

July 10, 2024

2024 REPORT

TRACKING THE USE OF SILICA AS AN ABRASIVE BLASTING MEDIA IN MICHIGAN



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Silicosis & Other Work-Related Lung Disease Surveillance Program

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There are many resources available to help employers, employees, health care professionals and others understand more about work-related lung disease. Links to these resources can be found at:
www.oem.msu.edu.

Acronyms

LEO MI Department of Labor & Economic Opportunity

MIOSHA Michigan Occupational Safety & Health Administration

MSU Michigan State University

OEM Occupational & Environmental Medicine

NIOSH National Institute for Occupational Safety & Health



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Abstract

Since 1988, Michigan has been tracking silicosis cases, in conjunction with the Michigan Department of Labor and Economic Opportunity's (LEO) Michigan Occupational Safety and Health Administration (MIOSHA). While silica exposure can occur in many different industries, silica exposure from abrasive blasting has been of special concern. Abrasive blasting with silica sand is a hazardous workplace practice, due to the potential harmful effects of exposure to respirable silica. Since 1995, Michigan State University's Occupational and Environmental Medicine Division (MSU OEM) tracks trends in abrasive blasting in Michigan through a survey instrument and encourages blasting companies to use non-silica abrasive media. The most recent survey was conducted to identify the number of abrasive blasting companies in Michigan in 2024 and the number of these companies who use silica for abrasive blasting. The percent

of abrasive blasting companies in Michigan who use silica for abrasive blasting has increased since 2016 but the number of exposed workers has decreased. Ongoing efforts to encourage the use of non-silica abrasive materials to prevent exposure to silica through either regulatory changes and/or educational materials is crucial.

Background

In 1988, the State of Michigan instituted a tracking program for silicosis with financial assistance from NIOSH. This is a joint project of MIOSHA and the Michigan State University, Department of Medicine, Division of Occupational and Environmental Medicine.

1995 was the first year of an ongoing special project to identify companies that perform abrasive blasting using silica, and offer resources on safety and health, and suggest alternate abrasives for blasting. The survey is updated every 4-6 years.

Silicosis

Silicosis occurs when the crystalline form of silica, or silicon dioxide, is inhaled (“Silicosis”, 2000). Silica is also known as quartz. When objects containing silica are used for blasting, chipped, cut, drilled, or ground, the particles become small enough to be inhaled. Baby sand, foundry sand, and beach sand are all common names of materials that contain silica. Potential adverse health effects of silica inhalation include silicosis, which can lead to the activation of tuberculosis, and lung cancer, autoimmune diseases, and kidney failure (“Silicosis”, 2000). Inhalation of silica even in the absence of silicosis (lung scarring) can cause these other adverse health effects. Silicosis can occur in three forms: acute, chronic, and accelerated, based on length of exposure, concentration of exposure, and symptoms (“Silicosis”, 2000). Silicosis can lead to irreversible and progressive damage to the lungs, making it imperative to fully understand and bring awareness to the issue. Silicosis typically occurs 20 years after the exposure, so preventative measures are imperative to prevent illness through outreach and education among the abrasive blasting community (“Silicosis”, 2000).

Silicosis Surveillance in Michigan

Silicosis cases in Michigan are monitored and investigated by Michigan State University’s Occupation and Environmental Medicine Division. Diagnoses are confirmed through medical records, medical questionnaires, and chest radiographs (“The Burden of Silicosis in Michigan”, 2019). 1,048 silicosis cases in Michigan were identified from 1988 to 2016 (“The Burden of Silicosis in Michigan”, 2019). The number of cases of silicosis per year have been decreasing from 620 between 1988 and 1997; 292 between 1998 and 2007; and 136 between 2008 and 2016 (“The Burden of Silicosis in Michigan”, 2019). It is important to note that Black/African American individuals had a cumulative incidence rate of 6 cases per 100,000 compared to White individuals who had an incidence rate of 1.2 cases per 100,000 (“The Burden of Silicosis in Michigan”, 2019). Systematic discriminatory practices in employment have led to health disparities among Black/African American individuals working in silica-using industries.

