Silica & Respirable Dust
Silica & Respirable Dust

- 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.
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
Silica & Respirable Dust

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

- 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.
Silica & Respirable Dust

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

  \[
  \frac{10 \text{ mg/M3}}{\% \text{ silica} + 2}
  \]

Note: Construction standard lists PEL as mppcf – use this formula instead.
Silica & Respirable Dust

- 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.
Silica & Respirable Dust

- 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
Silica & Respirable Dust

- 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.
Silica & Respirable Dust

- 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.
Silica & Respirable Dust

- 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.
Silica & Respirable Dust

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

Samples (250 total) were taken at:
- Amos – 155
- Cardinal – 41
- Big Sandy – 31
- Others – 23
Silica & Respirable Dust

- 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%
Silica & Respirable Dust

- 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)
Silica & Respirable Dust

- 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
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.
Silica & Respirable Dust

- The more personal samples that we have the better the study can help us protect our workers at the proper level.

- ANY QUESTIONS???