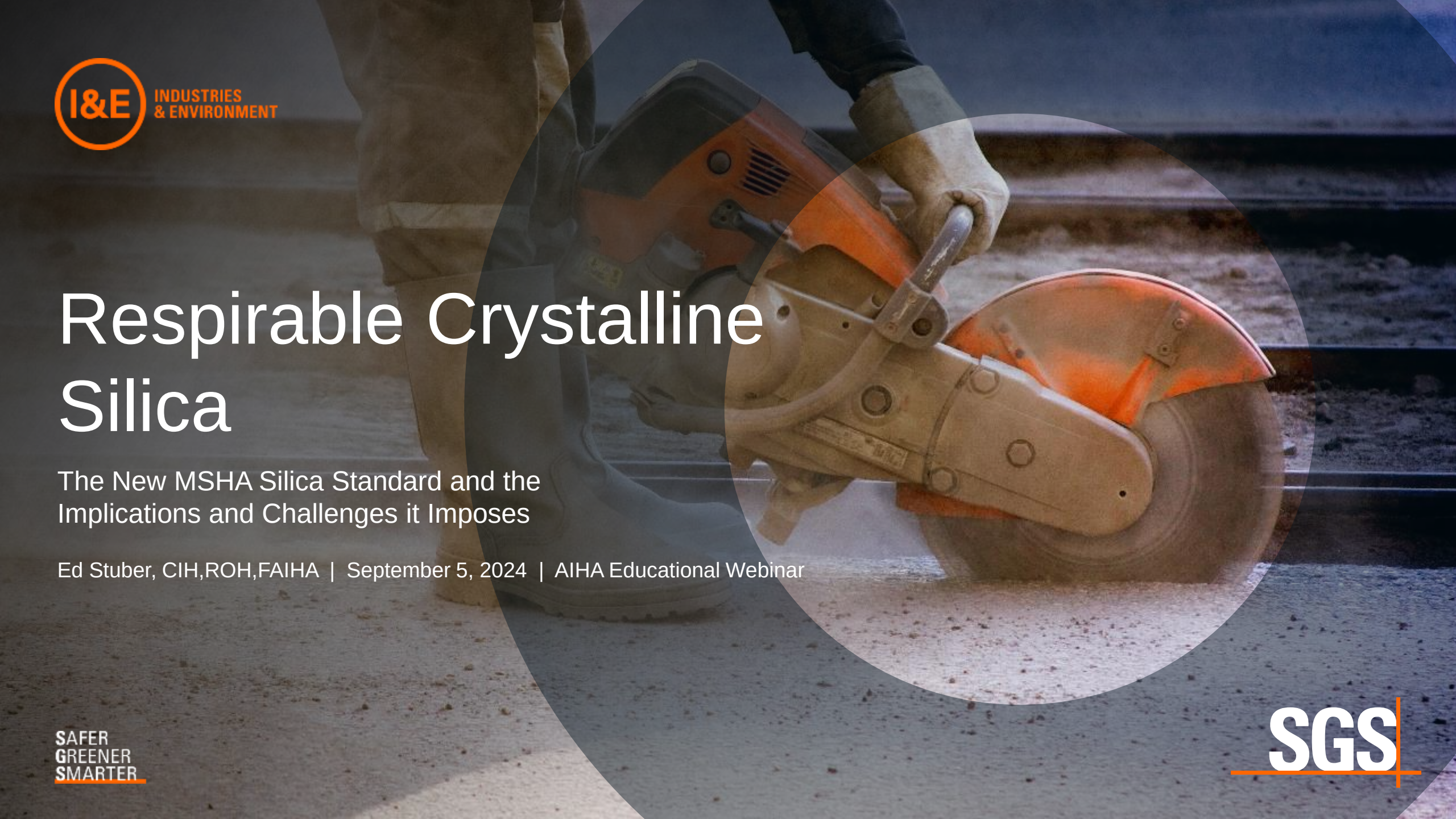

I&E INDUSTRIES & ENVIRONMENT

Respirable Crystalline Silica

The New MSHA Silica Standard and the Implications and Challenges it Imposes

Ed Stuber, CIH,ROH,FAIHA | September 5, 2024 | AIHA Educational Webinar

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Agenda

- Who is affected
- Exposure Hazards
- Timeline for Compliance
- Major Components of the MSHA Silica Standard
- Exposure Sampling
- How to Comply

