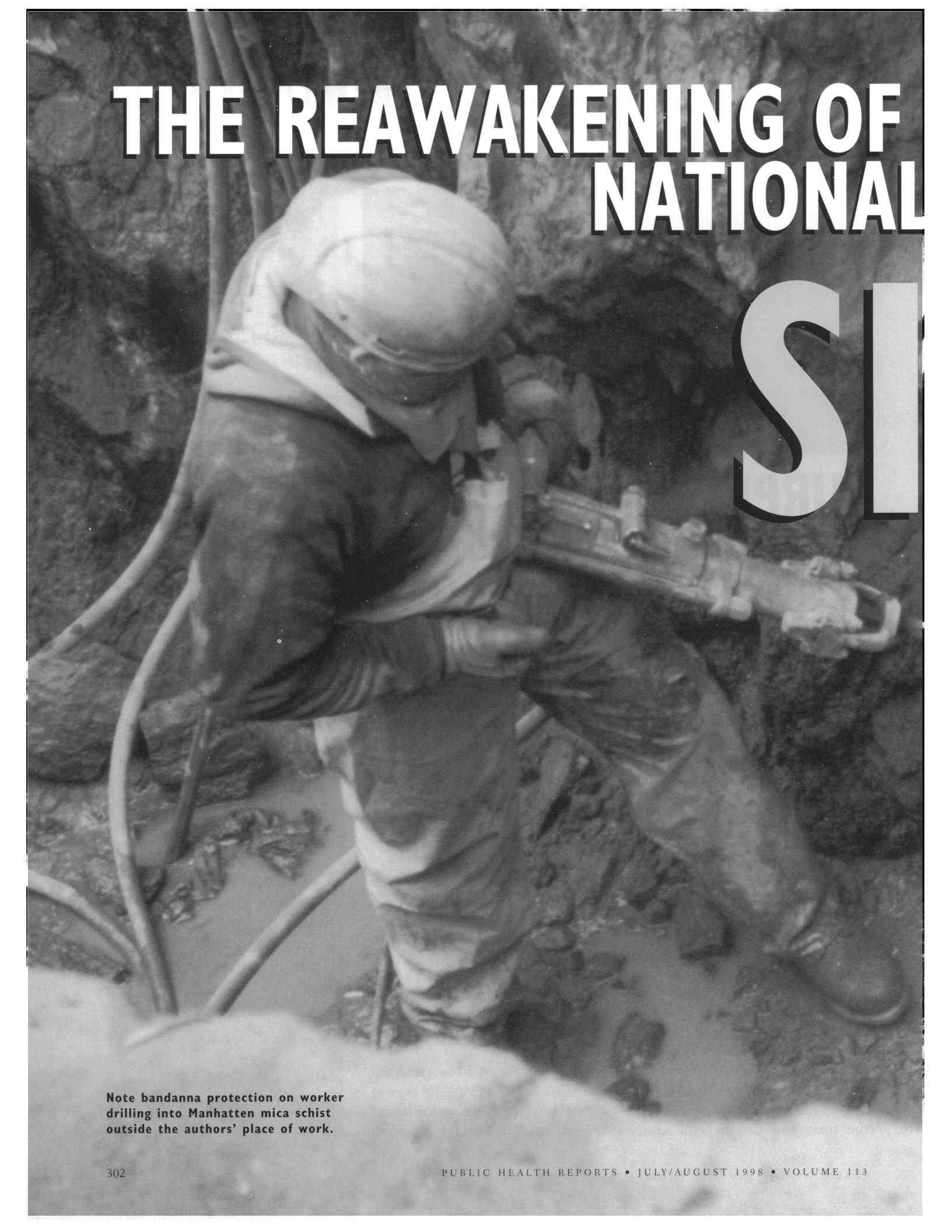


THE REAWAKENING OF NATIONAL

SI



Note bandanna protection on worker drilling into Manhattan mica schist outside the authors' place of work.

