Tracking Silicosis in the New Jersey Mining Industry – What Have We Learned?

Background

For over 30 years, the New Jersey Department of Health's (NJDOH) Silicosis Surveillance Project has tracked cases of the disabling lung disease silicosis. Starting in 1988, the Project received funding for this activity from the National Institute for Occupational Safety and Health (NIOSH). By law (N.J.A.C. 8:58; 1.4-1.7), New Jersey hospitals and health care practitioners are required to report suspected cases of silicosis to the NJDOH. [1] The majority of cases are identified through these sources. Remaining cases are identified through death certificate and workers' compensation records. Cases identified in New Jersey may have received their exposure many years in the past or in another state or country.

81 cases of silicosis in New Jersey were related to employment in the mining industry.

The goals of the NJDOH Silicosis Surveillance and Intervention Project are to:

1) Identify and track cases of silicosis;
2) Determine whether the working conditions related to case exposure still exist, and;
3) Take actions to prevent additional workers from being exposed

Why Track Silicosis?

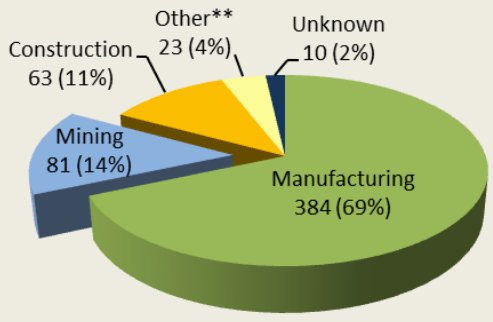
Silicosis is a potentially disabling and sometimes fatal lung disease caused by breathing dust containing extremely fine particles of crystalline silica. It is almost always related to work with prolonged exposure to respirable crystalline silica, found in materials such as sand, rock, granite, concrete, masonry and many building and landscaping materials. Breathing dust generated from these materials for prolonged periods can scar the lungs. There is usually a lag time of 20 years or more between exposure and onset of the disease. If exposure is intense, onset can occur in just a few years.

Silicosis begins with few, if any, symptoms. Once present however, these symptoms can affect day-to-day life, including the ability to work. Symptoms may include shortness of breath, severe cough, wheezing, and chest tightness. If silicosis develops, the damage is permanent. Scarring of lung tissue cannot be reversed. Therefore, prevention of exposure to airborne crystalline silica dust is critical.

Results of Tracking Silicosis in New Jersey – 1979-2011

- 561 total cases were confirmed in 8 major New Jersey industry sectors (Figure 1).
- 81 (14%) of those cases occurred in the mining industry and had documented exposure to silica dust.
- 66 of the mines where cases were exposed were located in New Jersey.
- All of the silicosis cases were male and predominantly white (86%).
- Average age at the time of case confirmation was 71 years old, but a 45-year old case was confirmed as recently as 2008.
- Information about workers' compensation status was available for only 17 of the 81 cases. Although silicosis is associated with employment, only 10 of the 17 were awarded compensation.

FIGURE 1 -- Number of NJ Silicosis Cases by Indusrial Sector,* 1979-2011 N= 561



*1987 Standard Industrial Classification

**Other: Services (11), Transportation (8), Agriculture (8), Retail Trade (1), Public Administration (1).

Decreasing Numbers of Cases but Risk of Silicosis Persists

Over the past 3 decades, the number of silicosis cases per decade related to work in the mining industry decreased by 42% (Figure 2). This reflects both declining employment in the mining industry and improvements in dust control technology. However, the Mine Safety and Health Administration (MSHA), which inspects mines, continues to document overexposures to respirable crystalline silica dust. Although a small percentage of overall samples exceeded the MSHA limit, several mining occupations had multiple overexposures (Table 1).

