



The Safety Association for Canada's
Upstream Oil and Gas Industry

Working Safely with Silica Within the Oil and Gas Industry

INFORMATION BULLETIN

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Enform: Your Partner in Safety

Enform is the upstream oil and gas industry's advocate and leading resource for the continuous improvement of safety performance. Our mission is to help companies achieve their safety goals by providing practices, assessment, training, support, metrics and communication. Our vision is no work-related incidents or injuries in the Canadian upstream oil and gas industry.

An Industry Product

This document was developed by industry for industry. Working collaboratively, Enform led cross-industry representatives in developing a guidance sheet that meets the industry's needs. Canada's leading oil and gas industry trade associations support the use of shared information to help companies of all sizes improve performance.

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Details

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Issue

Concerns have been raised related to worker exposure to quartz silica in the upstream oil and gas industry.

How am I exposed to silica?

The primary route of exposure that is of concern is through inhalation. See table on page 2 for silica exposure scenarios in the oil and gas industry.

What are the health effects of silica?

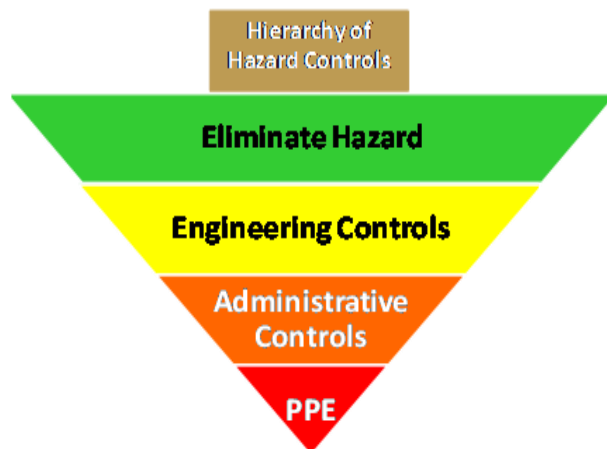
Health effects of inhaling silica dust include silicosis, lung cancer, chronic obstructive pulmonary disease and emphysema.

Silicosis is the development of scar tissue in the lung resulting in reduced lung function. Both lung cancer and silicosis typically develop after years of overexposure (chronic) and are often fatal diseases; however acute (immediate) and sub-chronic forms of silicosis are possible with extreme exposures.

Workers with silicosis may at first have no symptoms. As the disease progresses, coughing develops and breathing becomes difficult. Persons with silicosis have an increased risk of contracting respiratory infections such as pneumonia and tuberculosis. This happens when lung cells that normally kill infectious organisms are overwhelmed by silica dust and are unable to do their job.

What can I do to help control my exposure to Silica?

As workers, you have the responsibility to ensure the **Engineering and Administrative Controls** that have been put in place are followed and functioning (e.g. ventilation hoods, training, Safe Work Procedures etc) and the **Personal Protective Equipment (PPE)** chosen is utilized properly. The table on page two lists silica exposure scenarios and particular instances where you may be over exposed to silica.



By industry, for industry



Oil & Gas Industry – Silica Exposure Scenarios

General influencing factors: ambient temperature; indoors or outdoors; space and layout of the work area; general or local exhaust ventilation; HSE culture of the workforce, e.g. PPE discipline.