Gerald Markowitz, PhD
David Rosner, PhD

CONCERN ABOUT

SILICOSIS

SIXTY-THREE YEARS have passed since Congress learned that Union Carbide had buried about 700 deceased (and diseased) workers outside a tunnel they were drilling, an event that heralded silicosis as a major occupational threat. Forty-five years have gone by since silicosis was considered a "disease of the past." Twenty-five years have slipped by since the recommendation to cut in half the Permissible Exposure Limit to silica disappeared into the oblivion of unpassed laws. America is experiencing an epidemic raging from West Texas to West Virginia, from California to New York, in work settings from oil refineries and coal mines to foundries and shipyards. Why is the disease still such a public health threat? How can we avoid repeating the historical cycle of discovery, public health attention, and successful industry lobbying to quash permanent solutions?

SYNOPSIS

From West Texas to West Virginia, from California to New York, in industries from oil refining to coal mining and work settings from foundries to shipyards, the United States is experiencing an epidemic of silicosis, a preventable disease. Silica sand has been linked to cancer, and the International Agency for Research on Cancer has named silica as a probable human carcinogen. This article analyzes the reawakening of national concern about silicosis and the social, economic, and epidemiologic factors that have led scientists, policy makers, industrial hygienists, and labor and industry representatives to reassess the danger that silica sand poses to the health of an estimated two million workers in this country.

DAVID ROSNER

SILICOSIS

Silicosis is a disease of the lungs. It slowly suffocates its victims as the lungs' capacity to absorb oxygen is destroyed. Workers develop the disease by inhaling silica dust (fine particles of sand) while working in settings such as foundries, quarries, construction sites, shipyards, and mines. Dust is created when workers sandblast old paint, tar, oil, or other residues off metal pipes, bridges, oil storage tanks, oil rigs, or buildings. (In this article we use the term "sandblasting" to denote any blasting that uses an abrasive with more than 1% free silica, including flint as well as sand. This is the definition of a high silica content abrasive used by the National Institute for Occupational Safety and Health.¹) In surface coal mining, dust is created when workers drill through sandstone or other hard rock.

Silicosis was once considered the plight of older workers who became disabled after 30 to 40 years of

working in the "dusty trades"—potteries, foundries, construction, and mining. Yet today we see a host of younger workers falling prey to this devastating disease.

DISCOVERY AND WHITE-WASHING

The story of the current attention to silicosis begins in the 1930s during the Great Depression, when the disease became a national scandal. In 1935 testimony before a congressional committee revealed that approximately 700 workers had died after drilling tunnels for Union Carbide at Gauley Bridge, West Virginia, a tragedy often referred to as the "Hawk's Nest disaster"² for the name of the mountain through which the tunnel was drilled. Investigations by the committee, headed by progressive New York Representative Vito Marcantonio, revealed that the very company that was killing workers



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by placing them in hazardous work conditions had buried hundreds at the side of the road outside the tunnel in unmarked graves. Less well known but equally important were the thousands of Depression-era silicosis lawsuits threatening the economic stability of foundries, metal mines, potteries, and construction companies, among many other worksites. As a result, silicosis came to be known as the "king of occupational diseases." Industry responded to the lawsuits by convincing state governments to incorporate the disease into state workers' compensation schedules, thus taking silicosis out of the courts.

By the 1940s, despite continuing documentation of cases, the industrial hygiene and business communities declared silicosis a "disease of the past," whose current victims were a

legacy of the unhygienic and primitive work conditions of a bygone era.³ Ironically, at the same time, the postwar economic boom was leading to dangerous dust exposures for hundreds of thousands of additional workers. In the Gulf Coast region of Louisiana, east Texas, and Mississippi thousands of workers found jobs in the booming shipyards, off-shore oil rigs, and oil refineries. As workers were sent to clean the hulls of ships, oil storage tanks, and refineries and given the dirty job of sandblasting a variety of objects, including piping and the inside of tanks covered with toxic residues, they would become a new generation of victims.