The primary industries of exposure to silica in Michigan include foundries, construction, and mining, with the number of cases from the foundry industry declining over the years (“The Burden of Silicosis in Michigan”, 2019). Within the construction industry, the practice of abrasive blasting is of particular interest in relation to silica exposure. Abrasive blasting is the practice of using compressed air or water to push out a stream of abrasive media at a high speed to clean or prepare a surface (“Protecting Workers from the Hazards of Abrasive Blasting Materials”, 2014). Multiple types of abrasive media are used by businesses that do abrasive blasting in Michigan, including but not limited to silica sand, coal slag, garnet, glass beads, steel shot, steel grit, sponge, baking soda, slurry, corn cobs, walnut shells, plastic, aluminum oxide, and crushed glass. Abrasive blasting with sand is one of the most dangerous workplace practices, due to the high levels of small respirable particles of silica that result from abrasive blasting (“Preventing Silicosis”, n.d.).

Tracking the Use of Silica as an Abrasive Blasting Media in Michigan

In addition to silicosis cases, trends in abrasive blasting are monitored by Michigan State University's Occupational and Environmental Medicine Division because of the exposure to respirable silica. To monitor and report the most updated data regarding trends in abrasive blasting, a survey is regularly conducted among abrasive blasting companies in Michigan to determine what companies do abrasive blasting, what types of abrasive media are used, how many companies use silica as an abrasive media, how many employees do abrasive blasting, and how many employees use silica as an abrasive media. The first survey cycle was conducted in 1995 and the most recent survey cycle was conducted in 2016. The total number of abrasive blasting companies remained the same when the surveys were conducted in 1995 and 1999, increased in 2005, decreased in 2011, and increased in 2016 ("Snapshot of Abrasive Blasting in Michigan", 2016). The use of silica as an abrasive media decreased since 1995 from 89% of companies using silica to 35% of companies using silica in 2016 ("Snapshot of Abrasive Blasting in Michigan", 2016). 139 companies surveyed in 2016 responded that they did abrasive blasting and 35% of these companies reported that they used silica ("Snapshot of Abrasive Blasting in Michigan", 2016). 140 employees in Michigan used silica as an abrasive in 2016 ("Snapshot of Abrasive Blasting in Michigan", 2016). Due to the COVID-19 pandemic, the survey was last conducted in 2016.

Methods

A new survey cycle was conducted from March 2023 to April 2024 to update data regarding the use of abrasive media in Michigan. A 2024 Abrasive Blasting Survey was developed to collect the necessary information. See *Appendix A* to view the 2024 Abrasive Blasting Survey. The process for surveying abrasive blasting companies in Michigan was prepared by Michigan State University's Occupational and Environmental Medicine Division through procedural and instructional documents. 352 abrasive blasting companies were identified through the use of Dun & Bradstreet Hoovers (DNB) and SANDBLASTING-SERVICES.CMAC.WS/MI/. In March 2023, the status of abrasive blasting was determined for fifty-seven identified companies. The project paused for ten months.

In January 2024, the project resumed. A survey and a postage paid envelope were sent to the remaining 295 companies that were not surveyed in March 2023. Two weeks after the survey was sent, up to five follow-up calls and two voicemails were placed to survey non-responders. The survey was administered over the phone and responses were recorded in an Excel spreadsheet. The spreadsheet was used to track whether the company does abrasive blasting, whether the company uses silica for abrasive blasting, what other media the company uses for abrasive blasting, the number of employees who do blasting, the number of employees who use silica for abrasive blasting, the number of employees who use other media for abrasive blasting, if the company does monument engraving, and if the company does only monument engraving. Companies who indicated that they only do monument engraving were excluded from this survey. Attempted phone calls and voicemails left were tracked in the same spreadsheet. Companies were coded with one of the following response statuses: completed survey; refusal; out of business; duplicate company; non-functioning telephone number, and unable to find a new number; and left voicemails, with no response from the company.

