Respirable Crystalline Silica in Construction:

OSHA/MIOSHA Regulations and Updates

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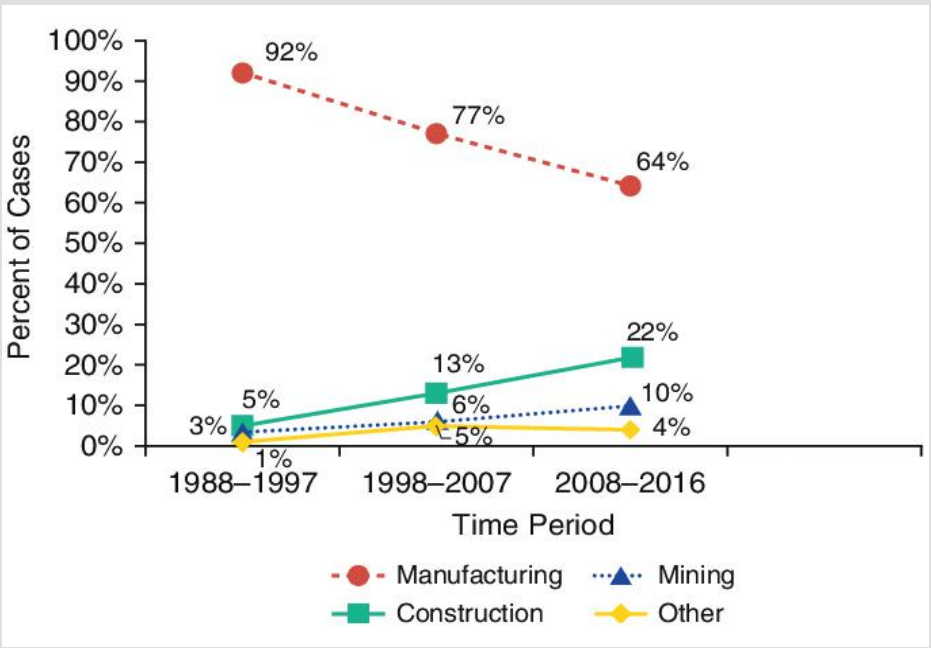
By now, many people are aware that the Michigan Occupational Safety and Health Administration (MIOSHA) made changes to its rules regarding assessing and controlling worker exposures to respirable crystalline silica (RCS). For the construction industry, these changes can be particularly important due to the prevalence of exposure sources. The revised and more stringent rules became fully enforced in September 2017 and are contained in MIOSHA's Safety and Health Standards Part 690, Silica in Construction. The Michigan rule basically adopts the Federal OSHA standard contained in 29CFR1926.1153. (There are similar but slightly different rules that apply to occupational exposures to RCS that occur in other industries, also.)

However, not everyone may have had a chance to follow the topic closely. If your company conducts work that may result in employee exposures to respirable crystalline silica, the following paragraphs present an overview of some relevant points and program considerations.

Why the Revised Standard?

OSHA believed that employees exposed to respirable silica at the permissible exposure limit (PEL) set in the old standard faced "a significant risk of material impairment to their health." It was estimated that there were 2 million construction workers impacted. The potential health effects that can result from certain levels of exposure might be surprising:

And, specific to Michigan, the percentage of silica-related disease cases stemming from exposures in construction has been increasing for a period of time, compared to those stemming from other sources. (The figure below illustrates this). While the reasons for this can vary (to include a decrease in the numbers of silica-exposed employees working in manufacturing), we could expect a continued and growing regulatory emphasis on the Construction RC standard.



Industry Reported as Source of Silica Exposure for Confirmed Silicosis Cases, Michigan, 1988-2016. *Source: "The Burden of Silicosis in Michigan, 1988-2016," Mary Jo Reilly, Suzanne J. Timmer, Kenneth D. Rosenman. AnnalsATS Vol. 15, No. 12, December 2018.*

Non – Malignant	Malignant
Alveolar Proteinosis (Acute Silicosis)	Lung Cancer
Parenchymal Fibrosis (Silicosis)	
Tuberculosis	
Connective Tissue Disease	
Chronic Renal Failure	
COPD	

Courtesy of Dr. Ken Rosenman, Michigan State University College of Human Medicine

In fact, we anticipate Federal OSHA to roll out a National Emphasis Program on silica that will likely be in place by the end of 2019. MIOSHA will need to adopt that emphasis program on silica within six months after that.