Despite years of assurance that silicosis was a disease of the past and that workers could be adequately protected through proper

ventilation, substitution of non-silica abrasives such as steel shot or garnite, and protective equipment, the reality is that during the postwar years workers continued to be exposed to excess amounts of silica and that silicosis never really vanished. However, it is virtually impossible to develop reliable statistics concerning its prevalence in the decades following World War II given the general complacency of industry

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and the industrial hygiene and medical communities regarding this disease and the fact that silicosis was often not listed on death certificates as a cause of death or contributing factor. In general, doctors were neither trained to diagnosis this disease nor given reason to suspect its prevalence among industrial workers.

THE DEBATE OVER BANNING SAND

In the late 1960s, sandblasters, painters, and other workers at the Avondale Shipyards in Louisiana began to come forward, complaining of constricted breathing and terrible pain. Morton Ziskind, Hans Weill, and Bezhad Samimi at Tulane University began a series of epidemiological studies that documented widespread silicosis among workers at Gulf Coast shipyards. This documentation of the silicosis epidemic in Louisiana coincided with the passage of the Occupational Safety and Health Act of 1970, which created the National Institute for Occupational Safety and Health (NIOSH) in the Department of Health, Education and Welfare and the Occupational Safety and

Health Administration (OSHA) in the Department of Labor. NIOSH was established to develop scientifically sound standards for occupational hazards while OSHA's mandate was to enforce safe and healthy work practices.

One of NIOSH's first activities was to produce reports that would provide scientific justification for OSHA's regulatory activity. Silica was among the first substances that NIOSH examined. Because silica was one of the oldest and presumably best documented occupational diseases, NIOSH believed, somewhat naively, that developing the scientific base for an enforceable standard would be politically less controversial than establishing standards for newer toxic substances (Personal communication, John Finklea, MD, NIOSH, June 1993).

In the early 1970s, partially in response to the Tulane studies, NIOSH sponsored an independent investigation of sandblasting practices throughout the country. NIOSH contracted with Austin Blair, an industrial hygienist from the Boeing Aerospace Company in Seattle, whose report proved to be an indictment of silica exposures and of the lack of protection that respirators and protective equipment afforded workers. In the 1950s and 1960s it had been assumed that silicosis could be prevented if workers used respirators that lowered inhaled dust to levels below the Threshold Limit Value (TLV) specified by the American Conference of Governmental Industrial Hygienists

(ACGIH) and adopted by OSHA. But Blair's report raised questions about this assumption; he found that with the equipment then commonly used, "the protection afforded these workmen is, on the average, marginal to poor."⁴

The indictment of protective equipment was serious enough. But, shortly thereafter, in mid-1974, two other NIOSH-supported projects reported on cases of silicosis among shipyard workers and steel fabricators in New Orleans and elsewhere.^{5,6} The response of NIOSH officials was swift; in 1974, the agency issued a Criteria Document Recommendation for a Crystalline Silica Standard, which recommended that OSHA's legally enforceable standard be made more stringent by cutting it in half to 50 micrograms per cubic meter of air. The document further recommended that silica be banned as an abrasive in blasting.¹

In February 1975, just after the NIOSH document was published in the *Federal Register*, more than 50 people representing the affected industries gathered together in Houston to form the Silica Safety Association (SSA). Their stated goal was to "investigate and report on possible health hazards involved in [the] use of silica products and to recommend adequate protective measures considered economically feasible,"⁷ but in reality their purpose was to make sure that OSHA did not adopt the NIOSH recommendation. Shortly thereafter, SSA wrote to various

