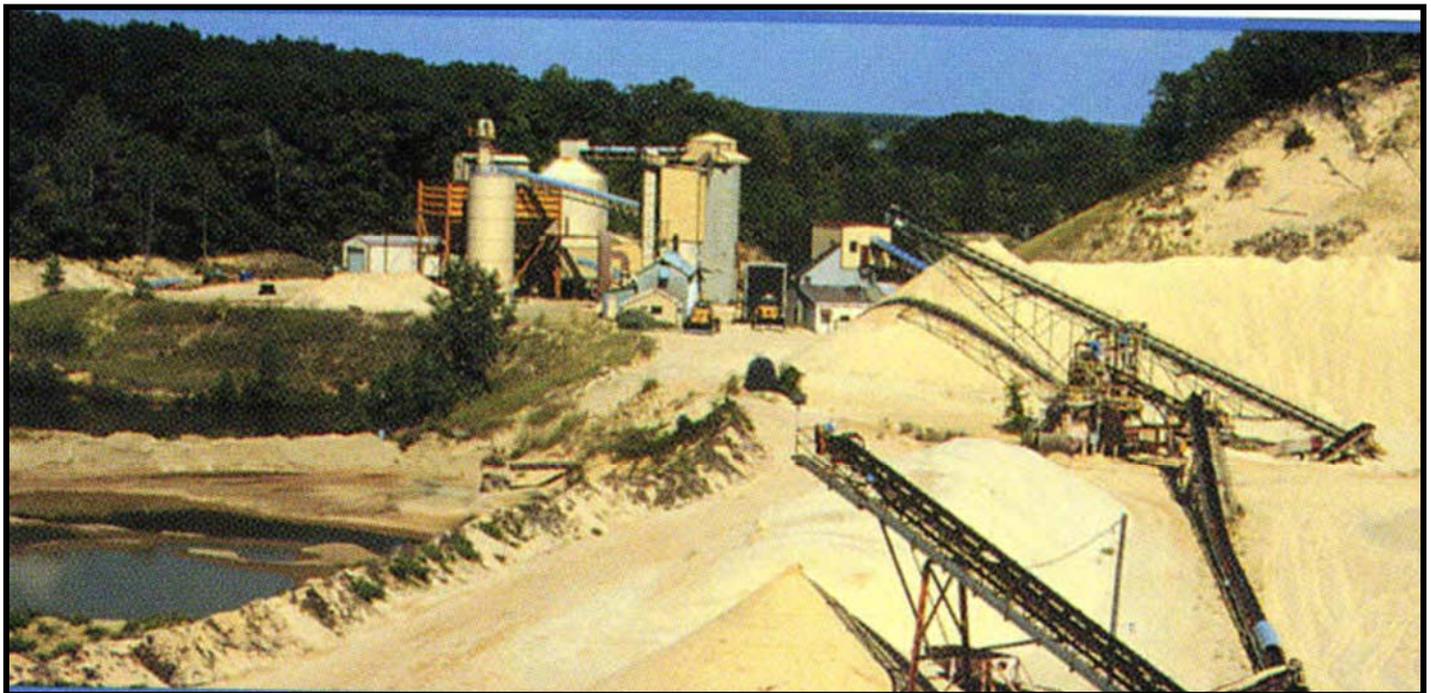


Mining in Michigan and Respiratory Disease

Historically mining in Michigan was a major industry in the Upper Peninsula. Most of the underground mines in the Upper Peninsula have closed. In Michigan in 2016, there were 413 active mines; two underground mines, six surface metal mines, nine surface nonmetal mines, 26 surface stone mines, four mills (one metal, three stone) and 366 surface sand and gravel operations. These mines employed 38 underground miners, 3,113 surface miners and another 670 office employees (NIOSH, MSHA Data File Downloads). Ninety-nine percent of the miners in Michigan are surface miners, compared to the United States, where overall 43% of miners are surface miners. There is an extensive literature on the health risk of underground miners including coal workers' pneumoconiosis (black lung disease), silicosis in gold and iron miners and lung cancer in uranium miners. Even though surface sand and gravel and stone miners are the largest group of miners in the United States and are the predominant type of miner in Michigan, there have been limited studies of the health of surface miners or the types of exposures that may contribute to adverse respiratory health outcomes.



Sand mining along Southern Lake Michigan

Source: Michigan State University Geography Department

Mining in Michigan and Respiratory Disease, continued...

From 1-1-2015 through 2-20-2018, according to the Mine Safety and Health Administration (MSHA) on-line Mine Data Retrieval System (MDRS), 213 of the 429 mine locations in Michigan had at least one silica air measurement above the current allowable level of 0.05 mg/m³, which indicates a risk to miners of silicosis, and the other conditions associated with exposure to silica including COPD, lung cancer, rheumatoid arthritis, scleroderma, chronic renal failure and active tuberculosis.