Speaker and Presentation Credit

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- Mr. Stuber has practical experience and expertise in the areas of industrial hygiene sampling and monitoring from a laboratory perspective. He also has industrial hygiene consultation experience and is familiar with regulatory compliance applications.
- He has worked with both USA and Global clients to assist them regarding Industrial Hygiene investigations, industrial hygiene technology, sampling plans, training, and regulatory interpretation.
- Ed has over 40 years of experience in industrial hygiene laboratory operations and is responsible for supporting industrial hygiene laboratory clientele, both in the US and abroad and technical consultation for industrial hygiene sampling and analysis projects.

MSHA Silica Standard

last updated 1985

OSHA Silica Standard

last updated 2016

The purpose of this proposed rule is simple – to better protect the miners from exposure to silica so they do not have to suffer form entirely preventable debilitating and deadly occupational illnesses. Silica overexposures have a real-life impact on a miner's health.

Chris Williamson
Assistant Secretary of Labor for MSHA

Who Is Impacted

All Mines

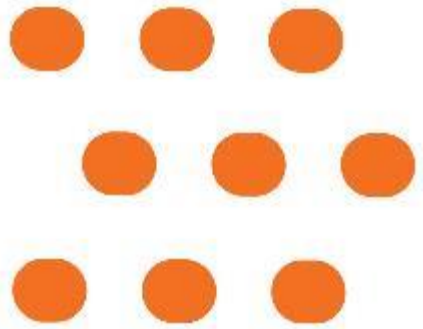
- Metal
- Non-Metal
  - Quarries
  - Gravel
  - Sand
  - Aggregate
- Coal

Why Change?

As industrial hygienists and safety professionals, we are on the brink of a long overdue but significant regulatory shift with the introduction of MSHA's silica rule, which is set to take effect in 2024.

It will also introduce an action level for silica of 25 µg/m³ for a full-shift exposure, calculated as an 8-hour TWA.

This rule will lower the permissible exposure limit (PEL) for respirable crystalline silica to 50 micrograms per cubic meter of air (µg/m³) over an 8-hour time-weighted average, aligning with OSHA standards and reflecting an increased emphasis on miner health and safety.



If exposure monitoring indicates an exceedance of the action level, then the mine operator would be required to conduct periodic sampling.

Crystalline Silica Polymorphs

α-Quartz

- Most common

Cristobalite

- formed at high temps 1400^{o}C
- foundry processes, brick
- manufacture, ceramics

Tridymite

- Common in volcanic rock
- Very rare in the workplace

Exposure Hazards

Exposure Hazards

Each of these illnesses is chronic, irreversible, and potentially disabling or fatal.

Pneumoconiosis

- Occupational lung disease caused by inhalation of dust
- 2,600 US deaths recorded in 2013, includes asbestosis, silicosis, coal workers' pneumoconiosis, byssinosis

Silicosis

- Primary health effect associated with inhalation of respirable crystalline silica
- Progressive fibrosis caused by deposition of respirable particles
- Irreversible
- ~600 US deaths attributed in 2013

Lung cancer

- Chronic obstructive pulmonary disease (COPD)
- Kidney disease
- Increases the risk of contracting tuberculosis and other infections

MSHA Silica Standard

178 pages as a PDF

Old Rule

SWA mg/m3

“Shift Weighted Average“

The amount of dust measured in the air in 480 minutes, no matter the length of the sampling event.

