

Welcome to a special edition of our *Mine to Port* that focuses on **respirable silica**. This publication will explore some important topics including: **what is silica, why it is a topic of interest, the legislated levels of silica in the workplace, which areas are impacted, improvements made by the Company, and ways you can protect yourself from exposure.**

Fortunately, people have learned from the past. Many safety standards that were acceptable in the 1970s and 80s are not now. IOC actively implements and supports stricter standards as they will ultimately protect the future of current employees. As you know, pursuing excellence in health and safety is one of our values.

What is silica?

Silica is the most abundant mineral found in the Earth's crust and it forms an important constituent of practically all rock forming minerals. Silica has many common uses such as: in glass, abrasives, refractory, and semi-conductors.

Crystalline silica is a basic component of many minerals, as well as granite, soil, and sand. It can take three different forms: quartz, cristobalite, and tridymite. Quartz is the most common form of crystalline silica and is the form we are concerned about. It can be a respirable (able to breathe it in) size particulate that, once airborne, is capable of penetrating to the gas-exchange region of the lungs to, ultimately, cause damage.

Silica at IOC

The ore we mine contains approximately 38 percent silica on average. Silica levels in the ore have increased slightly as we have started mining in areas with correspondingly lower amounts of iron.

In addition, due to a higher percentage of airborne dust, the Mine, along the Automatic Train Operation (ATO), Crusher, Drive House, Shuttle Gallery, Feed Tunnels, and Tailings are considered our highest risk areas. The silica hazard is reduced within the Concentrator once the ore enters the Autogenous Grinding Mills as the processes are "wet", thus, limiting the amount of dust. Silica levels in concentrate and pellets are reduced to four to five percent. For this reason, exposure to respirable silica is extremely low in the Load Out, Pellet Plant, along the QNS&L, and at the Port.

What are the legislated levels?

In 2007, ACGIH® (American Conference of Governmental Industrial Hygienists) reduced the silica exposure standard from 0.05mg/m³ to 0.025mg/m³ for an eight-hour day without respiratory protection. The Newfoundland and Labrador Silica Code of Practice follows the standard set by the ACGIH®. The Threshold Limit Value (TLV) is used as a guideline to assist in the control of health hazards, and states the airborne concentration believed that workers may be repeatedly exposed to day after day without adverse health effects.

The Newfoundland and Labrador Government began drafting a Newfoundland and Labrador Silica Code of Practice in 1982, which we have followed. This was signed and became legislation in 2006. This code dictates how and when companies monitor for silica, for example:

- how to monitor;
- how the data is analyzed;
- how to interpret the data;
- how to determine high risk jobs;
- what actions must take place.

All results are reported to the government on a monthly basis to ensure compliance with the Silica Code of Practice. The chest x-ray and lung function test portions of the IOC medical are mandated by this code.

We are also monitoring our existing controls to see if they are capable of reducing to levels below the new standard (0.025mg/m³) without the requirement for dust masks.



What are the potential long-term health effects of exposure to silica?

Prolonged or repeated inhalation of fine airborne crystalline silica dust may cause severe scarring of the lungs; a disease called silicosis. Inhaled silica particles become embedded in the lungs, and the lung tissue reacts by developing scars around the trapped particulate. The risk of developing silicosis and its severity depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and the duration of exposure.

Silicosis is an irreversible but preventable disease.

Although rare, silicosis can develop in people who have been exposed to airborne particles for 20 years or more. The early symptoms of silicosis (cough, mucous production and shortness of breath upon exertion) are non-specific, so the development of silicosis may not be detected until advanced stages of the disease. Evidence of silicosis can normally be picked up by an x-ray, which is why they are part of our medicals, and employees are notified of any concerns.

Silicosis can vary in severity from minimal to severe. In cases of mild silicosis, there is typically no significant respiratory impairment, although there is x-ray evidence of lung injury. In serious cases, significant and increasingly severe respiratory impairment develops. There is no proven effective treatment for the disease. Life expectancy may be reduced, depending on the severity of the case. Death is not usually a direct result of silicosis, but cardiac failure may occur as the heart has increased difficulty pumping blood through the scar tissue in the lungs.