Area / Task	Worker exposure issues may occur and controls are needed when...	Controls
Plant Sites		
<ul style="list-style-type: none"> Abrasive Blasting A variety of controlled products such as process additives. Maintenance Activities / Demobilization Cementing Operations - plant operations 	<p>...using silica containing products during abrasive blasting</p> <p>...utilizing products that contain silica in spill response procedures</p> <p>...working with refractory brick (ceramic fibre). Crystalline silica can be formed in refractory brick when used as an insulator at operating temperatures above 1000 deg C.</p> <p>...dry products containing silica are mixed or added and there is worker exposure.</p>	<p>Elimination</p> <ul style="list-style-type: none"> Investigate the use of product substitution and elimination. <p>Engineering Controls</p> <ul style="list-style-type: none"> Ensure adequate ventilation - investigate practicable engineering controls e.g. the installation of local ventilation hoods, the installation of dust collection systems, operator enclosures, enclosed work systems that produce dust, dust suppression systems (e.g. water) Workers need to ensure that engineering controls and other equipment used to reduce exposure are used and maintained properly...or reported!
Drilling / Completions		
<ul style="list-style-type: none"> Dry Product Additives Produced Dry Product - maintenance of shale dryers Cementing Operations - field operations 	<p>...the dry products contain quartz and are added to drilling fluids. In particular when bags are opened, when product is handled, mixed or added into the hopper or when dumping through grate of mud tank</p> <p>...the dry particulate (fine dust) from Shale dryers is scooped, shoveled, handled or mixed.</p> <p>...dry product containing silica is exposed to the workers during transportation, loading / unloading and mixing</p>	<p>Administrative Controls</p> <ul style="list-style-type: none"> Develop and implement a silica exposure control plan / code of practice that meets local legislative requirements. Company Respiratory Protection Program (RPP) Utilize warning signage informing workers of silica hazards and the required protective equipment needed. Educate workers on the hazards of silica exposure and where they are being exposed. Workers must participate in training and monitoring programs. Use good hygiene practices — workers must not eat, drink or use tobacco products in areas contaminated by silica. The hands and face should be washed before eating, drinking or smoking.
Seismic Drilling Rigs		
<ul style="list-style-type: none"> Air Hammer Drills 	<p>...air hammer drills are used in a dry hole environment and workers are exposed to silica dust</p>	
Hydraulic Fracturing		
<ul style="list-style-type: none"> Transporting Storage of sand Movement of Sand* 	<p>...sand being brought to site contains silica and workers are exposed during unloading / loading or storage.</p> <p>...sand containing silica is moving to/from site sand castles, on conveyors, on conveyors, augers etc. to blend trucks or hoppers and workers situated around equipment.</p>	
<p>*Amount of quartz in poppents being used is variable and you need to confirm this with your company</p>		
Other		
<ul style="list-style-type: none"> Road dust Sweeping/Moving sand/crush 	<p>...workers are being exposed to silica due to excessive road dust containing silica.</p> <p>...workers are being exposed to silica while sweeping or moving sand/crush containing silica (primarily during spring clean-up)</p>	<p>Personal Protective Equipment (PPE)</p> <ul style="list-style-type: none"> Respiratory protective equipment according to the company's RPP It is imperative that the RIGHT PPE (e.g. P100 respirator vs. dust mask) is used for the job the RIGHT way (e.g. fully shaven, fit tested etc.) Any additional PPE the company has deemed necessary for that task and situation.

Regulatory Requirements & Reference

Alberta

- The 8 hour Occupational Exposure Limit (OELs) for crystalline silica is 0.025 milligrams per cubic metre (mg/m^3), provided in Table 2, Schedule 1 of the OHS Code
- Refer to Part 4 Chemical Hazards, Biological hazards and harmful Substances.
- Note: Silica is a substance for which a code of practice must be prepared under section 26, and health assessments must be provided under section 40 of the OHS Code.

British Columbia

- The Occupational Health and Safety Regulations list an 8 hour occupational exposure limit (OEL) for respirable crystalline silica (including quartz) of 0.025 milligrams per cubic metre (mg/m^3).
- Refer to Part 5, Chemical and Biological Hazards, of the regulation.
- Note: An Exposure Control Plan (ECP) may need to be implemented according to part 5.54 of the BC OHS Regulation.

Saskatchewan

- The Occupational Health and Safety Regulations list an 8 hour occupational exposure limit (OEL) for respirable crystalline silica (including quartz) of 0.05 milligrams per cubic metre (mg/m^3).
- Refer to Part XXI – Chemical and Biological Substances, OHS Regulations
- Refer to Part XXIV – Silica Processes and Abrasive Blasting

Further Reading and References

- http://employment.alberta.ca/documents/WHS/WHS-PUB_ppe004.pdf Guideline for the Development of a Code of Practice for Respiratory Protective Equipment
- http://employment.alberta.ca/documents/WHS/WHS-PUB_ppe001.pdf Respiratory Protective Equipment: An Employer's Guide
- http://employment.alberta.ca/documents/WHS/WHS-PUB_ch059.pdf Crystalline Silica in the Workplace
- <http://www2.worksafebc.com/publications/posters.asp?reportID=35498> The Dangers of breathing Silica Dust
- <http://www2.worksafebc.com/Publications/Multimedia/Videos.asp?ReportID=36018> Silica Exposure Video
- http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/word/developing_a_silica_ECP_final.doc Developing a Silica Exposure Control Plan