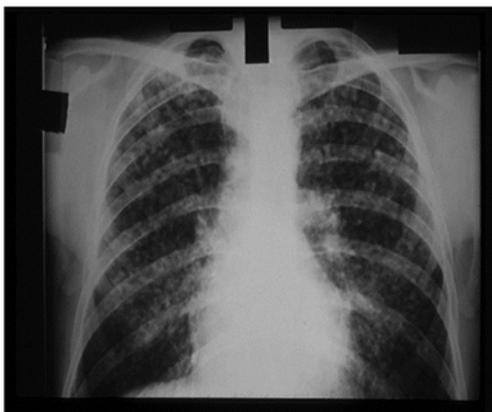
The risk of silicosis in stone quarry sheds in Vermont, where the quarry rocks are cut, is well documented (Graham WG et al., 2001; Wickman AR, Middendorf PJ, 2002). There have been reports to the Michigan surveillance system on the occurrence of silicosis and work-related asthma among miners in our state. Since 1985, 50 confirmed cases of silicosis have been reported from exposure in the mining industry (4.2% of all silicosis cases reported) and seven cases of work-related asthma (0.4% of all work-related asthma cases reported). Because of the relatively small number of workers in the mining industry in Michigan, the mining industry has the second highest rate of work-related asthma, with 5.6 cases per 100,000 after manufacturing, with 10.0 cases per 100,000. Fourteen of the 50 silicosis cases worked in mines out of state. Among the other 36 cases, 30 were underground miners from mines that are now closed and six were surface miners. The six surface miners with silicosis had worked for an average of 33.4 years with exposure to sand and/or gravel. They had worked sampling the sand, on rock crushers, as drillers and as loaders. Causes of work-related asthma in Michigan among miners were welding fumes, various chemicals and ore dust.

Individuals exposed to silica during mining operations are at risk not only for silicosis (Leung et al., 2012) but also for COPD (Omland et al., 2014). In addition, miners are also potentially at risk of developing COPD and work-related asthma (WRA) from exposure to diesel exhaust (Hart et al., 2009 and 2012; Wade et al., 1993). There are reports of asthma caused by diesel exhaust after acute high-level exposure among railroad workers (Wade et al., 1993) and repeated low-level exposure to diesel exhaust among mechanics who work on buses in indoor garages (Adewole et al., 2009).

We have received funding from the Alpha Foundation to assess the respiratory health of miners in Michigan. The Alpha Foundation was set up in 2011 as part of a Non-Prosecution Agreement related to the explosion at an underground coal mine, the Upper Big Branch Mine. This funding allows us to administer a questionnaire, review existing pulmonary function tests and chest radiographs, and provide testing to individuals with 15 or more years of mining who have not had a recent chest radiograph or pulmonary function test.

If you have patients who are current or former miners in Michigan and might be interested in participating, please have them contact us at our toll free number, 1-800-446-7805.

As always, please contact Dr. Rosenman if you have diagnostic or management questions about the respiratory effects of mining or other occupational/environmental exposures.



Chest X-Ray showing silicotic changes associated with long-term exposure to silica.

RESOURCE

The Mine Safety and Health Administration (MSHA) Occupational Illness and Injury Prevention Program—Health Ideas and Tips for Sand and Gravel Mines:

https://arlweb.msha.gov/Illness_Prevention/minetype/sandgrav.htm

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MiTracking Program

The Michigan Department of Health and Human Services (MDHHS) MiTracking Program, through a cooperative agreement with the Centers for Disease Control and Prevention (CDC), maintains an interactive web site (<https://mitracking.state.mi.us/?bookmark=34>) that has environmental (air quality, community drinking water, and ticks), population (number and percent of homes built before 1950 and 1980) and health data (asthma hospitalizations, birth defects, carbon monoxide hospitalizations, cancer incidence, childhood cancer, childhood lead exposure, COPD hospitalizations, heart attack hospitalizations, heat illness hospitalizations, fertility, infant mortality, low birth rate, prematurity, and sex ratio).

The first data on work-related injury and illness was added this past summer; **Traumatic Work-Related Fatalities**. You can query the site and look at traumatic work-related fatalities by age, gender, cause of death, county, and 2 and 3 digit NAICS industry codes. The traumatic work-related fatality data covers 2001-2015 and can be examined by 5-year time periods to look at trends or for all 15 years combined. For example, the number of fatal work-related electrocutions decreased from 33 in 2001-2005, to 31 in 2006-2010, to 19 in 2011-2015 in all industries combined with a more dramatic decrease among workers in the construction industry from 24 to 13 to 8 in the same three 5-year time periods.

Plans are under way to add adult blood lead data and paid workers' compensation claims data for lost work time.

Revisions to the Michigan OSHA Allowable Blood Lead Level

- ◆ A public hearing on proposed rule revisions to the MIOSHA lead standard was held on August 3, 2018, and the finalized rules were sent to the Office of Regulatory Reinvention for final steps and certification.
- ◆ The proposed revisions reduce the blood lead level (BLL) where a worker is required to be removed from exposure to lead. Currently a worker is required to be removed when their BLL is at or above 60 µg/dL or when two consecutive BLLs are at or above 50 µg/dL. The worker can return to work when their BLL is below 40 µg/dL. The revised standard will require removal for a BLL at or above 30 µg/dL and allow return to work only when the BLL is at or below 15 µg/dL. The revision reflects the increased research since the 1980's, the date of the existing lead standard, on the toxicity of lead at BLLs above the background levels found in the general population. In the absence of a specific exposure to lead, 95% of BLLs in the adult general population in the U.S. are below 3.8 µg/dL for men and below 2.8 µg/dL for women.
- ◆ The revisions also propose to remove the requirement for Zinc Protoporphyrin (ZPP) testing because it is not useful in workplace screening. No other changes to the MIOSHA occupational lead standard were proposed, including no changes to permissible air levels or BLL testing requirements.
- ◆ Once the revised rules are filed with the Office of the Great Seal, an effective date will be established.

*Project

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News

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The Project SENSOR News is published quarterly by Michigan State University-College of Human Medicine with funding from the National Institute for Occupational Safety and Health and is available at no cost. Suggestions and comments are welcome.

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