The survey process concluded in March 2024 and yielded fifty-one completed surveys from January 2024 to March 2024. With the addition of the March 2023 survey results, ninety-six total surveys were completed. Due to the low survey response rate, an internet search was conducted for identified abrasive blasting companies that were coded as follows: non-functioning telephone number, and unable to find a new number; left voicemails, with no answer from the company. Each company was coded with the results of the web search as one of the following: has a website, does abrasive blasting; has a website, does not do abrasive blasting; website not found; unable to determine based on website if does abrasive blasting. Eighty-one websites were located and information from these websites was used to fill in survey information on the spreadsheet for the corresponding abrasive blasting company.

The data were analyzed in Excel to determine the number of abrasive blasting companies in Michigan and the types of abrasive blasting media used. Educational material to assist abrasive blasting companies in the selection of non-

silica substitutes for abrasive blasting were developed. Results of the survey, educational materials, and an OSHA fact sheet will be disseminated to all identified abrasive blasting companies, regardless of survey completion.

Results

The survey response rate was 92 of 220 (41.8%). The denominator used to calculate this rate included the 92 respondents that completed the survey, four refusals and 124 nonrespondents (42 of the 124 nonrespondents had a website that indicated they did abrasive blasting, 11 of the 124 had a website that indicated they did not do abrasive blasting, 28 of the 124 had a website that did not indicate if they did or did not do abrasive blasting, and for 43 of the 124 unable to locate a website for the company).

To determine the number of abrasive blasting companies in Michigan, the number of abrasive blasting companies who responded to the survey and indicated that they do abrasive blasting (n = 56), the number of identified abrasive blasting companies whose websites indicated that they do abrasive blasting or probably do abrasive blasting (n = 42), and the number of abrasive blasting companies who refused to respond to the survey but had a website indicating they do abrasive blasting (n = 3) were added together. One hundred and one abrasive blasting companies in Michigan were identified. To determine the number of companies in Michigan who use silica for abrasive blasting, the number of abrasive blasting companies who responded to the survey and indicated that they use silica for abrasive blasting (n = 17) and the number of identified abrasive blasting companies whose websites indicated that they use silica for abrasive blasting or probably use silica for abrasive blasting (n = 26) were added together. Based on this survey cycle, forty-three abrasive blasting companies in Michigan use silica for abrasive blasting. Fifty-eight abrasive blasting companies in Michigan do not use silica for abrasive blasting and use another type of media, instead. Many companies indicated that they use multiple types of media for abrasive blasting. *Figure 1* displays a comparison of the use of silica for abrasive blasting to the use of other media for abrasive blasting in Michigan.