TLV mg/m3

"Threshold Limit Value"

The allowable limit for the sample in which the SWA had to fall below.

TLV*EF mg/m3

The level at which MSHA could issue a citation.

MSHA uses a 20% error factor to account for inaccuracies in the laboratory procedure.

The method has a plus or minus 20% variation.

SWA/TLV*EF

How close the sample was to the citation level.

- <1 means the result is below the citation level.
- The closer to 1, the closer this sample was to exceeding the citation level.

Measured results above the citation level indicate that some action needs to be taken to reduce the exposure. Making engineering changes to reduce the exposure and then re-sampling to make sure that the changes had the desired effect is the preferred course of action. Results measured below the citation level means that your operation is in control.

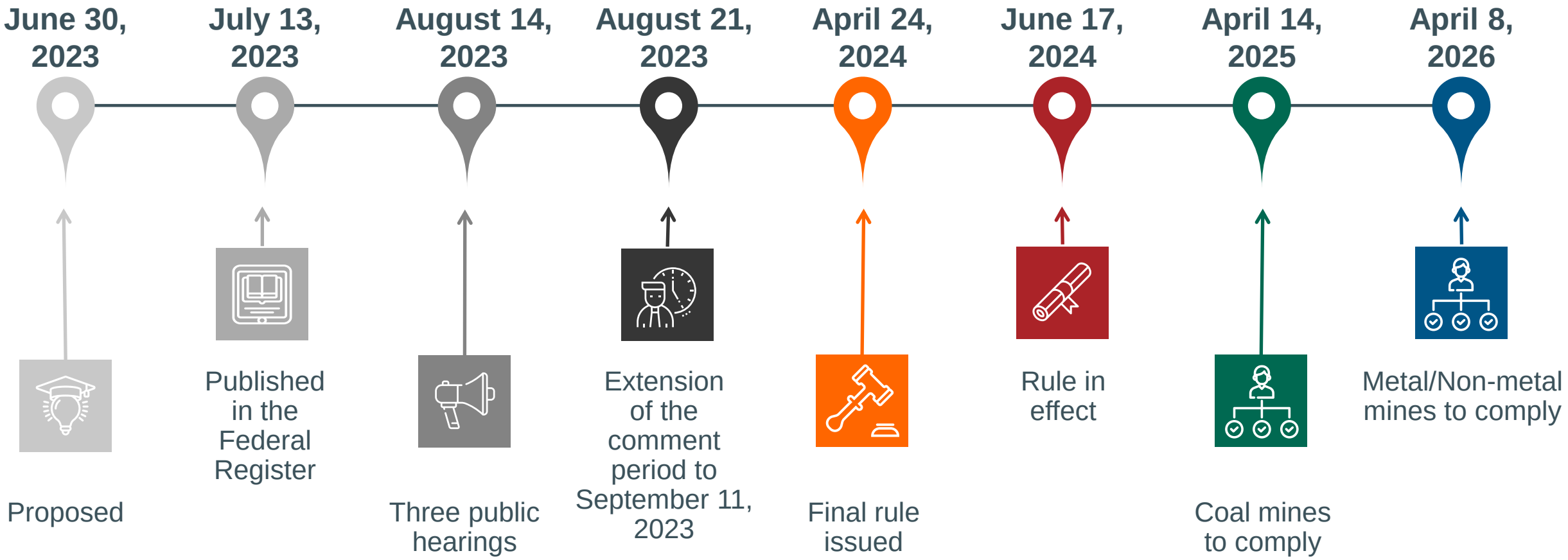
PPE is not an acceptable control.

