SILICA EXPOSURES IN THE METAL/NONMETAL (M/NM) MINING INDUSTRY

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What is “Silica”?

- SiO2 (e.g., sand, glass, etc.)
- Silicates (e.g., asbestos) is a chemical cousin
- This presentation will only address respirable **crystalline** silica in the quartz, cristobalite, and tridymite forms

Types of Mines Where Silica is Found

- Almost all mines – including coal
- Percent in ore varies considerably, even within same commodity and location

MSHA Targeting of Respirable Silica

MSHA has targeted respirable quartz for 33 years; it has been a Government Performance and Results Act (GPRA) goal for approximately 8 years

What is GPRA??

- GPRA – Government Performance and Results Act, congressional legislation that requires government agencies to prepare strategic plans and annual performance goals
- In MSHA M/NM, GPRA health goals have historically been associated with sampling toxic contaminants

What is the Overall Objective of M/NM GPRA Goals?

- Encourage consistent sampling of toxic contaminants at mines throughout the U.S.
- Focus on the contaminants that have the greatest likelihood of damaging miners' health
- Identify trends so far as feasible
- BOTTOM LINE: Reduce exposure to miners to toxic contaminants

FY2010 M/NM GPRA Goals Included:

2010 Metal/Nonmetal Health Sampling Program
Goal: Reduce Work-Related Illnesses in Metal & Nonmetal Mines

Sampling Annually

- **10 Contaminants:** Asbestos, Beryllium Dust, Calcium Oxide, Cristobalite, Cyanide, Lead, Mercury, Radiation-Alpha, Radiation-Gamma, Silica
- ***100% of Identified Commodity Mines:*** Asbestos, Beryl-Beryllium Ore, Ground Silica, Vermiculite, Cement, Lime, Crushed & Broken Quartzite, Diatomaceous Earth (Diatomite), Ground Cristobalite, Lead, Lead-Zinc Ore, Zinc, Gold, Uranium Ore, Uranium-Vanadium Ore, Vanadium Ore

Sampling Every 5 Years

- **10 Contaminants:** Chromium VI, Diesel Particulate, Noise, Radiation-Alpha, Respirable Dust, Silver, Sulfuric Acid, Talc Fiber, Welding Fumes
- Reported Musculoskeletal Illnesses within Last 5 Years
- *20% of Mines Sampled Each Year*

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FY2011 M/NM GPRA Goals will change:

Emphasis on enforcement of 56/57.5002

- M/NM sampling strategy will be to sample 20% of our mines each year during the next 5 years.
- Our goal will be to increase the percentage of mines conducting their own surveys.
- In 5 years, ensure compliance of 56/57.5002 at all of our mines.

2005–2009 MSHA Sampling for Respirable Dust (Silica)

Citable	Overexposures (>TLV) but not citable	> ½ TLV but < TLV	**Cumulative**
5%	2%	12%	**19%**

Factors Affecting Overexposure Trending

- MSHA management commitment to sampling
- Mine management commitment to dust controls
- Training of inspectors
- Commodity mined
- Job sampled
- Effectiveness of dust controls

What Does MSHA Require of Mine Operators?

Comply with 56/57.5001, .5002, .5005, and Part 58

What Does MSHA Require of Mine Operators?

.5001: Not exceed 1973 ACGIH TLVs

What Does MSHA Require of Mine Operators?

.5002: “Dust…surveys shall be conducted as frequently as necessary to determine the adequacy of control measures”

What Does MSHA Require of Mine Operators?

.5005: Control of Exposure

- "…insofar as feasible, by prevention of contamination, removal by exhaust ventilation, or by dilution with uncontaminated air"

- "…Whenever respiratory protective equipment is used [implement] a program for selection, maintenance, training, fitting, supervision, cleaning, and use…consistent with…ANSI Z88.2-1969 [and furnish/use] respirators approved by NIOSH under 42 CFR part 84 which are applicable and suitable for the purpose intended"

What Does MSHA Require of Mine Operators?

58.610: use of enclosed device or respirators approved under 42 CFR 84 when abrasive blasting

What Does MSHA Require of Mine Operators?

58.620: Drill Dust Control

- "…effective dust control measures shall be used…"

What Does MSHA Require of Mine Operators for 56/57.5002?

- A performance-based standard applicable to each unique mining environment, not an overarching prescriptive standard
- Program Policy Letter coming out
- How much is “enough”?

  “…surveys shall be conducted as frequently as necessary to determine the adequacy of control measures”
- MSHA will ask for operator’s records as evidence of their surveys
- MSHA website will have more information

What Guidance Does the MSHA Program Policy Manual Provide?