THE HUMAN TOLL

John Farmer, an African-American sandblaster, was born during the Depression along the Gulf Coast of Texas. (The names and some identifying information have been changed in these vignettes.) Farmer spent two years in college, joined the Army, and then worked primarily in a shipyard as a laborer and sandblaster until 1982, when he retired. Because of his short, thin stature (five feet, six inches tall, weighing less than 125 pounds), Farmer was often sent into the poorly ventilated holds and double bottoms of ships, where he sandblasted off asbestos and other residue. He usually used a "desert hood" to protect himself against ricocheting particles, a cartridge respirator to partially filter the silica-laden air he breathed, and sometimes an air-fed hood: a cumbersome, spacesuit that supplied him with relatively pure air for the short time he was able to wear it in the hot and humid environment of this Southern shipyard. In 1988, when he was 53 years old, a doctor diagnosed him with "massive progressive fibrosis." Three years later, he had deteriorated to the point that he "was no longer able to walk and [could] only stand briefly while using supplemental oxygen." After considering him for a

lung transplant, the physician noted that this 56-year-old man's future looked "bleak"—in terms of both longevity and quality of life. (Personal communication, M. Diane Dwight, Provost & Umphrey, Beaumont, Texas.)

Lawrence Brown was born in Louisiana in 1946. Following discharge from the Army in 1977, he began working as a sandblaster and painter for a company that contracted nonunion workers out to almost every major refinery in the Port Arthur, Texas, area. Brown usually wore a desert hood and sometimes a paper dust mask as he blasted the insides of storage tanks and other vessels, preparing them for painting. In 1988, at the age of 41, he developed night sweats, violent coughing, and shortness of breath. He was diagnosed with tuberculosis at a veterans hospital. Two years later he had lost more than 20 pounds and had persistent coughing, intermittent episodes of vomiting, and shortness of breath. He had difficulty exerting himself to take a shower. In June 1990, doctors reevaluated his X-rays and diagnosed silicosis. Brown died at the age of 46. He had sandblasted for only 10 years. (Personal communication, M. Diane Dwight, Provost & Umphrey, Beaumont, Texas.)



MINE SAFETY & HEALTH ADMINISTRATION

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industries requesting financial support for the organization and that letters be written to the OSHA Docket Officer requesting delay in the public hearings on NIOSH's proposed standard. In these appeals, it was clear that the primary purpose of the organization was “to represent interested parties in the attempt to assure the continued use of sand in abrasive blasting operations.”⁸

In the course of the next few months, SSA developed its argument justifying the continued use of sand. L.L. Sline, the organization's president, argued that sandblasting was safe.⁹ SSA's position was that if workers used

“proper protective devices” there was little danger of excessive exposure. Therefore, if equipment was capable of lowering exposure to “safe” levels, there was no need to lower the existing TLV for silica. SSA further argued that the reason that workers in the past had come down with silicosis was

that they “had no air-fed hoods.”¹⁰ What SSA officials did not reveal, however, were the results of a study conducted in a plant owned by one of the officers of the Association, which showed that “under conditions considered good work practice,” nearly half of all air samples were above the TLV, indicating danger for workers (Unpublished



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data, Courtney and Company, Deer Park, Texas, February 1977).

SSA was successful in delaying OSHA's adoption of the NIOSH recommendation.¹¹ Despite President Jimmy Carter's appointment of Eula Bingham to head OSHA, during whose tenure more occupational safety and health standards were promulgated and adopted than in any similar period before or since, no new silica regulations have been adopted up to the present day.¹²

The final blow to the NIOSH proposal to ban sand came once Ronald Reagan was elected President. As the Executive Director of the SSA observed: "With the change in administration, the ever increasing avalanche of government regulations have been reversed. Economic impact studies are *now* a required part of every regulatory process. As a result, OSHA's proposed abrasive blasting standard has been moved from a top prior-

ity 'target' regulation to the back burner."¹¹

By 1982, the anti-regulatory and pro-business environment in Washington had all but killed the efforts to lower the silica standard and made lobbying efforts unnecessary. With its success, SSA found its contributions drying up.¹³ A few months later, a special meeting of the SSA's Board of Directors concluded that "the association should be put on hold."¹⁴ The records of the organization were placed in storage and the offices closed.

A NEW EPIDEMIC EMERGES

Ironically, at the very time SSA was winding down its operations in East Texas, the silicosis epidemic was spreading from the Gulf Coast region to the West Texas oil fields in the Permian Basin, around Odessa and Midland. The West Texas oil fields, which had been in a long period of decline,

began to boom as domestic oil prices rose as a result of the OPEC oil crisis in the mid-1970s. In the process of restarting the fields, workers reconditioned and cleaned miles and miles of piping, scores of small and large oil storage tanks, and a large amount of equipment.

