OSHA’s Silica Rule

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Disclaimer

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Overview - Agenda

• Requirements of the new rule
  • Strategies for compliance
• Key challenges
• What if you cannot comply
• Why AFS decided to challenge
Summary of the Standard
29 CFR 1910.1053

(a) Scope and Application
- Separate standard for construction (29 CFR 1926.1153)
- Does not apply:
  - To processing sorptive clays (e.g. kitty litter)
  - Where exposures are below 25 µg/m³ under any foreseeable conditions
  - When using controls specified in Table 1 when doing construction activities (not regular)

(b) Definitions
- Respirable crystalline silica means quartz, cristobalite or tridymite meeting ISO size criteria
Silica

**Respirable**

- Visible >80 microns
  - Human hair (80)
  - Fine sand grain (100)

- Respirable <10 microns
  - 50% cut point = 4 microns
  - Collects 50% of 4 micron particles

**Crystalline**

- Includes:
  - Quartz
  - Cristobalite
  - Tridymite
  - (lake sand is 90+% quartz)

- Does not include
  - Amorphous
  - Vitreous or fused
OSHA Silica Standard

- (c) Permissible Exposure Level (PEL)
  - 50 µg/m³ (8 hour TWA)
  - (one half current PEL equivalent)

- Action Level
  - 25 µg/m³ (8 hour TWA)
(d) Exposure Assessment

- **Scheduled Monitoring Option**
  - Initial monitoring for each job, each shift, each work activity
    - May use representative sampling (highest expected exposure)
    - If <action level – no further monitoring needed
    - ≥action level ≤PEL – repeat every 6 months
    - >PEL – repeat every 3 months
    - Can discontinue if 2 consecutive samples <action level

- **Performance Option**
  - Combination of air monitoring or objective data sufficient to characterize exposure
Exposure Assessment Strategy

- Every employee needs to be accounted for, whether sampled or not
  - Define similar exposure groups
  - Keep track of job assignment
  - Keep data organized
- Performance option
  - Exposure mapping
  - Real time instruments
    - Help identify sources
    - need % quartz
- Learn to sample
Silica Measurement

• Respirable dust only
  • 4 micron cut point vs old 3.5 cut point
  • Current instruments already meet the criteria!!

• Air flow rate is critical to collection

• Requires more than 4 hours to collect enough quartz to analyze

• Exposure vs. source sampling
(d) Exposure Assessment (cont’d)

• **Reassessment of exposures**
  - When changes are likely to increase exposures
• **Methods of analysis**
  - Must use laboratory that uses procedures in Appendix A
• **Employee notification**
  - Notify each employee or post within 15 days
  - Describe corrective action if >PEL
• **Observation of monitoring**
  - Provide opportunity for employees or representative to observe monitoring
(e) Regulated Areas

- Where exposures exceed the PEL
- Demarcate and post
- Limit access
- Respirators are required when in a regulated area

- Why not make everything a regulated area?
  - No eating or drinking
  - 100% respirator usage
Regulated Areas Strategy

• The employer shall establish a regulated area wherever an employee’s exposure to airborne concentrations of respirable crystalline silica is, or can reasonably be expected to be, in excess of the PEL.

• **Option A**: Make everything a regulated area
  • Need to provide non-regulated areas where respirators can be removed (food, water, etc.)
  • Limit traffic in and out

• **Option B**: limit regulated area
  • Note: PEL is 8 hour TWA
  • E.g. Work station is regulated, but aisle is not
  • May be high concentration but no one works there

• **Option C**: conditional regulated area
  • During specified activities
(f) Methods of Compliance

- **Must use engineering and work practice controls**
  - Unless employer can demonstrate controls are not feasible
- **When feasible controls are not sufficient**
  - Use them anyway to reduce exposures
  - Supplement with respirators
- **Written exposure control plan (even if < PEL)**
  - Describe tasks, controls, housekeeping measures
  - Review and update at least annually
  - Make available
Engineering Controls Strategy

