and poisonous), adequately supporting roofs, and avoiding spark-producing equipment.²

It would be very difficult to determine conclusively how much of the progress in safety has been due to MSHA. Although the most important safety measures are found in MSHA standards, it could be argued that many mines would have adopted them without that inducement. And indeed, safety had been increasing for a long time before MSHA's founding. Be that as it may, all parties involved agree that there is still room for improvement, but they disagree on the specific course to be followed. The United Mine Workers union has often contended that MSHA has not been sufficiently active. It contends that there are not enough inspectors and that penalties, both as proposed and as negotiated, are not large enough. In general, the union would make enforcement of standards the highest priority. The mining industry generally supports MSHA's existing regulatory approach, although it has urged that inspections be focused on mines where problems are evident, rather than regularly spread among all mines as currently required.

¹ Data available at [<http://www.msha.gov/ACCINJ/BOTHCL.HTM>].

² For an overview of safety trends, see Ramani, Raja and Jan Mutmansky, "Mine Health and Safety at the Turn of the Millennium," *Mining Engineering*, Sept. 1999, pp. 25-30.

Some recent, widely publicized incidents have highlighted specific areas that may merit further attention. The flooding of the Quecreek Mine in Pennsylvania in July 2002 raised questions about the accuracy of underground mine maps and their availability to operators of nearby mines. The Quecreek accident might have been avoided if the mine operator had access to the final map of a nearby abandoned mine that had since filled with water. In response, \$10 million was appropriated to MSHA (in Labor Department appropriations for FY2003) for collection and digitization of abandoned mine maps and new technologies for detecting underground voids. In response to the Jim Walter No. 5 mine accident in Alabama in September 2001 (which took 13 lives), MSHA made a number of changes, including a new standard on mine emergency response. The mine workers union alleges that MSHA had not followed up properly on numerous previous violations at the site.³

The Sago explosion, caused by lightning that penetrated underground and set off a methane explosion, killed only one miner initially. Sixteen miners escaped; 12 survived the explosion but were trapped and succumbed ultimately to carbon monoxide from the ensuing fire. The episode raised a number of issues. It has been suggested that communication and tracking devices currently available might have enabled the trapped miners to escape or find better refuge, or rescuers to reach them more quickly. Emergency breathing apparatus issued to the miners were rated for only one hour, and reportedly a number of them did not work well. Also, there has been criticism of the fact that it took 11 hours from the explosion until rescuers entered the mine.⁴ (Ironically, though, one of the “lessons learned” from the Jim Walter case may have compounded the problems at Sago. Because most of the victims in the former incident were responding to a relatively small explosion when a larger one occurred, considerable time was taken at Sago to verify the state of the mine atmosphere before rescue crews were sent in.)

Illnesses

Accidental injuries can be quantified much more reliably than the extent of occupationally caused disease. It is clear, though, that coal mining is causing disability much more by way of long-latency disease than by traumatic injury. Prime among these diseases is black lung (coal workers’ pneumoconiosis (CWP)), which still claims about 1,000 fatalities per year (down by about half since 1990).⁵ The deaths tend to occur after a long progression, so that only about one year of life expectancy is lost on average for these cases. However, this is usually preceded by many years of impaired breathing and debilitating weakness, as well as many more cases not counted as fatalities (ending with death by other causes). As of 2002 (the latest year tabulated), there were 16,000 cases on the rolls of the black lung program (i.e., deemed totally disabled).

³ Notably, the \$435,000 in fines that MSHA assessed after the accident were reduced by an administrative law judge to \$3,000. "Judge Vacates Citations, Reduces Fines for Jim Walters Resources' Fatal Explosion," *Daily Labor Report*, Nov. 9, 2005, pp. A4, A5.

⁴ These issues were discussed at a hearing of the Senate Appropriations subcommittee on labor on Jan. 23, 2006.