The oil companies generally hired small, non-union contracting companies to blast off tar and oil residues that had accumulated over the years in pipes and storage tanks used to store the raw oil product. Most of those employed to do the dirty and extremely dangerous job of

Scores of workers, mostly Hispanic and mostly young, had come down with the disease.

sandblasting were Mexican migrants who had recently arrived in the boom towns of West Texas. Many of the workers were never provided more than bandannas or desert hoods to place around their noses and mouths to shield them from the silica sand they blasted. (Desert hoods protect the heads and chests of workers from ricocheting particles but do nothing to protect workers' lungs from dust-laden air.) In the early and mid-1980s, young men began to appear in doctors' offices complaining of shortness of breath, coughing, and sweating—symptoms of silicosis. Anti-immigrant feeling masked this outbreak until eventually the prolonged oil boom in the region brought silicosis to the attention of occupational health physicians and Federal and state occupational safety and health agencies.

In November 1988, the epidemic that had been brewing for the past decade became public when the Ector County, Texas, Health Department was informed by a physician in Odessa, a nearby oil town, that he had diagnosed three men as suffering from acute silicosis. Within a year seven other sandblasters had been identified as victims of silicosis. All were Mexican-Americans, seven of them under the age of 30, and all had worked cleaning tanks and pipes used in the oil fields. By the early 1990s, scores of workers, mostly Hispanic and mostly young, had come down with the disease.

In the late 1980s and early 1990s, workers exposed to silica began to sue sand providers and equipment manufacturers, which were not protected by workers' compensation statutes developed in the 1930s to limit liability suits against employers. Under Texas common law, those

selling dangerous products had an obligation to adequately warn users of potential hazards. Using legal strategies developed in the asbestos litigation of the mid-1970s and 1980s, plaintiffs' lawyers began to reach substantial settlements, and many of the companies began to substitute non-silica abrasives for the deadly sand previously used.

The election of President Clinton led to an attempt to revitalize NIOSH and OSHA. Within OSHA, people who had long been concerned about silicosis such as Mike Connors and Richard Fairfax were given positions of authority. Within NIOSH, Gregory Wagner was Director of the Division of Respiratory Disease Studies, and in the Mine Safety and Health Administration (MSHA), Davitt McAteer (the son of a miner) was named Assistant Secretary, and Andrea Hricko Deputy Assistant Secretary. All three had longstanding interest in dust diseases and the need for the Federal government to play an important role in protecting workers' health. Together, they refocused Federal attention on silicosis, culminating in the 1997 National Conference to Eliminate Silicosis, which attracted over 600 Federal employees, industry representatives, union officials, and public health workers.

The national conference broadened the discussion of silicosis to include coal miners in addition to oil workers, foundry workers, sandblasters, and hard rock miners. While silicosis had long been considered a danger to hard rock miners in the West, MSHA officials' concern over silicosis stemmed from fundamental changes in the technology and political economy of coal mining in West Virginia, Pennsylvania, and Kentucky. The Appalachian coal fields were once the richest and most easily accessible source of coal in the nation; in recent decades, the veins of coal have become thinner and deeper in the ground, which has meant that miners have had to drill through silica-laden rock to reach the coal. As a result, miners are now endangered not only by coal workers' pneumoconiosis—which has plagued anthracite miners for decades—but also by silicosis. (Personal communication, Davitt McAteer, LLB, July 1997).

In a 1994 letter to MSHA, a Pennsylvania insurance company said it was paying claims on young surface miners who had died from silicosis and questioned what MSHA could do to prevent the disease. In response, an MSHA manager, Jack Kuzar, spearheaded an MSHA-NIOSH X-ray screening and outreach program in Johnstown, Pennsylvania, to investigate the magnitude of the problem and to educate coal miners and mine operators on ways to reduce exposure to silica-containing dust. Eight of 150 miners screened had silicosis (Personal communication, Andrea Hricko, MPH, MSHA, July 1997). This spurred MSHA to make silicosis one of its top priorities, in addition to its long-standing concern over coal workers' pneumoconiosis.