- **Smart ventilation**
  - Know and understand the dust source
    - Process, activity, background
    - Make sure you address the real problem
  - Pay attention to mass balance of air
    - Supply is as important as exhaust
    - Where does air (and dust) move
  - You can’t fight physics
    - 100 FPM hood capture velocity will not capture 16000 FPM particle
    - Thermal currents are important
  - Focus on the little particles (HEPA filters)
(g) Respiratory Protection

- **Provide when**
  - >PEL while installing controls
  - >PEL during maintenance or tasks where control is not feasible
  - Where all feasible controls are not sufficient
  - In regulated areas

- **Requires respiratory protection program**
  - 1910.134
Respirator Program

• Existing standard (29 CFR 1910.134)
  • Written program
  • Selection:
    • NIOSH approved;
    • Assigned protection factor (APF)
  • Medical evaluation
    • PLHCP
    • using questionnaire
    • Prior to use
  • Fit testing
    • Qualitative testing is OK for APF<100 (xPEL)
    • No facial hair in way of seal for tight fitting respirator
  • Maintenance
  • Training annually
  • Recordkeeping (medical, fit testing)
(h) Housekeeping

• **No dry sweeping or brushing**
  • Where activity could contribute to exposure
    • Any exposure, not just >PEL
  • Unless wet sweeping, HEPA vacuuming are not feasible

• **Prohibit compressed air**
  • To clean clothing or surfaces
  • Unless used with a ventilation system
  • Or unless no alternative is feasible

• **Burden is on employer to demonstrate infeasibility**
(i) Medical Surveillance

• Make available for those >25 µg/m³ for 30 days/yr
• Initial exam within 30 days of hire
  • History focusing on respiratory exposure/symptoms
  • Physical exam,
  • Chest x-ray
  • Pulmonary function test
  • TB test
• Periodic exam
  • Every 3 years (except TB test)
(i) Medical Surveillance (cont’d)

- Information to PLHCP (physician/licensed health care provider)
  - Copy of standard
  - Employee duties
  - Exposure levels
  - Personal protective equipment use and history
  - Records from prior tests under employer control

- PLHCP shall provide
  - Written medical report for employee
  - Written medical opinion for employer

- Additional exam by specialist if recommended by PLHCP
Medical Surveillance Strategy

- **PLHCP**
  - Physician or other licensed health care provider
- **Mobile services are an option**
  - Initial testing within 30 days may require local provider
- **Specialist examination**
  - Within 30 days of recommendation by PLHCP
- **Lots of Information**
  - Exposures, duties, PPE, prior results
  - Will require great organization
(j) Communication

• Containers must be labeled
  • Labels and data sheets must include cancer, lung effects, immune system effects, and kidney effects

• Signs at entrances to regulated areas

DANGER
RESPIRABLE CRYSTALLINE SILICA
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
WEAR RESPIRATORY PROTECTION IN THIS AREA
AUTHORIZED PERSONNEL ONLY
(j) Communication (cont’d)

• Employer shall ensure that each covered employee can demonstrate knowledge and understanding of:
  • Health hazards of silica
  • Specific tasks that could result in exposure
  • Control measures the employer has implemented, including engineering controls, work practices and respirators
  • Contents of the OSHA standard
  • Purpose and description of medical surveillance program
(k) Recordkeeping

- **Air monitoring data**
  - Date, task and analytical method
  - Number, duration and results
  - Analytical laboratory
  - Personal protective equipment
  - Name, SSN, and job classification of all employees represented by sampling

- **Objective data**

- **Medical surveillance data**
  - Name, SSN, PLHCP opinion
  - Information provided to PLHCP
(I) Dates

• **Effective June 23, 2016**

• **All obligations commence June 23, 2018**

• **Medical surveillance**
  • >PEL (30 days or more) – June 23, 2018
  • >AL (30 days or more) – June 23, 2020
What the Silica Rule Means for Foundries:

Key Challenges

What if you cannot meet the standard?
Key Issue: Feasibility

- One gram of respirable silica sand (equivalent to artificial sweetener packet) would generate exposure level above the new PEL in a space the size of a football field 13 feet high.
What does compliance with the PEL mean?

