



WINNIPEG
Air Testing

Practical Health and Safety Solutions

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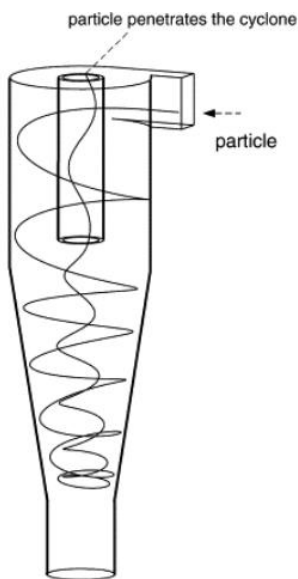
AIRBORNE SILICA EXPOSURE SURVEY

Dear Client:

Please find below the results of the airborne silica survey performed at ABC Inc. located at 123 First Street, Winnipeg on April 3, 2020. ABC Inc. supplies and installs stone products. The process at the facility includes cutting and edging of stone materials. Air testing was performed to evaluate the airborne concentrations of silica in the shop and personal exposures of some of the workers.

Methodology

Personal samples were collected by having the workers wear a sampling train consisting of a small pump, a hose running up to the lapel of the worker, and a PVC filter cassette with cyclone.



The cyclone filters out the larger particles leaving only the smaller respirable silica particles on which the exposure standard is based. Air passing through the cyclone creates a vortex. Larger particles rub against the inside of the cyclone and fall to the bottom. Finer particles stay airborne and are carried up and into the cassette where they are caught on the filter in the cassette and later analysed at the lab.

The sampling equipment worn by the workers was positioned in order to collect air from their breathing zones. The samples were collected using normal industrial hygiene sampling pumps. A flowrate of 2.75 litres per minute was used for both samples as specified for the cyclones. The samples were analysed at an AIHA-accredited laboratory using NIOSH (National Institute of Occupational Safety and Health) Analytical Method 7602 for silica.

Allowable Exposure Limits

The airborne silica results were compared to the 2019 Threshold Limit Values (TLVs). TLVs represent time-weighted average airborne concentrations to which it is believed that a worker can be exposed, 8 hours per day, 40 hours per week, without adverse effect. TLVs have been adopted in the Safety and Health legislation as the allowable exposure guidelines in Manitoba.

Results

The results from the samples are provided in the following table. A copy of the lab results has been appended.

Sampling Results of Silica Exposure

2019 TLV = $25 \mu\text{g}/\text{m}^3 \text{ (R)} = 0.025 \text{ mg}/\text{m}^3 \text{ (R)}$

| Work Station | Worker | Silica Exposure ($\mu\text{g}/\text{m}^3$) |
|--------------|----------|--|
| Fusion Saw | Worker 1 | 27.6 |
| Titan | Worker 2 | 30.7 |

Workers were not observed wearing respirators on the day of testing. Both the Fusion Saw and Titan had wetting as controls (see images below). With the current controls, both workers tested were exposed to silica levels above the TLV.



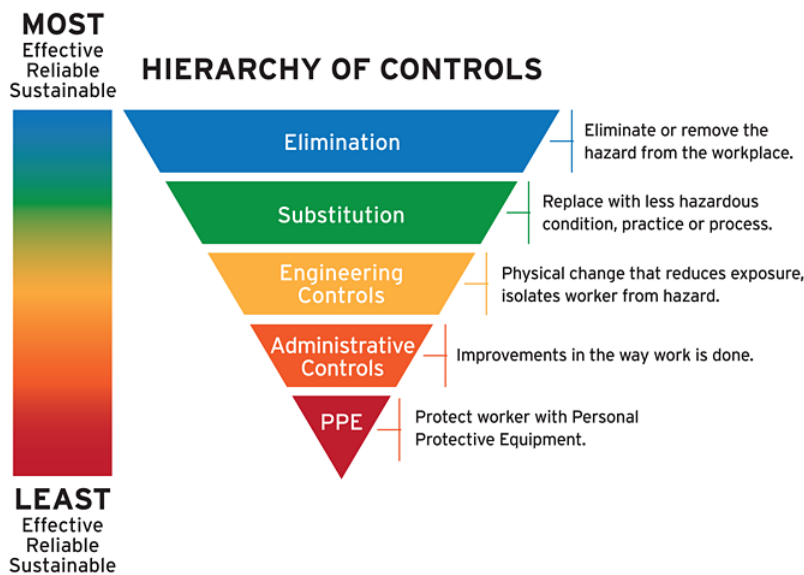
Left. Fusion Saw workstation, where cutting of stone occurs.