⁵ Data cited here are from the NIOSH “Worlds” report, Section 2 (CWP). U.S. Department of Health and Human Services, *Work-Related Lung Disease Surveillance Report*, DHHS report no. 2003-111, 2002, available at [<http://www.cdc.gov/niosh/docs/2003-111/pdfs/2003-111c.pdf>] .

Improved dust control requirements have led to a decrease in prevalence of the disease since the 1970s. Among miners with 20-24 years of work experience, for example, the proportion of examined miners who had positive x-rays decreased from 23.2% in the mid-1970s to 2.2% in the late 1990s.⁶ While this is a great improvement, there is still dispute about whether the current dust limits should be lowered, as well as questions about the degree of compliance by mine operators with current limits.

Regulatory Regime

The Mine Safety and Health Administration (MSHA) is charged with overseeing the safety of coal and other mining industries. MSHA's budget of \$278 million (FY2006) is somewhat less than the \$472 million of its sister agency, the Occupational Safety and Health Administration (OSHA), but OSHA is responsible for protecting a far larger number of workers.⁷ MSHA oversees a mining industry (including surface operations and all other minerals besides coal) of about 200,000 workers, whereas OSHA is responsible for most of the rest of the economy. Thus, while OSHA must target its inspections mostly on firms with the worst accident records in a few sectors (notably manufacturing and construction), MSHA is able to cover its whole industry. Indeed, it is mandated to inspect each underground mine at least four times a year and each surface mine twice. In addition to financial penalties, and in contrast to OSHA, MSHA has direct authority to immediately shut down dangerous operations.

Substantively, the regulations promulgated by MSHA cover a wide range of equipment, procedures, certifications and training, including methane monitoring, dust control, ventilation, noise, electrical equipment, diesel engines, explosives, fire protection, roof support, hoists and haulage, maps, communications, and emergencies.⁸

In the wake of the Sago accident, the agency was criticized by many for its slow pace of rulemaking in recent years, allegedly dropping 18 proposed standards that had been pending as of January 2001.⁹ The Administration has said that it was pursuing a revised agenda,¹⁰ and that it was being more frank by no longer listing long-term projects that had not been making much progress. Since the outset of 2006, however, MSHA has started

⁶ Worlds report, *ibid*. Interestingly, sharp drops in rates occurred at certain times. For 25-29 year workers, the rate fell from 20.2% in the 1987-1991 survey to 5.4% in 1992-1996. The former cohort began their careers around 1962, the latter around 1967. Under the 1969 Coal Act, tighter dust standards were phased in from 1970 to 1973.

⁷ The emergency supplemental appropriations bill of 2006 (H.R. 4939, P.L. 109-234) includes \$26 million for additional mine inspectors and \$10 million to NIOSH for research on new safety technologies.

⁸ Mine safety regulations are found generally in *Code of Federal Regulations*, Title 30, Chapter 1. Coal mines specifically are addressed in Subchapter O.

⁹ Joby Warrick, *Federal Mine Agency Considers New Rules to Improve Safety*. *Washington Post*, Jan. 31, 2006, p. A3.

¹⁰ Standards proposed and adopted since 2001 include methane testing (alternate means), emergency evacuations, belt entries as air intakes, and training shaft and slope construction workers.

action on a number of measures. As mentioned, the recent emphasis has been on emergency preparedness and response. A new temporary standard (with formal rulemaking for a permanent standard) was issued on the subject of evacuations, which includes provisions for additional breathing apparatus (self-contained self-rescuers — SCSRs), additional training on SCSRs, escape guides (“lifelines”), and prompt notice of emergencies. Requests for information and proposals were issued for communications and tracking technologies, rescue chambers and rescue teams. MSHA indicated it will revise its penalty assessment formula and has asked the Congress for an increase in the authorized maximum from \$60,000 to \$250,000.