With a mean exposure level at the PEL, half of exposures will exceed the PEL.
Control Target for Compliance Is Far Below PEL

Compliance Control Target

OSHA PEL

Sample distribution

Exposure Levels

Compliance requires mean exposure level of 20 µg/m³ to achieve 84% confidence of compliance with a PEL of 50µg/m³. (10 µg/m³ to achieve 95% confidence)
Clean Room Technology Needed to Meet OSHA PEL

<table>
<thead>
<tr>
<th>ISO 14644-1 Cleanroom Standards</th>
<th>maximum particles/m³</th>
<th>Silica Mass µg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>&gt;=0.1 µm</td>
<td>&gt;=0.2 µm</td>
</tr>
<tr>
<td>ISO 1</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>ISO 2</td>
<td>100</td>
<td>24</td>
</tr>
<tr>
<td>ISO 3</td>
<td>1,000</td>
<td>237</td>
</tr>
<tr>
<td>ISO 4</td>
<td>10,000</td>
<td>2,370</td>
</tr>
<tr>
<td>ISO 5</td>
<td>100,000</td>
<td>23,700</td>
</tr>
<tr>
<td>ISO 6</td>
<td>1,000,000</td>
<td>237,000</td>
</tr>
<tr>
<td>ISO 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISO 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISO 9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- ISO 9 clean room exceeds Proposed PEL if dust is 100% Silica
- Meeting compliance target for 20% silica dust may require clean room
- Proposed PEL requires fundamental operational and design changes.
Designs that do not collect dust
Why Size Matters - Settling Rate for Silica Particles in Still Air

<table>
<thead>
<tr>
<th>Diameter of Particle (microns)</th>
<th>Time to Fall 1 Foot (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0.02</td>
</tr>
<tr>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>2</td>
<td>14.5</td>
</tr>
<tr>
<td>1</td>
<td>54</td>
</tr>
<tr>
<td>0.5</td>
<td>187</td>
</tr>
<tr>
<td>0.25</td>
<td>590</td>
</tr>
</tbody>
</table>

Dust from compressed air gun may stay suspended for days.
No More Compressed Air for Cleaning
Future of Housekeeping:
HEPA Vacuum
What To Do If You Cannot Comply

• Use engineering and work practice controls “unless the employer can demonstrate that such controls are not feasible”

• Where feasible controls are not sufficient use them to reduce exposures to lowest feasible level and supplement with respirators

• Be proactive
  • You need to decide what is feasible
  • Do not wait for OSHA to make suggestions
    • It is not their job
    • They may cost a lot of money and may not work
Foundries Must Control Feasibility

- **Determine what is feasible**
  - Effective at reducing silica levels
  - Does not interfere with producing quality product
  - Useable/ Acceptable to employees
  - (Affordable)

- **Take control of the process**
  - Determine root causes
  - Document analysis and decisions
  - Use industry publications
  - Be prepared to defend position
Why AFS decided to challenge the rule
Key Regulatory Issues – What OSHA Needs to Show

- **Health risk**
  - new standard needed and
  - standard will lower risk

- **Technological feasibility**
  - control is possible

- **Economic feasibility**
  - business impact will be acceptable

- Based on evidence in the record
### Annualized foundry industry costs for reduction of PEL from 100 to 50 µg/m³

<table>
<thead>
<tr>
<th></th>
<th>OSHA Proposal</th>
<th>URS/Environomics*</th>
<th>OSHA Final</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual Cost (incremental)</strong></td>
<td>$41 million</td>
<td>$2,188 million</td>
<td>$47 million</td>
</tr>
<tr>
<td><strong>Annual Cost as percent of revenue</strong></td>
<td>0.15%</td>
<td>9.9%</td>
<td>0.19%</td>
</tr>
<tr>
<td><strong>Annual Cost as percent of profit</strong></td>
<td>3.7%</td>
<td>276%</td>
<td>4.4%</td>
</tr>
</tbody>
</table>

Actual costs are **50 times** higher than OSHA estimates. OSHA’s annual cost estimate is $32,000 per establishment.