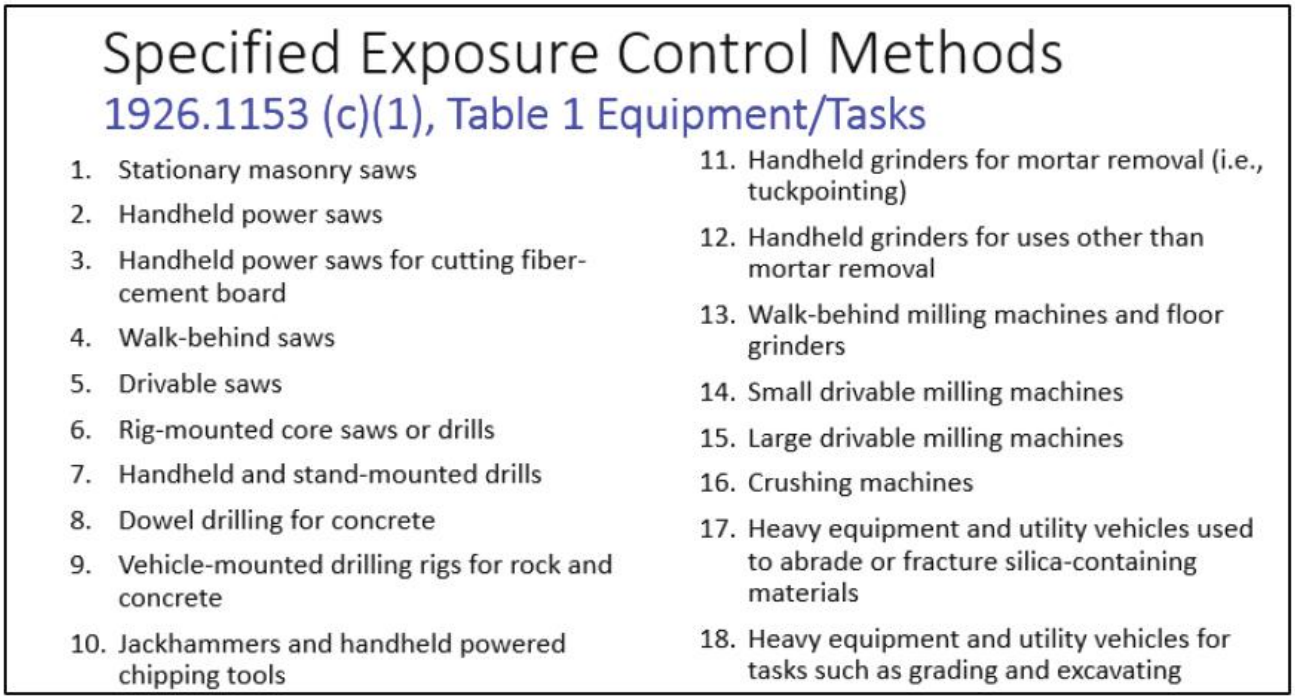
What Is Respirable Crystalline Silica and Where Is It Found in Construction?

Silica (silicon dioxide/SiO2) can exist in crystalline or non-crystalline form. The standard is intended to provide protection from exposures to the crystalline form, when it exists in or is made into an especially small size, referred to as "respirable." "Respirable" particles are those of a size (approximately less than 10 µm) that when inhaled have the potential to reach the deeper regions of the lung. The particles can be so tiny that one can have significant exposures and yet not necessarily know that based on how much dust one sees in the air.

α-Quartz is the most abundant crystalline form and is found in sand, sandstone, shale and granite. Other forms listed in the standards are cristobalite and tridymite. RCS exposures may be created from abrasive blasting, cutting/grinding/drilling or otherwise abrading silica containing materials (such as cement, brick, asphalt), hydraulic fracturing processes, tunneling, highway repair, the manufacturing and repair of engineered stone countertops, and other sources (including various manufacturing sources). You can find out if products of potential concern contain or may contain crystalline silica by consulting industry publications, reviewing safety data sheets, communicating with manufacturers, and/or conducting laboratory tests.

Regulatory Status

The MIOSHA construction standard for



RCS has been fully enforced for a little over two years now. Many construction-related organizations have developed information tools either for its membership or the public, many of which can be easily found on the internet; one especially good resource is from the Center for Construction Research and Training (https://www.silica-safe.org/). The Construction Association of Michigan (CAM) has provided some excellent training sessions and information to its members through periodic training sessions, CAM safety meetings, and at CAM Safety Leadership Conferences.