FIGURE 2 -- Number of NJ Silicosis Cases in Mining by Decade, 1980-2009

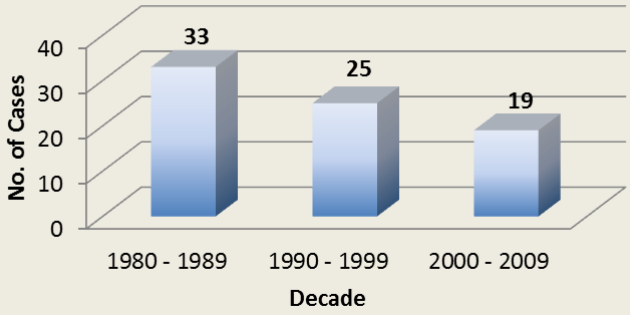


TABLE 1 – Ranking of NJ Mining Occupations with Overexposures* to Silica Dust, 2002-2012

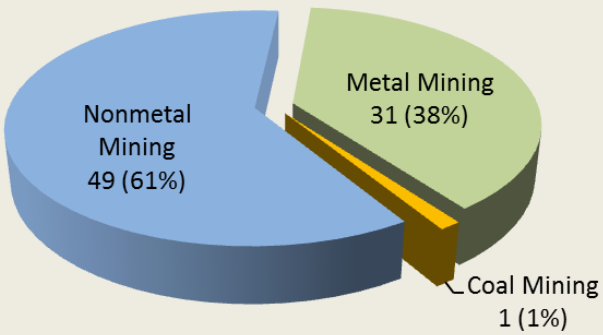
Rank	Mining Occupation	# of Samples
#1	Bagging Operator	11
#2	Dryer Operator	8
#3	Laborer	5
#4	Crusher Operator	5
#5	Truck Loader/Driver	3

*Sampling results from MSHA inspections, MSHA Mine Data Retrieval System, 11/29/12

Forty-nine (61%) of the silicosis cases in mining (Figure 3) were related to work with nonmetallic minerals like sand, gravel, and stone. One case (1%) was employed as a tunnel worker in coal mines in Europe where his predominant exposure was to silica dust. Historically, 31 (38%) cases were associated with work in metal ore mines during the 1930's, 40's and 50's. Twenty of these mines were underground iron ore mines located in Morris County, NJ. All underground mines in New Jersey have been abandoned.

The majority of silicosis cases in mining were related to work with nonmetallic minerals like sand, gravel, and stone.

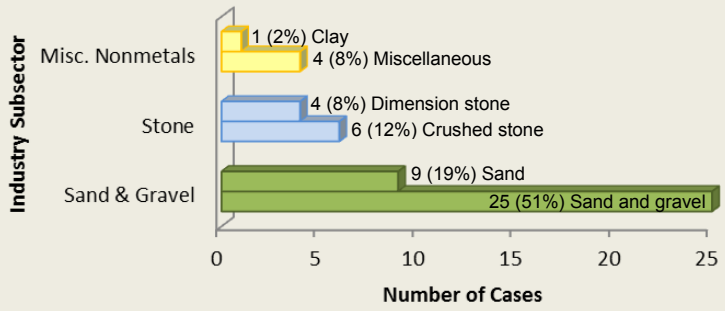
FIGURE 3 -- Number of NJ Silicosis Cases by Mining Industry Subsector, 1979-2011 N=81



►►Materials Mined

The major groups of nonmetallic materials mined in New Jersey are: 1) sand and gravel (sand mines, construction sand and gravel mines); 2) stone (crushed, dimension), and; 3) miscellaneous nonmetals (for example, gypsum). Construction sand and gravel and crushed stone account for over 90% of New Jersey's non-fuel mineral production.[2] Correspondingly, work in sand and gravel mines was related to more than twice as many silicosis cases as any other nonmetal mining subsector (Figure 4).

FIGURE 4 -- Distribution of NJ Silicosis Cases in Nonmetal Mining, 1979-2011 N=49



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►►Occupations of Mine Workers Who Developed Silicosis

Nearly all phases of extraction, processing, and handling of nonmetallic minerals provide risk for exposure to silica dust. The occupation of silicosis cases was defined as the job that contributed most to silica exposure (Table 2). Laborers and quarry workers accounted for the largest numbers of workers who developed silicosis. Machine and heavy equipment operators followed with lower numbers of special trades workers. Many of the mine operators, managers, and foremen who developed silicosis had come up through the ranks and previously worked in jobs with more intense exposure to silica dust.

