

Crystalline Silica

IN AIR & WATER, AND HEALTH EFFECTS

Crystalline silica is a type of silica formed from silica sand, a ‘building block’ material in rock, soil and sand, through natural heat and pressure. It is used in a number of industrial and commercial processes like glass-making, road-building, hydraulic fracturing for oil and gas production, water filtration, and even electronics.

Who Does It Affect?

Exposure to silica sand particles is of greatest concern for workers in the fracking or mining industry, and other construction trades where dust is generated. People who live in communities near silica mining and processing operations have not been shown to be exposed to levels of crystalline silica harmful for health.

Silica in Air

Crystalline silica can be released into the air from cutting, grinding, drilling, crushing, sanding, or breaking apart many different materials. A few years ago, concern mounted surrounding silica sand mining activities and the potential release of large amounts of crystalline silica into the air. In response, MDH developed a health-based guidance value for crystalline silica in the air and the Minnesota Pollution Control Agency (MPCA) began monitoring for crystalline silica in air near silica sand facilities. Please see: MDH’s [Crystalline Silica Toxicological Summary Sheet \(PDF\)](https://www.health.state.mn.us/communities/environment/risk/docs/guidance/air/silicasumm.pdf) (<https://www.health.state.mn.us/communities/environment/risk/docs/guidance/air/silicasumm.pdf>) and [Air monitoring at Minnesota silica sand facilities](https://www.pca.state.mn.us/air/air-monitoring-minnesota-silica-sand-facilities) (<https://www.pca.state.mn.us/air/air-monitoring-minnesota-silica-sand-facilities>).

Silica Sand Mining & Water

Silica sand mining or processing can affect drinking water sources.

Groundwater

Any mine may create a pathway for chemicals and/or bacteria to more easily reach the groundwater.

The risks to drinking water depend on:

- How close the mining operations are to the groundwater’s surface
- The use of heavy equipment
- Leaks and spills of fuel, engine oil or other chemicals
- Runoff from contaminant sources or waste dumped illegally in the mine

Products called flocculants used by some frac sand mines (mines that extract silica sand to be used for hydraulic fracturing) may contain low concentrations of chemicals (acrylamide and DADMAC) that are of potential concern. MPCA sets limits in the mine’s permit for the amount of flocculants that can be used and MDH recommends monitoring of the groundwater at facilities where the chemicals are used to ensure safe drinking water levels are not exceeded.

Groundwater near frac sand mines may become slightly more acidic (lower in pH).

This may cause minerals (like iron and manganese) to more easily dissolve, which can cause water to have unpleasant taste and odor, and may cause staining. MDH recommends that pH be included in the water monitoring list for groundwater near frac sand mining operations.

Wells

Mining can remove large volumes of groundwater and has the potential to impact nearby wells. Impacts could include the lowering of water levels, possibly even causing a nearby well to go dry.

- The Minnesota Department of Natural Resources reviews large water removal activities to ensure that groundwater use will not harm wells in the area.
- MDH evaluates whether there are any potential risks to community water supply wells.
- MDH recommends a number of actions to prevent or reduce the potential for pollutants to enter the groundwater and water quality monitoring to protect nearby drinking water wells.

Health Effects

Crystalline silica is a substance of concern for human health. Dust sized silica particles, invisible to the naked eye, are generated during a variety of activities and can be breathed into the body where they reach deep into the lungs. Once in the lungs, these particles can be coughed up, or pass from the lungs to other organs in the body through the blood stream, or stay stuck in the lungs. Breathing crystalline silica repeatedly over many years is a well-known cause of occupational health problems. Suppression of this dust is important to

control exposure to workers and the general public.

At high concentrations in the air:

Disease risk is related to both the levels and duration of crystalline silica exposure. The onset of disease may occur long after the exposure has stopped. Silicosis, lung cancer, chronic bronchitis, and several autoimmune diseases have been linked to long term or very high exposures to crystalline silica.

Health effects of crystalline silica have been well studied in workers. Occupational exposures are associated with serious health effects at higher concentrations in the air, and new rules have recently been implemented to better control worker exposures.

At lower concentrations in the air:

We do not currently know what impacts silica has at lower concentrations such as those typically found in air. At this time, there is no evidence that exposure to low-levels of breathable crystalline silica in air has adverse health effects. This continues to be an area of on-going research.

For more information about the health and environmental impacts from crystalline silica and silica sand mining, see [Crystalline Silica in Air & Water, and Health Effects \(https://www.health.state.mn.us/communities/environment/hazardous/topics/silica.html\)](https://www.health.state.mn.us/communities/environment/hazardous/topics/silica.html).

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