"The sampling and analytical methods used by the mine operator should be consistent with established scientific principles…."

What if Operator Sampling Records Show a Past overexposure?

- Will MSHA issue a citation for overexposure identified through operator sampling?
  - **NO!**
- Can MSHA resample the job/location where the operator exposure occurred?
  - **Of Course!**

P-Codes

- **What is a P-Code?**
  - A code added to MSHA sampling documentation signifying that “citable overexposure occurred, but all feasible engineering and administrative controls have been implemented…”
  - When a P-Code is issued (by MSHA headquarters with District recommendation) any subsequent citation is not issued

BUT…

What About Issuing a P-Code?

- P-Codes apply to **NOISE ONLY**
- Also **FYI…operators do not request P-Codes.** [Requests are initiated by MSHA District Managers based on a history of noise overexposure and good faith efforts of operators to control the noise for the particular job & location]

What is the Current MSHA M/NM Standard?

- Current standard is based on 1973 ACGIH TLV:
  - Quartz: $\frac{10\ mg/m^3}{\%\ respirable\ Q + 2}$
  - Cristobalite: ½ value calculated for quartz
  - Tridymite: ½ value calculated for quartz

“Designed to limit exposures to 0.1 mg/m3”

Respirable Crystalline Silica Standard

- MSHA's agenda is to publish a "notice of proposed rule making" in 4/2011
- See http://www.msha.gov/REGS/UNIFIED/April2010/1219-AB36.asp#
- Check www.msha.gov for updates

Respirable Crystalline Silica Standard

- **DOL/MSHA** **RIN:** 1219-AB36 **Publication ID:** Spring 2010
- **Title:** Respirable Crystalline Silica Standard
- **Abstract:** Current standards limit exposures to quartz (crystalline silica) in respirable dust. The coal mining industry standard is based on the formula 10 mg/m3 divided by the percentage of quartz where the quartz percent is greater than 5 percent calculated as an MRE equivalent concentration. The metal and nonmetal mining industry standard is based on the 1973 American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values formula: 10 mg/m3 divided by the percentage of quartz plus 2. Overexposure to crystalline silica can result in some miners developing silicosis, an irreversible but preventable lung disease, which ultimately may be fatal. Both formulas are designed to limit exposures to 0.1 mg/m3 (100 ug) of silica. The Secretary of Labor's Advisory Committee on the Elimination of Pneumoconiosis Among Coal Mine Workers made several recommendations related to reducing exposure to silica. NIOSH recommends a 50 ug/m3 exposure limit for respirable crystalline silica. MSHA will publish a proposed rule to address miners' exposure to respirable crystalline silica.
- **Agency:** Department of Labor(DOL) **Priority:** Other Significant
- **RIN Status:** Previously published in the Unified Agenda **Agenda Stage of Rulemaking:** Long-Term Actions
- **Major:** No **Unfunded Mandates:** No
- **CFR Citation:** 30 CFR 56 to 57; 30 CFR 70 to 72; 30 CFR 90 (To search for a specific CFR, visit the Code of Federal Regulations.)
- **Legal Authority:** 30 USC 811; 30 USC 813
- **Legal Deadline:** None

- **Statement of Need:** MSHA standards are outdated; current regulations may not protect workers from developing silicosis. Evidence indicates that miners continue to develop silicosis. MSHA's proposed regulatory action exemplifies the agency's commitment to protecting the most vulnerable populations while assuring broad-based compliance. MSHA will regulate based on sound science to eliminate or reduce the hazards with the broadest and most serious consequences. MSHA intends to use OSHA’s work on the health effects and risk assessment, adapting it as necessary for the mining industry.
- **Summary of the Legal Basis:** Promulgation of this standard is authorized by sections 101 and 103 of the Federal Mine Safety and Health Act of 1977.
- **Alternatives:** This rulemaking would amend and improve health protection from that afforded by the existing standard. MSHA will consider alternative methods of addressing miners' exposure based on the capabilities of the sampling and analytical methods.
- **Anticipated Costs and Benefits:** MSHA will prepare estimates of the anticipated costs and benefits associated with the proposed rule.
- **Risks:** For over 70 years, toxicology information and epidemiological studies have shown that exposure to respirable crystalline silica presents potential health risks to miners. These potential adverse health effects include simple silicosis and progressive massive fibrosis (lung scarring). Evidence indicates that exposure to silica may cause cancer. MSHA believes that the health evidence forms a reasonable basis for reducing miners' exposure to respirable crystalline silica.

Timetable:

Action	Date	FR Cite
NPRM	04/00/2011	

Respirable Crystalline Silica Standard

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Respirable Crystalline Silica Standard

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QUESTIONS?