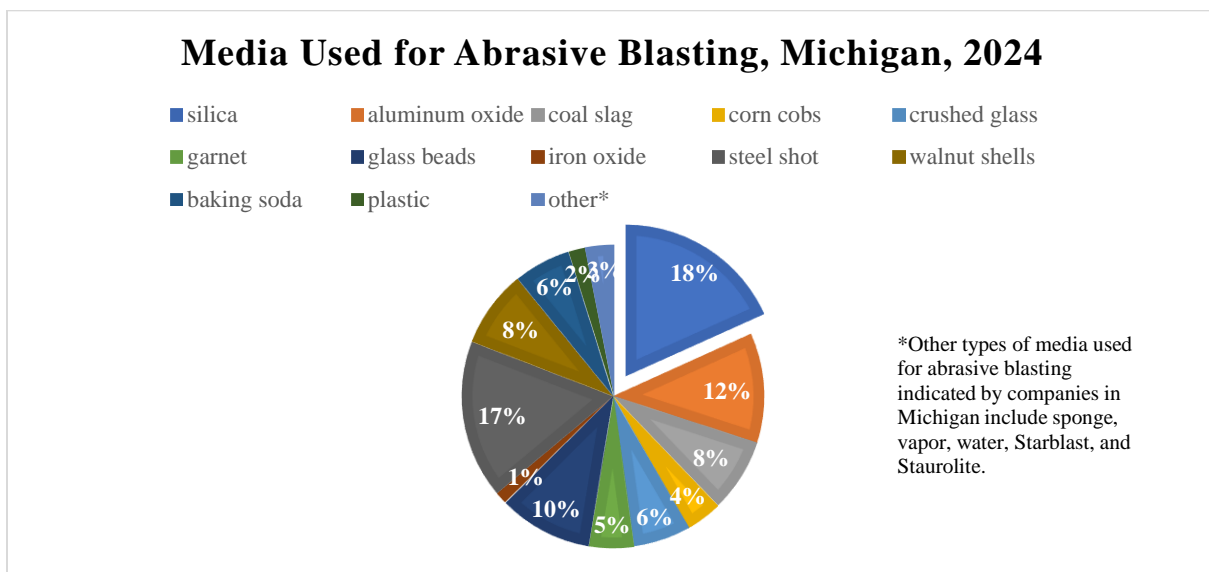


Figure 1: Media Used for Abrasive Blasting in Michigan, 2024.

See *Figure 2* to review the trends in use of silica for abrasive blasting in Michigan from 1995 to 2024. From 2016 - 2024 the use of silica among abrasive blasting companies in Michigan increased from 35% of abrasive blasting companies compared to 43% of abrasive blasting companies in 2024. In 2011, 40% of abrasive blasting companies used silica for abrasive blasting. The percentage of companies using silica in 2024 remains less than the percentage of companies who used silica from 1995 to 1999. Among the 43 companies in 2024 that use silica as an abrasive media, information was available for 17 of the companies on how many employees use silica as an abrasive; 30 employees from those 17 companies perform abrasive blasting using silica as a media. This compared to 140 of 597 employees that performed abrasive blasting using silica from 139 companies in 2016, 146 of 611 employees that performed

abrasive blasting using silica from 122 companies in 2011, and 239 of 556 employees that performed abrasive blasting using silica from 151 companies in 2005.

Use of Silica as an Abrasive for Blasting, Michigan, 1995-2024

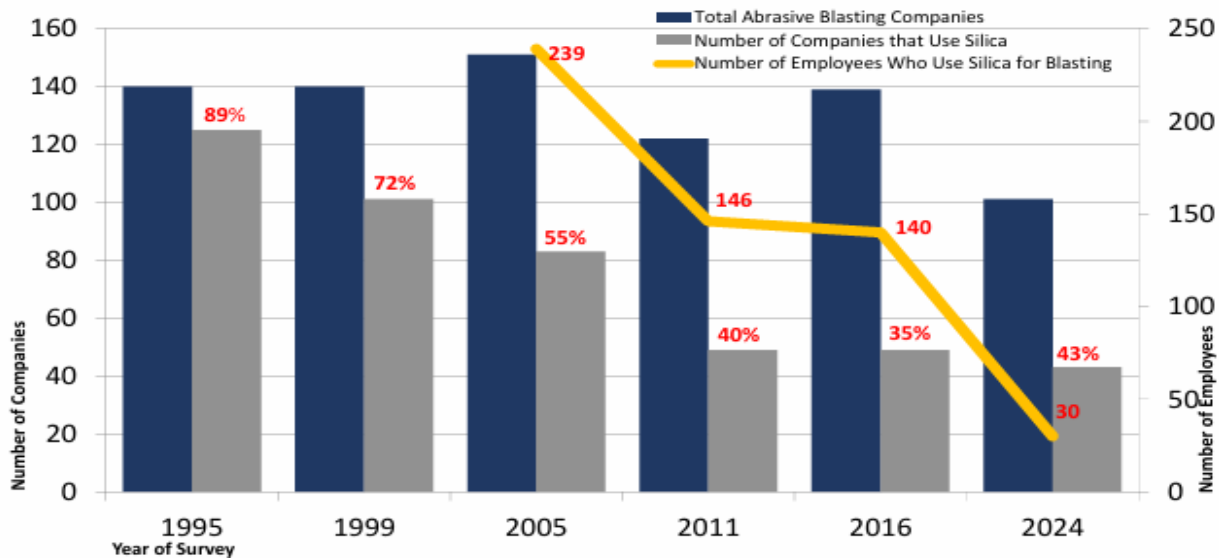


Figure 2: Use of Silica as an Abrasive for Blasting, Michigan, 1995-2024

Discussion

The increase in the percentage of companies using silica for abrasive blasting in Michigan underscores the importance of continuing to develop and disseminate educational and promotional materials to guide abrasive blasting companies in their selection of abrasive blasting media. It is important to note, however, that most abrasive blasting companies in Michigan do not use silica for abrasive blasting and that it is practical to use a non-silica abrasive. Abrasive blasting companies in Michigan identified sixteen other types of media used for abrasive blasting. The most common alternative to silica is steel shot, which is used by forty abrasive blasting companies in Michigan.