On-person sampling – A randomly selected employee wears a sample pump for the duration of his/her work day. The results reflect the person’s exposure during that time period.

Location sampling – A sample pump is placed in a specific area and left for the duration of the day.

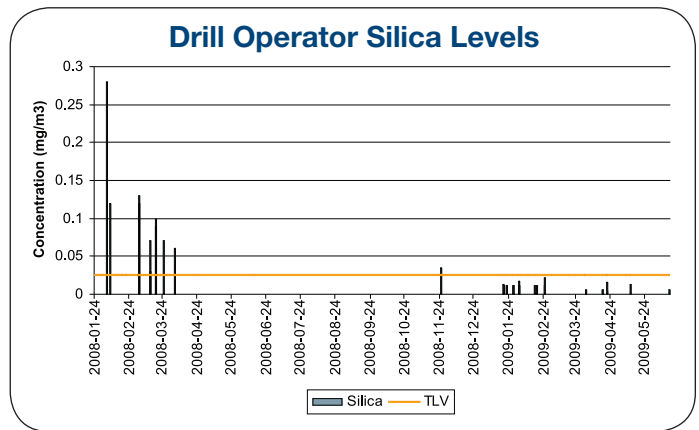
On-person sampling is preferred as it reflects actual exposure. Location sampling is used when a problem has been identified and requires troubleshooting. It also allows us to verify the effectiveness of the implemented controls.

Actions taken in Primary Ore

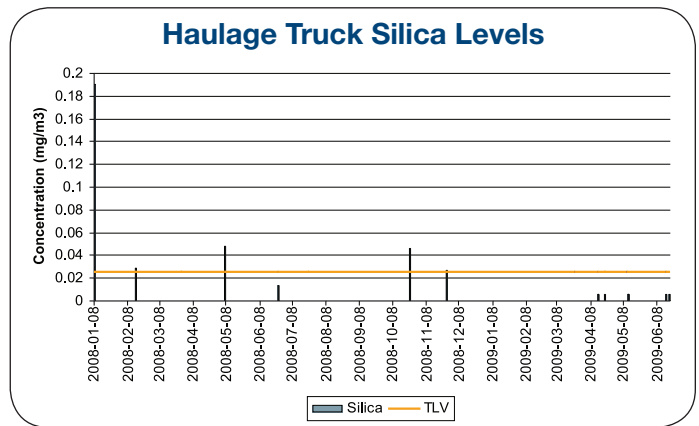
A cross-functional team, consisting of management and unionized Mine employees, has been working together on adding a second water/sand truck, quick water fill stand pipe and reliable year round drill dust suppression system. The second water/sand truck and quick fill water stand pipe are completed, while the drill dust suppression project is very close to completion. Examples of improvements made to suppress drill dust include:

- Improved air filtration system inside the cabs of the BE drills by installation of a 0.5 micron High Efficiency Particulate Air (HEPA) filter.
- Operator cab seals repaired.
- Manometers installed in the cabs; allowing operators to verify positive pressure.
- Winterization through improved air swivels to reduce leaks, and tank insulation to reduce freezing.

Since this work has been completed, the air quality tests have not shown any significant signs of silica in the drill cabs.



On-person samples taken to measure the Drill’s silica levels.



On-person samples taken to measure Haulage Truck silica levels.

As the weather has a direct impact on the amount of dust we experience, levels will continue to be monitored in the Mine. One of the major contributors to increased levels of silica in the equipment is operating with the windows down: This increases the operator's potential exposure. Mine equipment must never be operated with the windows down (including the light vehicle fleet).

Actions taken in Product Manufacturing

The areas being monitored in Product Manufacturing include: Loading Pockets, Crusher, Drive House, Shuttle Gallery, Feed Tunnels and Tailings. We have been working together to make improvements in these locations and we are seeing some positive results. Measurements are also taken in the Pellet Plant.