TABLE 2 – Distribution of NJ Silicosis Cases in Nonmetal Mining by Occupation, 1979-2011

- Dryer Operator (5)
- Machine Operator (3)
- Screener (2)
- Stone Crusher Operator (1)

- Shipping/Receiving (1)
- Sample Manager (1)
- Mining Engineer (1)

Occupation	No. (%)
Laborer/Quarry Worker	19 (39%)
Machine Operator	11 (23%)
Operator/Manager	6 (12%)
Special Trades	5 (10%)
Heavy Equip. Operator	3 (6%)
Other	3 (6%)
Unknown	2 (4%)
TOTAL	**49 (100%)**

- Laborer/Quarry Worker (13)
- Miner (3)
- Bag Handler (2)
- Sweeper (1)

- Machinist (2)
- Truck Driver (2)
- Mechanic (1)

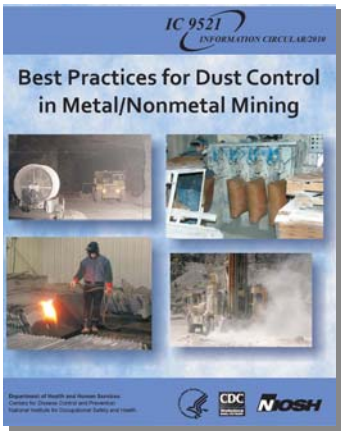
How Can Silicosis Be Prevented in Today's Active New Jersey Mines?

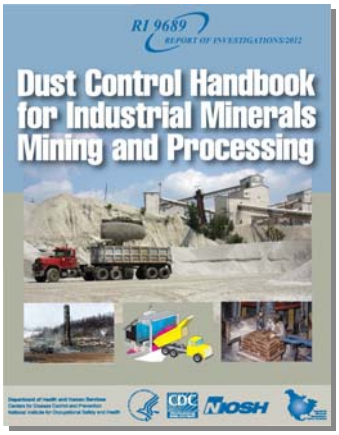
Recent personal sampling results from the Mine Safety and Health Administration indicate that overexposures to respirable silica dust continue to occur for miners in metal and non-metal mining operations.[3] This represents an ongoing threat to miners' health. Employers are tasked with identifying the work operations related to silica exposure and taking action to reduce and control worker exposure.

Control measures for reducing worker exposure range from long-used controls, (water suppression and local exhaust), which have developed into industry standards, to newer ones (use of robotics), which are still being improved. The following recent publications from the National Institute for Occupational Safety and Health discuss these industry best practices and control measures in great detail:

- **Best Practices for Dust Control in Metal/Nonmetal Mining, 2010**
  Web site: http://www.cdc.gov/niosh/mining/works/coversheet192.html

- **Dust Control Handbook for Industrial Minerals Mining and Processing, 2012**
  Web site: http://www.cdc.gov/niosh/mining/works/coversheet1765.html





The aim of these publications is to empower minerals industry personnel to apply state-of-the-art dust control technology to reduce or eliminate exposure to hazardous dust concentrations. Employers, unions, and health and safety professionals in the New Jersey metal and nonmetal mining industry are encouraged to download or obtain these publications to determine which control technologies might be implemented at their facilities. Once implemented, it must be stressed that the ultimate success of ongoing protection for workers is dependent upon continued maintenance of these controls.

References

1. New Jersey Administrative Code 8:58; 1.4-1.7. Reportable Occupational and Environmental Diseases, Injuries and Poisonings, 2009.
2. U.S. Department of the Interior, U.S. Geological Survey. 2008 Minerals Yearbook, New Jersey [Advance Release], p. 30.1
3. U.S. Department of Health and Human Services, Centers for Disease Control, National Institute for Occupational Safety and Health. Best Practices for Dust Control in Metal/Nonmetal Mining, May 2010, p. 1.