

Silica & Respirable Dust

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- Corporate Industrial Hygiene is currently doing a study to determine the exposure levels of silica in various facilities and types of jobs.
- Silica is one of the contaminants that OSHA is seeking to regulate to a more stringent level.
- Rulemaking is expected for both General Industry and Construction.

Silica & Respirable Dust

- Silica is primarily a respiratory hazard.
- Lung cancer and silicosis are the main concerns.
- Kidney disease, autoimmune disorders and rheumatoid arthritis have been linked to chronic silica exposures.

Silica & Respirable Dust

- Silica is common name for SILICON DIOXIDE – SiO₂
- Silica occurs in both AMORPHOUS and CRYSTALLINE forms.
- CRYSTALLINE SILICA poses a much greater health hazard.

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■ AMORPHOUS SILICA

- Defined as lacking definite form, shapeless
- Sand is most common form
- Concentration ranges from 12% to greater than 30% in coal dusts and ashes

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- CRYSTALLINE SILICA has definite shape
- Types of CRYSTALLINE SILICA:
 - QUARTZ (most common)
 - CRISTOBALITE
 - TRIDYMITE
 - TRIPOLI

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- Crystalline Silica is present in both coal dust and fly ash from less than 0.1% to greater than 5%, depending upon the coal used
- There are other silica sources in plants – concrete, sandblasting, gypsum, etc.

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- The current Permissible Exposure Limit for silica, except for coal dust (for > 1% concentration) is:

$$\frac{10 \text{ mg/M}^3}{\% \text{ silica} + 2}$$

Note: Construction standard lists PEL as mppcf – use this formula instead

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- If the silica concentration is less than 1%, the sample needs to be evaluated based on the respirable dust PEL of 5.0 mg/M³.
- If the silica concentration is 1% or more, the respirable dust concentration is used to determine the silica PEL.

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- If the level of respirable dust is greater than the calculated PEL, there is an exceedance of the silica PEL.

Example:

8 hour TWA Respirable Dust = 2.5 mg/M³

5% silica = calculated PEL of 1.43 mg/M³

Since $2.5 > 1.43$, silica PEL has been exceeded

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- For coal dust with less than 5% silica, the PEL is 2.4 mg/M³.
- For coal dust with greater than 5% silica, use the PEL formula.
- All respirable dust sampling must be performed with a cyclone, properly calibrated.

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- S&H website on AEP NOW has information on silica sampling – go to INDUSTRIAL HYGIENE section, select Sampling Protocols.
- There is a spreadsheet available to calculate silica in the INDUSTRIAL HYGIENE section, select CALCULATIONS SPREADSHEET.

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- Actual OSHA proposed PEL has not been listed, but 0.1 mg/M³ has been discussed.
- NIOSH REL is 0.05 mg/M³ (10 hr TWA).
- ACGIH TLV is 0.025 mg/M³.

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- From the study (as of 2-5-2010):

Samples (250 total) were taken at:

Amos – 155

Cardinal – 41

Big Sandy – 31

Others – 23

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- Number of samples with silica above detectable levels – 25 or 10.0%
- Highest in study – 10.3% from a soil sampling process (construction project)
- The highest from coal ash was 5.46%

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- Number of samples with respirable dust above detectable levels – 155 or 62.0%
- There were 3 samples above the respirable dust PEL of 5mg/M³
- Highest was 96.5mg/M³ from coal yard work (note: exceeds half face APR of 10x)

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- Silica listed exposure limit exceedances:
 - OSHA proposed 0.1mg/M3 – 5
 - NIOSH 0.05mg/M3 (compared as 8 hr) -8
 - ACGIH TLV 0.025mg/M3 – 11
 - Calculated PELs - 4

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- More data are needed to determine the areas of concern for our facilities. Silica evaluation is a corporate-wide S&H goal for 2010.
- The results are being used as a part of a larger EEI study to determine the electric industry's overall response to a silica standard.