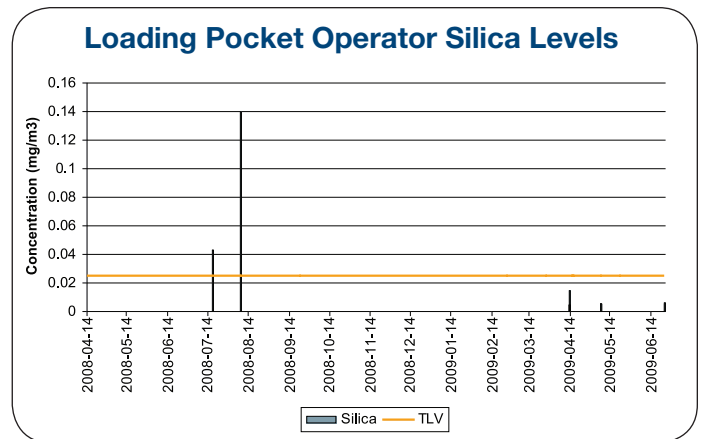
Some of the actions taken by the Product Manufacturing team include:

- Communicated respiratory protection is mandatory in the Crusher, Drive House, Shuttle and Feed Tunnels.
- Additional clean-up in targeted areas (including walls and conveyor structure).
- Re-assigned shift clean-up accountabilities.
- Audited material transfer points and material conveying systems to identify deficiencies.
- Completed all preventive maintenance requirements (both mechanical and operational) for the existing dust collection and suppression systems.
- Improved sealing around 3rd floor surge pit doors.
- During Crusher mantle and concave changes, applied additional sealing to minimize the potential for dust leaks.
- Completed air velocity checks on the existing dust collection system.
- Verified that the Crusher Control Room is under positive pressure.
- Sealed holes in the Crusher Control Room's floor.
- Increased air quality sampling to pinpoint problem areas.
- Setup operational preventive maintenance for the Crusher's dust collection systems in SAP for automatic triggering based upon time.

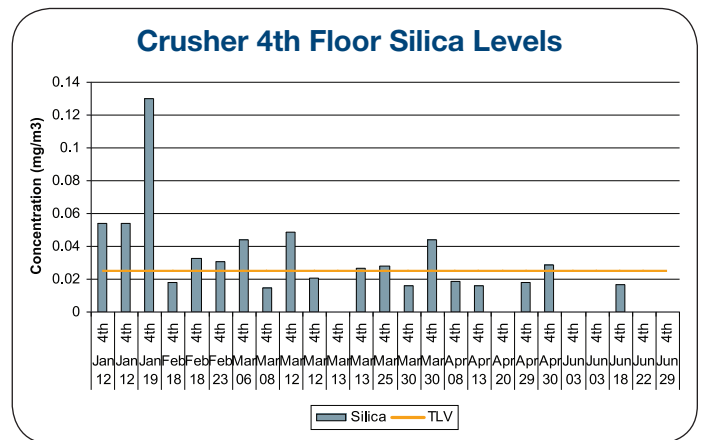
So where does the silica go?

Silica-based rejects from the Concentrator are pumped to a Tailings area. There has been a lot of work done to improve our Tailings over the past several years and the work continues, including:

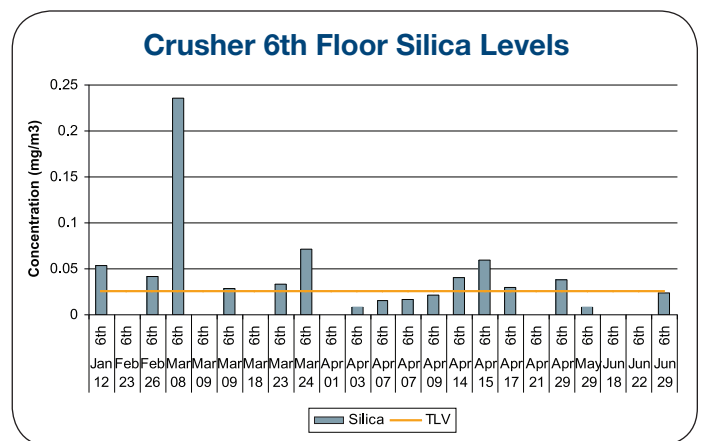
- Re-vegetation is completed on a yearly basis, and helps keep the airborne dust levels down;
- The discharge from the Concentrator goes to the active area, keeping the area wet and controlled;
- Air sampling is completed in the Tailings area on a seasonal basis.