SILICOSIS

PROSPECTS FOR THE FUTURE

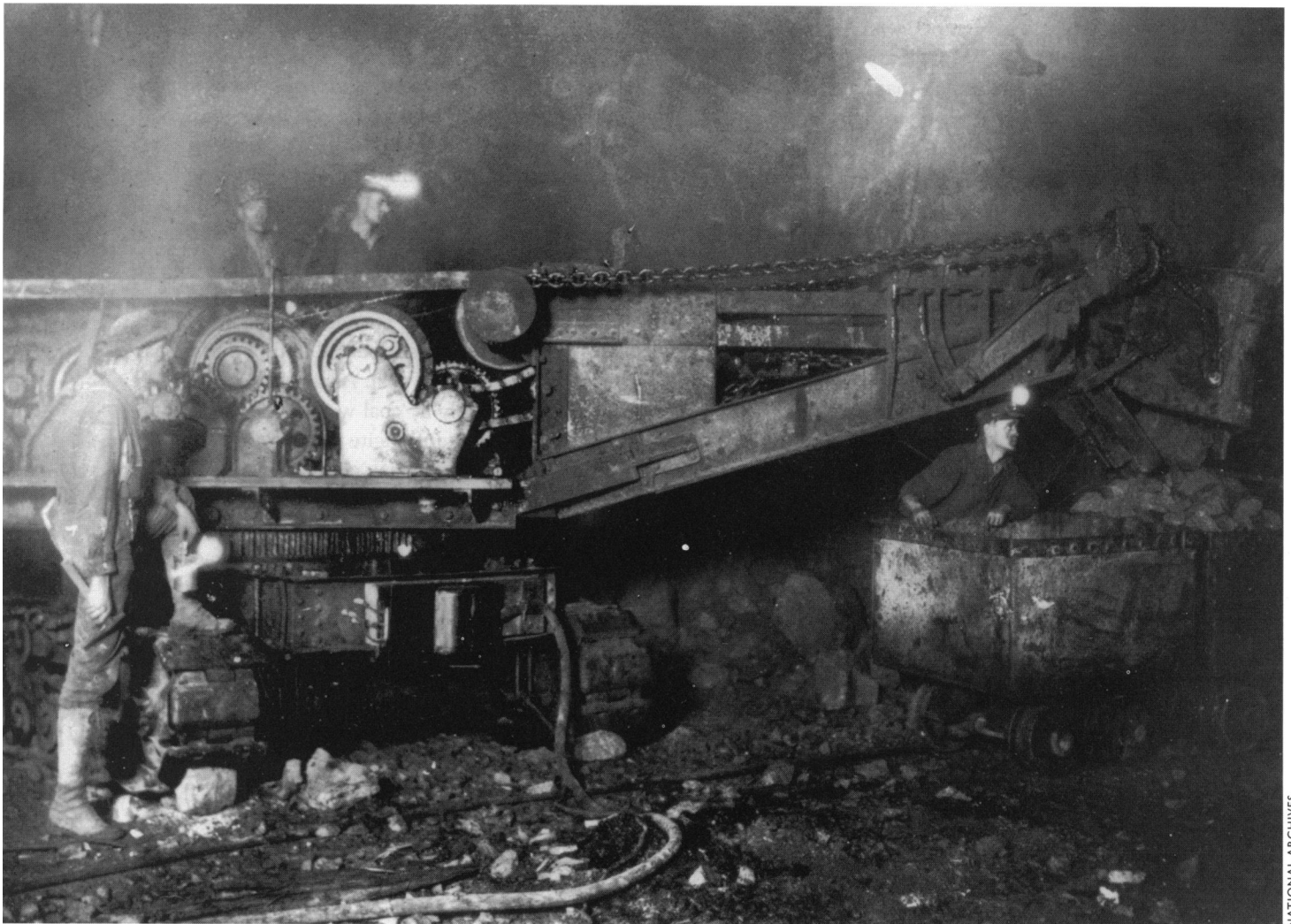
Today, scientists, policy makers, industrial hygienists, labor unions, and industry representatives are reassessing the danger that silica sand poses to the health of an estimated two million workers. The last three years have seen two international conferences evaluating the scientific evidence of the link between silica and cancer; an International Agency for Research on Cancer decision to name silica as a known human carcinogen; a decision by the American National Standards Institute to recommend a ban on the use of sand in indoor abrasive blasting; and the initiation by OSHA and MSHA of a National Campaign to Eliminate Silicosis.