Not every abrasive blasting company was able to be contacted, limiting the data validity regarding existing abrasive blasting companies and the types of abrasive media used in Michigan. Although only four abrasive blasting companies refused to complete the survey when contacted, many companies did not respond to the mail-in surveys, calls, or voicemails. In previous survey cycles, the number of employees who did blasting, number of employees who used silica for abrasive blasting, and the number of employees who used other media for abrasive blasting were determined. Employee data were not available for companies that did not reply to the mail-in or telephonic survey and the media they used for abrasive blasting was obtained from the company’s website. Although the percentage of abrasive blasting companies using silica as a blasting media increased from 35% in 2016 to 43% in 2024, the number of employees exposed to silica decreased from 140 in 2016 to 30 in 2024.

One possible limitation was the time of day that survey calls were made, as a conflicting work schedule made it so survey calls could only be conducted in the afternoons, evenings, or on weekends. Another limitation was the 41.8% rate of survey participation. Notably, The Bureau of Labor and Statistics recently discussed in an article the decline in survey responses in the United States that the federal government has faced over many years and continues to face in the aftermath of the COVID-19 pandemic (“What is BLS Doing”, 2023). It is possible that this tendency not to participate in surveys that has been adopted by the public played into the lack of responses for this survey cycle.

To maintain the most up-to-date information in future abrasive blasting data collection efforts, it is important to consider ways to overcome the current lack of mail-in and phone call survey responses. Viable solutions for survey nonresponse could include supplementing telephonic and paper surveying with an electronic survey sent via email or

by including a QR code for an electronic survey on the mailed paper surveys. When possible, a company's website was used to determine the survey information if they did not respond, to help offset the low response rate but there was often no way to determine the validity or how up to date the websites were. Websites for some companies were unable to be found. Instead of manual website searches, web-scraping applications could be utilized in the future to sift through website information as a supplement to the surveying process.

Conclusion

The 2023/2024 abrasive blasting survey identified 43 companies that continue to use silica as an abrasive blasting media despite the ready availability of other blasting media. Outreach efforts to those companies, as well as any company that does abrasive blasting with any other type of media, should be regularly conducted to inform them of the harmful effects of the use of silica. Outreach could potentially be conducted through trade journals, the National Institute for Occupational Safety and Health, the Michigan Occupational Safety and Health Administration (MIOSHA), mailings to companies identified through internet search engines including DNB, and trade shows. Future surveys will continue to monitor trends in abrasive blasting in Michigan.

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Appendix A: Abrasive Blasting Survey, Michigan 2024

ABRASIVE BLASTING SURVEY – Michigan, 2024

date interview: _____

Company Name: _____

Company Address: _____

Contact Name: _____

Telephone: _____

1. Does your company do abrasive blasting? Yes No

If YES, what do you use (check all that apply):

silica sand (includes foundry sand, beach sand, baby sand)

aluminum oxide

coal slag, including Black Beauty®

corn cobs

crushed glass

garnet

glass beads

iron oxide (specular hematite)

steel shot/steel grit

walnut shells

baking soda

plastic

other, specify: _____

2. How many employees do you have? _____

3. How many of your employees do abrasive blasting? _____

Number of employees who use silica sand (includes foundry sand, beach sand, baby sand) _____

Number of employees who use other media _____

4. Does your company do monument engraving? Yes No

If YES, does your company ONLY do monument engraving? Yes No

Thank you for taking the time to complete this survey. If you have any questions or wish to complete the survey by phone, please do not hesitate to contact my office at 517.353.1846.

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