On the matter of preventing black lung and silicosis, MSHA is expressly required by its authorizing statute to enforce a dust control standard. The limit is currently set by regulation at 2 milligrams/cubic meter as an eight-hour average “for each miner in the active workings of each mine,” although NIOSH has recommended a limit of 1 mg.¹¹

Besides the limit itself, there has been continual controversy about how concentrations are to be measured in the mines, and how MSHA will monitor operators’ plans and performance. In July 2000, MSHA proposed new regulations (superceded by revised proposals in March 2003) under which its inspectors would verify plans and performance by directly collecting single full-shift samples, rather than the previous practice of multiple samples retrieved by the operators. This proceeding was suspended on June 24, 2003, in favor of the development of personal dust monitors (PDMs), a new technology that could give personalized, real-time readings of dust concentration and finesse longstanding disputes about how air samples are to be handled. Initial tests of PDMs have been promising.¹²

Legislation

Much legislative activity, at both state and federal levels, has occurred in response to the Sago and other accidents in early 2006. The most prominent measure has been the Mine Improvement and New Emergency Response Act (MINER), P.L. 109-236 (S. 2803 (Enzi, Kennedy et al.) / H.R. 5432 (Capito et al.)), which went from introduction to passage in about three weeks.¹³ Among the major points in this bill:

- *Emergency preparedness.* Each mine to have a plan which includes coordination with local emergency agencies, tracking and communication devices, and a two hour oxygen supply with each miner plus supplementary supplies positioned along escapeways.

¹¹ U.S. Department of Health and Human Services. Criteria for a Recommended Standard / Occupational Exposure to Respirable Coal Mine Dust. Cincinnati: NIOSH, September 1995. (DHHS report no. 95-106)

¹² Volkwein, Jon, et al. Laboratory and Field Performance of a Respirable Personal Dust Monitor. Pittsburgh: NIOSH Pittsburgh Research Laboratory, May 2006 (draft report). Available at [<http://www.cdc.gov/niosh/review/public/dustmonitor>].

¹³ There were predecessor bills with similar ideas, beginning 1 February 2006 with H.R. 4695 / S. 2231, which was sponsored by all members of the West Virginia delegation.

- *Rescue teams.* Each large mine to have two teams familiar with the mine (including a “knowledgeable” mine employee), available within one hour. More flexible rules for smaller mines (fewer than 36 employees). Limitations on legal liabilities of teams.
- *Penalties.* Willful violations may be subject to imprisonment and fines up to \$250,000 (\$500,000 second offense), compared to current \$25,000 (\$50,000). Up to \$220,000 civil penalty for “flagrant” failure to correct cited conditions. MSHA empowered to seek court orders to collect penalties.
- *Sealing of abandoned mine areas.* MSHA to issue new standard, with strength criterion greater than current 20 pounds per square inch pressure resistance.

While S. 2803 had broad bipartisan support (passed by unanimous consent in the Senate and under suspension of the rules in the House), some Members characterized it as only a “first step,” to be followed by more measures. For example, as compared with S. 2803, H.R. 5389 (George Miller, Rahall et al.) / S. 2798 (Kennedy et al.) would feature:

- additional specific safety measures, including continuous monitoring of the mine atmosphere, refuges stocked with five days of supplies (these measures to be enforced by a withdrawal order if found to be lacking), and a lower limit on dust concentrations;
- more stringent requirements for rescue teams, e.g. that they must be composed exclusively (in larger mines) of mine employees and be immediately available for deployment;
- public hearings and family involvement in accident investigations, which are to be conducted independently of MSHA if so requested by miners’ union or majority of affected family members;
- stricter penalties, e.g. \$1 million penalty and entire-mine withdrawal order if “pattern of violations” identified; fines to be paid into escrow pending appeals; elimination of consideration of mine size or financial viability;
- a safety ombudsman within the Department of Labor Office of Inspector General; and
- implicitly, a shift of budgetary resources from technical support to enforcement personnel.¹⁴

¹⁴ See Section 10 of the bill, “Transition to a new generation of inspectors.” The approach of S. 2803 with regard to human resources is to establish scholarships for the training of miners, inspectors and researchers (funding levels to be determined by appropriations).