New Rule

50 µg/m3 as 8-hour TWA

25 µg/m3 action level as TWA

New Rule Timeline



Major Components of the New Rule

▪ Allowed to continue to operate if exposure is > action level and < TWA.	▪ Increased rigor of enforcement protocols and inspections with penalties for non-compliance.	▪ Report any PEL exceedance to MSHA.	▪ Qualified labs can be found on the AIHA LAP website or A2LA.
▪ Labs must ISO 17025 certified and use NIOSH or OSHA approved methods.	▪ Establishes uniform standard among all mines.	▪ Uniform requirements for medical surveillance across all mines.	▪ Periodic inspections conducted every 6 months whenever there is a change in the process - resample.
▪ If over exposure occurs, MSHA is notified, and employees wear approved respirator until exposure is PEL.	▪ Mine operators can conduct the surveys.	▪ Allows for alternative collection devices – must meet ISO 7708:1995E standard.	▪ Full shift sampling must be done and includes extended work shifts.
▪ Environmental cabs can be considered engineering controls.	▪ Uniform requirements for controlling and monitoring exposures across all mines.	▪ NO need to sample all miners; use a representative fraction (>2) at the highest expected exposure.	▪ Updates reflect the latest advances in respiratory technologies and practices.

Exposure Assessment

Exposure Assessment
Initial Compliance

- Initial exposure monitoring of employees who are, or may reasonably be expected to be, exposed to crystalline silica

- Determine employee exposure levels
  - >50 µg/m3 (PEL)
    - mine operator must make approved respirators available to the affected miners before the start of the next work shift and ensure that the affected miners wear the respirators for the full shift or during the period of overexposure until miner exposures are at or below the PEL. Corrective actions must be taken immediately to lower the concentration of respirable crystalline silica to at or below the PEL.
  - <50 µg/m3 and >25 µg/m3 (between PEL and Action Level)
    - mine operator must continue to sample within 3 months of the previous sampling.
  - <25 µg/m3 (Below Action Level)
    - Periodic inspections every 6 months

Common Mistakes

- X Incorrect flow rate
  - X will not be a respirable sample
- X Insufficient air vol
  - X will not meet detection limit
- X No turnaround time
  - X results could be late
- X No field blank
  - X results could be questioned
- X Incorrect field calibration
  - X not calibrating with media in line
- X Incorrect sample handling
  - X no COC, cyclone tipping
- X Not indicating type of silica
  - X delays start of analysis

Exposure Sampling

- Samplers must meet ISO 7708:1995 specifications
  - 4 µm 50% Cut Point (Previous OSHA Standard 3.5 µm)

- Cyclones selected based on several factors

Higgins Dewel Cyclone

Dorr-Oliver Cyclone

SKC Aluminum

Exposure Sampling

- Samplers must meet ISO 7708:1995 specifications - NEW and IMPROVED
- Alternative to Cyclone – SKC Parallel Particle Impactors (PPI) Sampler
  - Meets Standard Requirements
  - Single use or Re-Usable
  - 2, 4, or 8 LPM Models
- Pros:
  - Removes some problems associated with cyclones
  - Availability of High-Flow Personal Sampling Pumps
- Cons:
  - Single use adds cost

Exposure Sampling

- Samplers must meet ISO 7708:1995 specifications - NEW and IMPROVED
- Alternative to Cyclone and SKC Parallel Particle Impactors (PPI) Sampler
  - Meets Standard Requirements
  - Single use
  - 2 LPM Model

The DRS is a Disposable Respirable Sampler

- Pros:
  - Removes some problems associated with cyclones
  - Availability of High-Flow Personal Sampling Pumps
- Cons:
  - Single use adds cost – but not as much as the PPI

How to Comply

Read the RULE

Federal Register :: Lowering Miners' Exposure to Respirable Crystalline Silica and Improving Respiratory Protection; Correction

Don’t Wait

- April 14, 2025, for coal mines
- April 8, 2026, for all others

Develop a Sampling Plan

- Internally
- Outside Consultant
- Laboratory support

Choose a Qualified Lab

- your best friend

Thank you!

Do you have any questions?
www.sgsgalson.com

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