RESPIRABLE CRYSTALLINE SILICA EXPOSURE MONITORING CONSIDERATIONS

WHAT YOUR LAB WANTS YOU TO KNOW

The Essential Minerals Association (EMA) is providing this guide to field personnel in the essential minerals industry who will be collecting exposure monitoring data as the result of the newly published Mine Safety & Health Administration (MSHA) 30 CFR PART 60; Respirable Crystalline Silica. This is a product of the EMA Silica Compliance Task Force.

Industrial hygiene laboratories should be considered a partner to those engaged in crystalline silica exposure assessments. When collecting samples, it is important to communicate with your laboratory and understand their recommendations prior to submitting samples for analysis. Time and resources can be saved, and accuracy can be improved, by maintaining a close partnership with your lab.

The following advice is offered for your consideration.

Get ready now before the compliance deadline!

- Samples collected now can be used for future compliance therefore there is no need to wait.
- MSHA compliance dates:
  - April 14, 2025, Coal Mines
  - April 8, 2026, Metal and Nonmetal Mines
- Evaluate any overexposures now, and determine what controls need to be implemented

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In advance of sampling, communicate with the lab

- Communicate with the lab as early as possible
- Obtain sampling media and appropriate forms – Chain of Custody (COC)
- Let the lab know how many samples will be arriving
- Inform the lab as to when you will need the results

Lab certification

- Your lab must be ISO17025 certified and have the Field of Testing for silica

Determine your Similar Exposure Groups (SEGs)

- This will assist you in determining how many samples you need to collect

Discuss mineral interference potential with lab

- Indicate on COC any possible or known interferences (e.g., feldspars, mica, etc.)
- Collect bulk samples to check the potential for possible mineral interferences with the lab analysis.
- Accumulated dust samples from equipment, rafters, or settling ponds can be considered.

Cyclones vs. disposable parallel particle impactors (PPIs)

- Cyclones require more attention and training
- Cyclones can accidentally be inverted which invalidates the sample
- Cyclones are heavier for workers to wear
- PPIs are easy to calibrate, and color coded for type of sampling (please note they are not reusable). They will require a PPI calibrator.
- PPIs are more costly and have a limited shelf life (~ 2 years)

Preparation at the work site

- Communicate with mine personnel in advance about schedule and expectations
- Allocate extra time before and after the shift for set up and calibration, and for providing proper instruction to those wearing the samplers
- A good rule of thumb is allowing an hour before and after the sampling event is scheduled

Inspect equipment

- Inspect media and sampling equipment prior to collection
- Check O-rings and accessories
- Verify everything is intact
- Clean out cyclones and cyclone grit pots prior to use

Sample volumes

- Make sure you use the correct air flow rate for the size selective sampling device you are using such as cyclones or parallel particle impactors (PPIs)
- Verify with the lab the air volume needed to meet the limit of detection (DL) required

Calibration

- Always perform a pre- and post-calibration, and record results

Representative sampling

- Make sure sampling is representative of equipment use and engineering controls
- Sample during normal working conditions – neither worst case or least possible exposure

During sampling

- Spot check your sample and record relevant activities
- Keep an activity log with relevant information such as location and work activities
- Do not simply turn on the pumps and leave then come back at the end of the shift; but instead schedule times to make spot checks and take notes
- Sample for the entire shift and not just during potential exposure activities

Field blanks

- Field blanks are ALWAYS needed with each batch for quality assurance purposes
- Field blanks are sampling media that accompany and are handled in a similar manner as air samples, but no air is pulled through them.
- At a minimum, there should be at least one blank submitted for each day of sampling

Sample submission

- Provide sampling times and flow rates required for determining or verifying air volumes
- Identify clearly responsible person and contact information for whom will be receiving the lab report and invoice
- Identify everyone that needs a copy of the report
- Provide contact information for the lab if there are any questions regarding samples
- Sign and date COC form prior to shipment to the laboratory.

Sample labeling and paperwork

- Use unique identification IDs on all media (do not label samples with the same ID)
- Make paperwork and media labels legible
- Use pre-labelled media when possible
- Keep IDs confidential and consider not using names
- Do not use Social Security Numbers (keep cross reference field notes)

Specify analysis type (gravimetric and silica)

- Indicate if lab should analyze for all three forms of silica or just quartz
- Although respirable dust results are not required for MSHA RCS compliance, please indicate if you need it and order pre-weighed filters

IR vs. XRD

- The majority of labs are accredited for and use XRD

Reasons to invalidate collected samples

- Significant pre and post flow rate differences NOTE: Post-sampling calibration checks varying by no more than ±5%. [1]
- Damage to sampling media
- Overloading of sampling media
- Cyclone not vertical during sampling or “microvacuuming”
- Samples collected backwards
- Cassettes loaded improperly

Chain–of-custody

- A signed chain-of-custody is required
- Fill out all spaces on COC and use online and or prefilled COC where possible

Shipping

- Do not ship bulk samples with air samples (Bulk samples can be archived by operator or sent to the lab if necessary)
- Use lab provided shipping containers if possible
- Give special care to packing

Results

- Be sure to inform management and affected employees of results
- Post the results for employees as required
- Be sure to inform MSHA if the PEL is exceeded for valid samples
- Maintain results and sample collection information for record keeping

Area sampling

- Consider area sampling to evaluate specific areas or processes prior to or in conjunction with personal sampling
- Area samples can provide useful information on air quality but are not valid samples for MSHA compliance purposes.

[1] United States Mine Safety and Health Administration. (2014). Metal and nonmetal health inspection procedures handbook. Arlington, VA: U.S. Dept. of Labor, Mine Safety and Health Administration, Metal and Nonmetal Mine Safety and Health.

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