Some Highlights from the MIOSHA Construction Standard for RCS

This short article is not intended to regurgitate the MIOSHA standard. However, here are a few highlights from it. The Standard establishes:

- **Revised exposure limits.** The new Action Level (AL) and Permissible Exposure Limit (PEL) for respirable crystalline silica are 25 micrograms per cubic meter of air (µg/m3) and 50 µg/m3, respectively. Companies that *used* to be compliant, may no longer be.
- **The requirement to have a"competent person"** when performing work regulated under the standard. The concept is similar to other OSHA construction standards that require a "competent person," (identify, foresee, authority for prompt corrective action) but as pertains to silica. "The competent person must have the knowledge and ability necessary to fulfill the responsibilities set forth in paragraph (g) of 1926.1153."
- **The ability to use "Specified Exposure Control Methods"** as contained with Table 1 of the Standard. What is Table 1? Well, most OSHA regulations for particular substances require employers to conduct air sampling ("exposure assessments") from which further requirements may kick in. In this standard, however, employers performing types of work described in and in full compliance with Table 1 (to include for engineering controls, work practices and respiratory protection), would not need to conduct the exposure monitoring. This is because use of the controls described in the table are thought to be adequately protective for the tasks described. Before implementing use of Table 1, employers need to understand the full regulation and requirements for application of the Table. The Table itself was based on industry information and data and can potentially help ease the burden placed on contractors. An abbreviated summary of types of work included in Table 1, follows:
- **Requirements for exposure assessment** (air monitoring). In cases where a company's specific tasks are not listed in Table 1 (and therefore employers don't have a "Table 1 option") or the requirements of Table 1 are not *fully* followed, the Standard specifies new air sampling (exposure assessment) requirements. If one goes down this air sampling path, there can be a significant amount of sampling required. The Standard describes the specifics. When the required air sampling is conducted and the results show exposures exceed certain airborne levels, the Standard requires re-sampling on a routine frequency. The standard also describes requirements for discontinuance of the sampling.
- **Requirements for the development of a written exposure control plan** with specified content, when using the Table 1, or when planning projects that may result in exposures to RCS.
- **The expectation to use engineering and work practice controls.** And, where these are not sufficient to keep exposures to below the MIOSHA limit

(at or below the Permissible Exposure Limit), the employer still needs to use these controls, supplemented by the use of respiratory protection.

- **Compliance with the MIOSHA Respiratory Protection Standard** where respirators are required.
- **Medical surveillance provisions.** The standard requires the offering of medical monitoring through a "Physician or other licensed health care professional (PLHCP)." Be aware that the silica-related surveillance content goes beyond what is required for respirator clearances. In other words, just because workers may be medically cleared to wear respirators, does not mean that they've been through a medical surveillance approach that would meet the requirements of the silica standard.
- **Specific communication and warnings** to employees on silica hazards
- **Recordkeeping.** Exposure assessments and lists of persons exposed, data sheets, etc.

So What's Going On? Is This for Real?

Yes, this Standard is in effect and being enforced. Data available from the State of Michigan regarding MIOSHA enforcement indicates that citations are being issued for noncompliance with several rules. Higher percentages of citations stem from the violation of rules pertaining to: (1) Written exposure control plans, (2) Exposure assessments, (3) Implementation of Table 1, and (4) Employee ability to demonstrate knowledge of and understand things such as silica-related health hazards, tasks that can result in exposure to silica, measures taken by the employer to protect employees from exposure, identification of the silica competent person, and purpose and description of the medical surveillance program required by the standard.

Some Implementation Considerations

There are many requirements in the standard; one must read it and implement its requirements to ensure compliance. However, a few key points include:

Exposure Assessments: If your organization finds itself needing to conduct exposure assessments, sampling should be conducted very purposefully. The full potential value of your exposure assessments could get lost in the shuffle, especially if employees work interchangeably throughout a project, move quickly between projects, or have tasks that create exposure for only a small fraction of the workday. A cross-reference chart showing job categories, task(s) conducted during sampling, materials being disturbed/made airborne, and related air sampling information can be of value for longer-term tracking and compliance assurance. Of course, persons conducting the air sampling should be competent to do so through education, training and experience. Consider having the work conducted or directed by a Certified Industrial Hygienist (CIH). A botched job will hurt you more than help you.

Air sampling devices used to conduct personal sampling that will meet MIOSHA requirements need to be selected carefully based upon likely exposure levels, nature of work and body postures, and laboratory detection limits. While there are many "tools" that can be used and each can have its purpose, for personal sampling I've found that SKC PPI (Parallel Particle

Impactor) sampling devices can be a great addition to traditional sampling (which requires the use of devices referred to as "cyclones"). This is due to the ability to get good samples for shorter duration tasks, and ease-of-use considerations.

In case you're wondering about direct-reading meters like those one might use for confined space entry atmosphere monitoring (for oxygen, flammable gases, etc.), there is no such thing for silica. There are some instruments that can provide essentially a particle-size selective direct measurement for "dust" levels in air, which can help one get an idea of potential problem areas. However, these types of devices do not measure specifically for silica, and therefore require the user to make some assumptions regarding percent silica content. They do not replace personal air sampling as required by the standard.

