OSHA New Silica Regulation and How to Mitigate It with No Footprint

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Application Technology Manager
What is Respirable Crystalline Silica Dust?

- Hair: 100 Microns
- Visibility Threshold: 40 Microns
- RCS: <10 Microns
Dust Testing Instruments

Personal Data Ram (pDR)
- Real time dust measuring for
- <10 microns (µm)
- Does not differentiate the types of dust
- Not used for compliance measurement

Dorr Oliver (DO)
- Gravimetric sampling
- Samples are analyzed using an XRD
- Size-selective for respirable fraction
- Used for compliance measurements
OSHA Silica Standard Outline

• Reduces the personal exposure limit (PEL) of the employees from 0.1mg/m$^3$ to 0.05mg/m$^3$ 8 hr. time weighted average (TWA)

• Creates an action level (AL) of 0.025mg/m$^3$

• Requires engineering controls and written control plans

• Medical Surveillance of employees

• Requires training of employees on the hazards associated with respirable crystalline silica (RCS)

• Respirators may be required with, but not in place of engineering controls measures
OSHA Time Line

Construction 6/23/2017

General Industry and Maritime 6/23/2018
Hydraulic Fracturing (Medical Surveillance, Exposure above the PEL) 6/23/2018

Hydraulic Fracturing (Medical Surveillance, Exposure above the AL) 6/23/2020
Hydraulic Fracturing (Engineering Controls) 6/23/2021

2017 2018 2019 2020 2021 2021

3 Months

Today
Exposure Monitoring Requirements

Offer medical surveillance at no cost to the employee if exposure is above the AL for more than 30 days per year.
What are the Big Effects on Hydraulic Fracturing?

- Engineering Controls
- Medical Surveillance
- Routine Testing
- Document Exposure Plans
- Respirators are last line of defense
NIOSH Study of Hydraulic Fracturing Employees

- 6 Frac Sites Studied (5 different plays)
- 111 total samples taken
- High Risk Employees
  - Blender Operator
  - Sand Mover/T-Belt Operator

### TABLE VI. Samples Above ACGIH TLV, NIOSH REL, or OSHA PEL

<table>
<thead>
<tr>
<th>Site</th>
<th>ACGIH TLV</th>
<th>NIOSH REL</th>
<th>OSHA PEL</th>
<th>Total No. Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fayetteville, Ark.</td>
<td>24 (92.3%)</td>
<td>19 (73.1%)</td>
<td>14 (53.9%)</td>
<td>26</td>
</tr>
<tr>
<td>DJ Basin 1, Colo.</td>
<td>16 (64.2%)</td>
<td>14 (73.7%)</td>
<td>12 (63.2%)</td>
<td>19</td>
</tr>
<tr>
<td>Eagle Ford, Tex.</td>
<td>5 (62.5%)</td>
<td>5 (62.5%)</td>
<td>4 (50.0%)</td>
<td>8</td>
</tr>
<tr>
<td>DJ Basin 2, Colo.</td>
<td>19 (90.5%)</td>
<td>14 (66.7%)</td>
<td>9 (42.9%)</td>
<td>21</td>
</tr>
<tr>
<td>Marcellus, Pa.</td>
<td>25 (92.6%)</td>
<td>23 (85.2%)</td>
<td>18 (66.7%)</td>
<td>27</td>
</tr>
<tr>
<td>Bakken, N.D.</td>
<td>2 (66.7%)</td>
<td>1 (10%)</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>95 (83.8%)</strong></td>
<td><strong>76 (68.5%)</strong></td>
<td><strong>57 (51.4%)</strong></td>
<td><strong>111</strong></td>
</tr>
</tbody>
</table>

- 0.025 mg/m³
- 0.05 mg/m³
- 0.1 mg/m³

Journal of Occupational and Environmental Hygiene  
July 2013
Major Types Engineering Controls

Mechanical

Mini-Baghouse/Isolation

Chemical
Internal Chemical Testing
Internal Pneumatic Truck Trial

12 psi

Sand

12 ft

5 ft

4 ft

1L 1R 2L 2R 3E

Treated 40/70

Untreated 40/70
Internal Pneumatic Truck Trial

87-98% Reduction in Dust

Untreated 40/70

Treated 40/70
Area Monitoring Trial
Area Monitoring Trial
Area Monitoring Trial

Unable to detect total dust reduction as the pDr was saturated
Area Monitoring Trial

Average RCS Reduction

<table>
<thead>
<tr>
<th>Silica Dust Concentration (mg/m³)</th>
<th>Untreated</th>
<th>Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 M</td>
<td>97.4%</td>
<td>0%</td>
</tr>
<tr>
<td>40/70</td>
<td>99.3%</td>
<td>0.0%</td>
</tr>
<tr>
<td>30/50</td>
<td>98.5%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Personal Exposure Monitoring
Personal Exposure Monitoring

**Personal Sample Results for Respirable Crystalline Silica**

- **Time-Weighted Average (mg/m³):**
  - BLENDER OPERATOR: 0.125
  - FLUID TECHNICIAN: 0.075
  - HYDRATION SPECIALIST: 0.05
  - SAND MASTER: 0.075

- **Job Positions:**
  - BLENDER OPERATOR
  - FLUID TECHNICIAN
  - HYDRATION SPECIALIST
  - SAND MASTER

- **Markers:**
  - New PEL
  - Action Level
  - Old PEL
  - Untreated
  - Treated

SPE-187069
The Big Difference
Supply Chain Engineering Controls

Mechanical
Isolation
Chemical
Supply Chain Engineering Controls

- Mechanical
- Isolation
- Chemical

Components:
- Plant
- Rail Logistics
- Terminal
- Truck Logistics
- Frac Site

UNIMIN
Supply Chain Engineering Controls
Conclusion

• Measurements proven below the new action level

• Serves as an engineering control for the supply chain (mine to well)

• Transparent to your operations

• Long shelf life

• SPE Paper-187069
Thank You!

Questions?