These samples are collected on the operator, which includes both time inside the cab and outside working in dusty conditions.



All results are location samples, which will be higher than personal exposures as no worker spends his/her shift in one location. Location samples are used to help determine sources of exposure. Respiratory protection is mandatory in this area to ensure a worker's exposure to elevated levels is eliminated.



All results are location samples.

Protecting the future of our employees is everyone’s responsibility

The health and safety of our employees is paramount at IOC. There are programs in place to keep you informed of ways to protect yourself and your co-workers.

Our HSE Technicians have undergone a three-day air sampling workshop to learn proper collection and troubleshooting techniques (determining potential sources and deciding what actions to take). They are responsible for collecting a set amount of samples, while staff employees and/or consultants assist with collecting additional samples. Collected samples are sent to two different third party laboratories for analysis (one in Ontario, and another in New York). Results of the samples are posted in the tested areas, and employees who assist with on-person sampling receive their results via mail, along with a copy kept in their confidential file in the Occupational Health office.

Members of our Occupational Health Services department, as well as our HSE Technicians, are available to assist you with questions you may have, so please contact them if you have any concerns about silica in your work area:

- Terrielynn Foster – 8830
- Brian Jacobs – 8610
- Gloria Pike – 8616
- Wayne LeDrew – 8293
- Colleen Rixon – 8877
- Ed MacDonald – 8339

Status	Actions Taken by IOC – General
✓	Ensure employees complete the mandatory medical testing: <ul style="list-style-type: none"> • 1-15 years of service – one x-ray every three years (first year is used as a baseline) • 15-20 years of service – one x-ray every two years • 20+ years of service – x-ray is completed on an annual basis • Pulmonary function testing
✓	Conduct respiratory fit testing during Orientation Week and then offer re-certification every two years.
✓	Air monitoring in designated areas.
✓	Safety Talks given by Team Leaders and/or Occupational Health employees.
✓	Collect on-person and air dust samples.
✓	Increase the number of samples collected, when necessary.
✓	Communicate the different types of respirators available on-site.
✓	Communicate the areas that require respirator use.
✓	Provide employees with a fact sheet about silica.
✓	Check and maintain all controls (doors, seals, dust collectors, etc.).
✓	Conduct velocity checks of pick-up points.
✓	5S roll-out to improve housekeeping.
✓ Completed ✓ In Progress ✓ Ongoing	

You and I can make a difference

Elimination of the hazard through engineering or substitution is always the best method. As these solutions take time to implement, respiratory protection, housekeeping, and clean-up are the best ways to protect you from silica. However, at times respirators are still necessary. A variety of respirators are available to our employees. In particular, model N95 NIOSH certified respirator (8210 or 8511) offers a protection factor of 10 times the TLV. A matrix of all the respirators available at IOC will be posted at various locations on-site.

There are a few simple things you can do to protect yourself and your colleagues:

- Keep your work area clean.
- Use a water hose to moisten the dust before it becomes airborne.
- Ensure the ventilation system in your area is not blocked.
- Make sure dust doors are kept closed.
- Attend your scheduled medicals.
- Make sure your respirator fits properly. Employees should be fit tested by members of our Occupational Health Services team every two years to ensure the respirator makes a proper seal with their face.
- Be clean shaven at all times when wearing a respirator. Beards, moustaches and even stubble will allow some dust to bypass the respirator and be inhaled.
- Do not eat or drink near dusty areas.
- Always wear the appropriate personal protective equipment.
- Replace your dust mask whenever necessary.
- Wash your work clothes on a regular basis.
- Clean mud from your boots before entering a vehicle.
- Operate Mine equipment with the windows up.
- And as always, if you have ideas on how to handle this issue, please bring them forward.

Remember, you can make a difference. Although elevated silica levels may occur, you do have the ability to protect yourself by always using the proper PPE in identified work areas.