* URS report in OSHA 2010-003402307
## Unit cost assumptions - a few examples

<table>
<thead>
<tr>
<th></th>
<th>PEA (prelim.)</th>
<th>AFS</th>
<th>FEA (final)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HEPA vacuum</strong></td>
<td>15 gal @ $3,495</td>
<td>2 Cu. Yd. unit @ $45,000</td>
<td>15 gal@ $3,633</td>
</tr>
<tr>
<td><strong>Abrasive blasting</strong></td>
<td>$8000 glove box</td>
<td>&gt;$100,000</td>
<td>$8000 glove box</td>
</tr>
<tr>
<td><strong>Ventilation CFM</strong></td>
<td>$5.33/CFM</td>
<td>$25/CFM (EPA @ $5-55/CFM)</td>
<td>$12.83/CFM</td>
</tr>
<tr>
<td><strong>Thorough cleaning</strong></td>
<td>Not included</td>
<td>$1 per sq. ft.</td>
<td>$0.15 per sq. ft.</td>
</tr>
<tr>
<td><strong>Downtime to clean</strong></td>
<td>none</td>
<td>1 extra week/yr.</td>
<td>None extra</td>
</tr>
<tr>
<td><strong>Respirator use</strong></td>
<td>10%</td>
<td>60%</td>
<td>10% (4 users in a foundry with 20-500 workers)</td>
</tr>
</tbody>
</table>
Typical Unit Cost Example

- Cleaning/finishing operator – hand grinding bench
  - 3’x5’
  - 3750 CFM
  - $19,996 annualized cost in proposal

- AFS comments
  - Many operations use larger stations with more air
  - Cost per CFM is understated

- Final economic analysis
  - 3’x5’; 3750 CFM
  - $19,735 annualized cost
Technological Feasibility Errors

- **Variability**
  - Control target needs to be average of 10µg/m³ to assure compliance
  - OSHA response is that variability is due to poor control. Mean is good measure of compliance.

- **Case study analysis**
  - Isolated samples used to show feasibility
  - OSHA position – exposures simply due to:
    - Other operations that need to be controlled
    - Poor work practices
    - Poor control
    - Lack of automation or enclosure
Disappointing OSHA Response

• AFS provided hundreds of pages of data and comments
• OSHA failed to address most of it
• OSHA answered facts and evidence with opinion and assumption.
AFS Silica Litigation

• April 4, 2016 – American Foundry Society and National Association of Manufacturers* (*through our Texas state affiliates) filed a challenge to OSHA’s final silica rule in the U.S. Court of Appeals - 5th Circuit

• First step in the litigation process
  • Petitions for Judicial Review of OSHA standards can be filed w/in 60 days following publication of rule in Federal Register
  • Significant advantages to filing petitions w/in 10 days since it determines judicial venue that hears challenge
  • Additional petitions challenging the rule filed in various courts of Appeals, included organized labor, U.S. Chamber of Commerce, Construction Consortium, & National Stone, Sand and Gravel Association
  • Judicial Panel on Multidistrict Litigation will randomly select circuit court (lottery type process) to centralize all the challenges into a single circuit court from those petitions filed w/in the 10-day period
  • Impacted stakeholder groups, not filing yet, still have until May 24, 2016 to file petition
What is the Goal?

• **Overturn the standard**
  • Technological and economic infeasibility
  • Standard goes back to OSHA to fix

• **Negotiate a settlement**
  • Special rule for foundries?
  • Increased allowance of respirators?
  • 30 day rule for respirators
  • More favorable requirements on regulated areas

• **No matter what happens:**
  • Monitoring, medical surveillance, training, records, respirators and vacuuming are in your future
Timing of Litigation

• After the circuit is selected, the court will set a briefing schedule

• Initial briefs from AFS/NAM would need to be filed within 45 days of the order

• DOL will have an opportunity to file a response brief - 30 days after filing of the opening briefs

• AFS/NAM would have opportunity after that to file a reply brief to respond to DOL’s brief

• Once the briefing is complete, the court will set oral argument, which would likely be about 60 days from the completion of the briefing
Final Thoughts

• You have 2 years to get ready

• Do not wait to get started
  • Many requirements will not be affected by lawsuit
  • Find out where you are
  • Be proactive on feasibility

• CastExpo – Overview of Silica Rulemaking on Monday, April 18 @ 12:30 (Room 102EF)

• AFS Government Affairs Conference – Overview of Silica Litigation from Outside Attorney – May 18
Questions?
For additional information, please contact:

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