As mentioned before, it can be hard to know when exposures exceed the Standard, and we can't gauge that well, visually. In fact, take a look at the two pictures below, from a construction project where I took multiple air samples during a manhole cover removal project. The work involved milling on asphalt around the periphery of existing covers in various roads. Looking at the picture on this page, you can see an individual standing around a dust cloud associated with the milling. This person also had to approach the area after the milling was complete to shovel materials around the work area, which also resulted in visible dust clouds. This person had worn a personal air sampler; would you think that this person's 8-hour time weighted average exposure exceeded the MIOSHA limit?

Before you answer that, look at the picture on the right:

The person in the vehicle was inside a ventilated cab, with cabin air filters. He, too, wore an air sampler. During his breaks, the inside of the cab looked pretty clean. Would you think that his exposure level was higher or lower than that of the person working outside?

As it turned out, for this case, both persons had exposures that were less than the MIOSHA PEL and even less than half that (the MIOSHA "Action Level"). However, the exposure to the person inside the cab was higher than the exposure to the person standing outside. Of course, don't let these

pictures fool you into thinking that all cases would be the same; what's in the dust (the percent silica concentration in the source material), the size of the particles in the dust, effectiveness of cabin filtration and atmospheric conditions are all factors in the results. I have seen air sampling studies and pictures of persons operating concrete saws that had no water sprays or other engineering controls, with significant visible dust clouds, that absolutely resulted in worker exposures that were many times higher than the PEL. My point is that our eyeballs are not good predictors of respirable silica levels.

Coordinated Efforts and Culture: Are employees used to working in ways that are now prohibited? Changing old habits can obviously require more than management edict. Have a variety of employees been involved in the identification of alternate methods of work if needed, and have they worked through the consequences of using new processes? For example, when cyclones and vacuums are used, what methods will be used for emptying containers and changing filters while still protecting workers? How will a company address the requirements prohibiting dry sweeping and compressed air, or otherwise address and document the "feasibility" of alternate methods? How will employees avoid the temptation to take shortcuts when extra effort is needed to obtain necessary tools, or fully ensure compliance with Table 1 (when used)?

Exposure Control Plan (ECP): The ECP that companies must develop should be a coordinated plan, and not simply list canned requirements. The Standard details required content. Organizations should expect development of this plan to be more than trivial, since it must describe tasks that involve exposure to RCS, as well as outline work practices, engineering controls, and other things that will take coordination. The plan should be "evergreen" and updated to reflect new information.

Medical Monitoring: Some organizations have experienced difficulties obtaining the medical monitoring required for its employees under the standard. Not all medical organizations are familiar with the requirements of the silica standard or even want to "take on" providing that service. Medical monitoring requirements and guidelines are a significant part of the standard, and described over many pages. On the other hand, there are some occupational medicine providers and organizations that can be very well equipped to provide what you need, and potentially more. Organizations should be careful to provide what is required under the standard but also be aware that prices, services, and assertions of what MIOSHA requires can vary significantly.

One Last Note – Possible Changes to Table 1:

In August of this year, federal OSHA issued a public request for information (RFI), centered around Table 1. OSHA wanted information regarding control method effectiveness for the tasks that are "in" the Table, and also wanted input about what else "should" be placed in the Table, with corresponding exposure data. By the time this article is published, the deadline for submission of comments (October 15, 2019) will have expired. The thing to know is that this information could assist the agency in assessing whether revisions to the standard may be appropriate. OSHA may place similar requests for information "again" a few years into the future. So, if you have novel approaches, if you have controls that work, if you have controls that you'd like to ultimately have added to Table 1, keep this together neatly. It may help you in future MIOSHA inspections. Also, consider keeping your data and correlations together for future possible sharing with others in the construction industry, and for possible submission to OSHA in response to other RFIs.

Conclusion:

Revisions to the MIOSHA construction safety and health standards for occupational exposure to respirable crystalline silica have been in effect for over two years. The Standard is being enforced, and citations are being issued against it. Time is of the essence for companies that have work that may or does result in employee exposures to RCS. Companies needing additional information should obtain and read the applicable regulations, as well as OSHA Directives/FAQs and other available information. It is suggested that implementation or improvement plans address both regulatory requirements and organizational change factors. Further information about occupational exposure to RCS and the OSHA/MIOSHA standard for it is available through CAM literature and presentations, and multiple other sources. Air sampling, plan development, training, and other technical implementation assistance is also available through industrial hygiene and safety consultants. Some companies may have significant management decisions to make as they move toward improving regulatory compliance and reducing exposure. Good luck!

About the Author:
Greg Zigulis, CIH, CSP, is President of Sixth Sense Safety Solutions and provides companies with comprehensive occupational health and safety assistance. Over the span of his 30+ year career to include construction management, manufacturing and mining industries, he has helped numerous organizations implement and improve their compliance with respirable crystalline silica requirements. He is also an active member of the ANSI/ASSP Z10 committee on Occupational Health and Safety Management Systems. He can be reached at gz@sixthsensesafetysolutions.com.