Right. Titan work station, the Titan places edges on countertops. Both machines had wetting as controls.

Discussion

Both workers were exposed to silica levels slightly above the TLV. The two exposures are quite similar and the workers move around the shop rather than staying at one work station. This suggests that the general background concentration in the shop may be similar to the measured worker's exposures.

Additional controls are needed to reduce worker's exposure to silica in these areas. In general, the introduction of controls should follow a control hierarchy where the most effective controls are considered first and the least desirable controls considered last. A diagram of a control hierarchy is provided below.



The first approach should be to ensure that the water suppression system is working properly. The table below shows that water suppression effectively reduces airborne silica concentrations with exposures during cutting being reduced by over 90%. It may be that the spray has become misdirected or partially clogged so as to not produce a proper mist at the point of dust emission.

| | Mean mg/m ³ (range) | Standard deviation | Percent reduction |
|-----------------------------------|-----------------------------------|-----------------------|----------------------|
| <i>Block cutting</i> | | | |
| Bosch abrasive cutter, no control | 2.83 (1.00–4.04) | 1.14 | NA |
| Bosch abrasive cutter with LEV | 0.11 (<0.05–0.17) | 0.04 | 96.2 |
| Felker stationary wet saw | 0.26 (0.09–0.61) | 0.21 | 90.7 |
| <i>Brick cutting</i> | | | |
| Bosch abrasive cutter, no control | 0.94 (0.45–1.58) | 0.49 | NA |
| Bosch abrasive cutter with LEV | 0.08 (<0.05–0.15) | 0.04 | 91.1 |
| Target stationary wet saw | 0.09 (<0.05–0.14) | 0.04 | 90.6 |

Source: Safety in Numbers (www.safetyinnumbers.ca)

Due to the magnitude of the silica exposures, it is recommended that respiratory protection be introduced as an interim measure to reduce worker exposure until more permanent solutions can be explored and implemented. All workers are currently supplied with respirators. Thus, the use of respiratory protection would be an easy and immediate method of reducing worker exposure.

Manitoba legislation requires that air sampling be done after the implementation or change in controls to ensure that worker exposure has been reduced to acceptable levels. An excerpt from the Manitoba regulation is provided below. Retesting is not required if respirators are used because the airborne concentrations are not changed but rather a known correction to the exposure is added based on the protection factor of the respirator.

Monitoring after control measures implemented

36.8 When an employer implements control measures to control the concentration of an airborne chemical or biological substance, the employer must monitor the concentration of the substance in the workplace for a period sufficient to determine that the control measures have reduced the concentration of the substance below the occupational exposure limit for the substance.

Conclusion

Both workers at the Fusion Saw and Titan were exposed to levels of silica slightly above the TLV. Additional controls should be explored for these work stations. Respiratory protection should be used as an interim measure to reduce worker exposure until more permanent solutions have been applied.

I hope this information is of assistance to you. Should you have any questions, or if we can be of any further assistance, please contact me at (204) 801-3022.

Winnipeg Air Testing
Per:

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Copy of Laboratory Results of Air Testing

| Location Number | 3892 | | | | | PO Number |
|-------------------|-----------------|------------|----------|----------|-------------------------|-----------|
| Sample ID | Cust. Sample ID | Location | Date | Time | Flow Rate | |
| Parameter | | Method | | Total | Concentration | |
| 309065-001 | | [REDACTED] | 04/01/19 | 429 min | 2.78 L/min | |
| Cristobalite | | NIOSH 7602 | | <5.00 µg | <4.20 µg/m ³ | |
| Quartz | | NIOSH 7602 | | 32.8 µg | 27.6 µg/m ³ | |
| Respirable Silica | | NIOSH 7602 | | 32.8 µg | 27.6 µg/m ³ | |
| 309065-002 | | [REDACTED] | 04/01/19 | 424 min | 2.77 L/min | |
| Cristobalite | | NIOSH 7602 | | <5.00 µg | <4.26 µg/m ³ | |
| Quartz | | NIOSH 7602 | | 36.1 µg | 30.7 µg/m ³ | |
| Respirable Silica | | NIOSH 7602 | | 36.1 µg | 30.7 µg/m ³ | |