The silica standard is likely to once again become an issue. Although the arguments will be cast primarily as epidemiological and technical debates, the historical record suggests that competing interests play a role in framing the question of when and in what amounts silica

is safe or dangerous. In the 1930s, with a severe liability crisis forcing industry to act, standards were established that reflected the economic interests and technical capabilities of equipment manufacturers, industries that used sand, and insurance companies that paid liability claims. During the postwar years, the generally conservative political environment, business efforts to downplay the seriousness of the silica hazard, and the incorporation of silicosis into state workers' compensation laws led to the end of efforts to revise the silica standard. Despite studies indicating that silicosis remained a problem, few voices called for legislative action. In the 1970s, following the passage of the Occupational Safety and Health Act, the issue of the standard once again became important. Only concerted industry efforts and the conservative triumph of the 1980s forestalled the banning of sand as an abrasive in blasting.

With the reawakened attention to silicosis and the flood of lawsuits in Texas, Louisiana, Florida, and other

Silicosis was known as the “king of occupational diseases” in the 1930s when this photo was taken in an Oklahoma mine, yet 60 years later it is still a significant problem.



NATIONAL ARCHIVES

states, industry is faced with a quandary of which way to proceed. On the one hand, the American National Standards Institute (a voluntary association of industrial hygienists and industry representatives that has established consensus standards for numerous substances) has called for banning the use of sand in indoor abrasive blasting. On the other hand, history is repeating itself in the formation of the Silica Coalition, "a diverse coalition of trade associations and companies involved in the mining, processing, production, and use of silica and silica-containing materials," established in 1997 in anticipation of "OSHA rulemaking to control worker exposure to crystalline silica dust in the not-too-distant future."¹⁵ While the organization is ostensibly aimed at providing "sound science" and legal resources to companies potentially affected by any change in government regulation of silica, it is also clear that increased awareness of the dangers of silica and the resulting threat of litigation hang over the heads of industry executives.

At a 1997 meeting of companies interested in the silicosis issue, Jean McHarg, a Washington, DC, attorney, noted that "approximately 2,000,000 workers are exposed to respirable silica annually" and that this posed an enormous litigation problem. "If only 10% of occupationally exposed workers (or their heirs) believed their lung cancer is due to their occupational silica exposure," then there was a potential for enormous claims.¹⁶

At present it appears that MSHA, NIOSH and OSHA, along with private industry, are approaching a moment of decision. The cooperation between govern-

ment and industry that led to a national conference in March 1997 has, in marked contrast to events of the past 50 years, created enormous attention and activity around the issue of silicosis. Yet this attention has the potential to generate enormous conflicts. Attempts to reduce the Permissible Exposure Limits, for example, could pit the regulators in governments against the regulated in industry. Similarly, attempts to ban sand as an abrasive, one of the longest standing goals of NIOSH, will antagonize both providers of sand and end users, despite the availability of cost-effective alternatives to sand for abrasive blasting. As the dangers of silica are more widely publicized, more diseased workers are likely to file lawsuits. Recent attention to the carcinogenic effects of silica and the resulting fear that silica is not only an occupational but also an environmental hazard will undoubtedly broaden the debate and generate new conflicts. Let us hope that we can learn from the past and effectively protect the future generations of workers. We must not let the cycle repeat itself.

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