



OSHA's Silica Rule

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April 12, 2016

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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

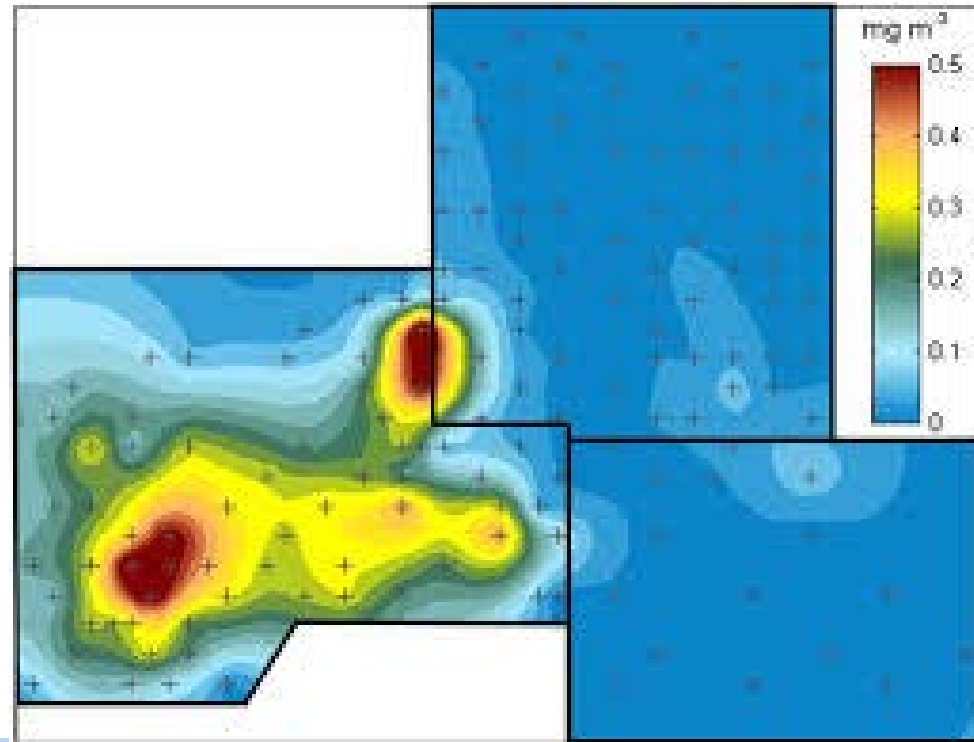
- (c) Permissible Exposure Level (PEL)
 - 50 $\mu\text{g}/\text{m}^3$ (8 hour TWA)
 - (one half current PEL equivalent)
- Action Level
 - 25 $\mu\text{g}/\text{m}^3$ (8 hour TWA)

(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
 - \geq action level \leq 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 $>25 \mu\text{g}/\text{m}^3$ 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

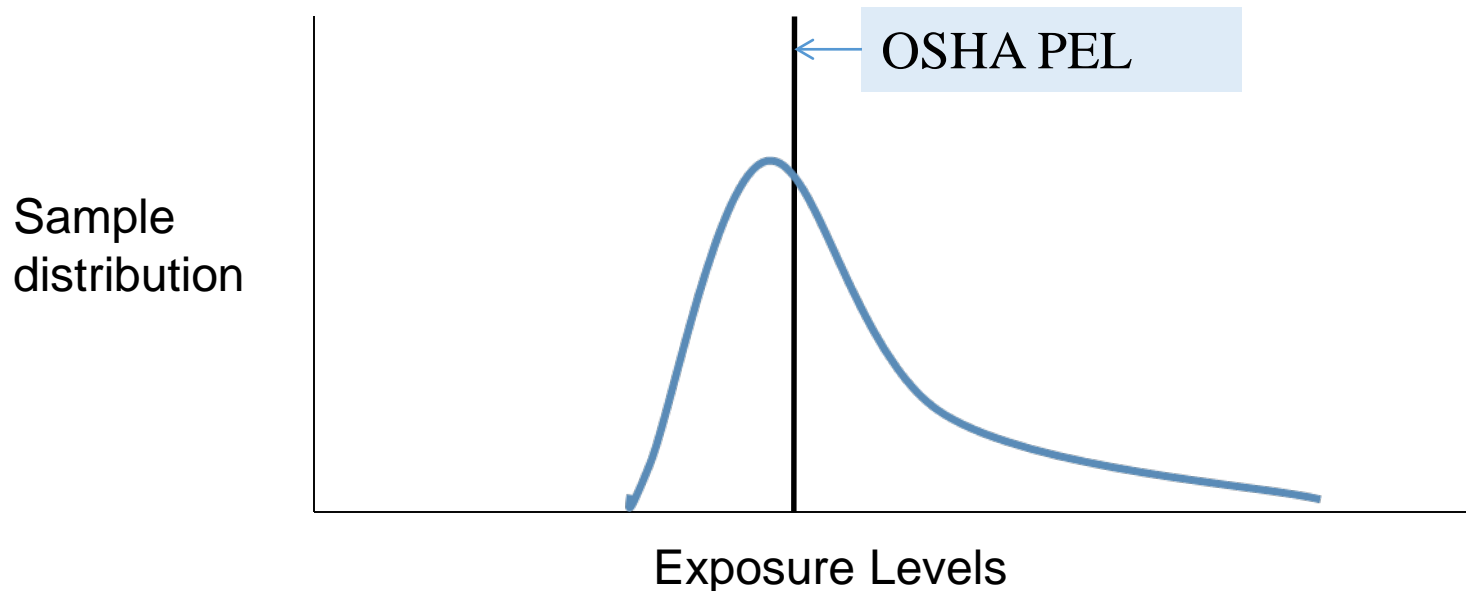
- One gram of respirable silica sand (equivalent to artificial sweetener packet) would generate exposure level above the new PEL in a space the size of a football field 13 feet high



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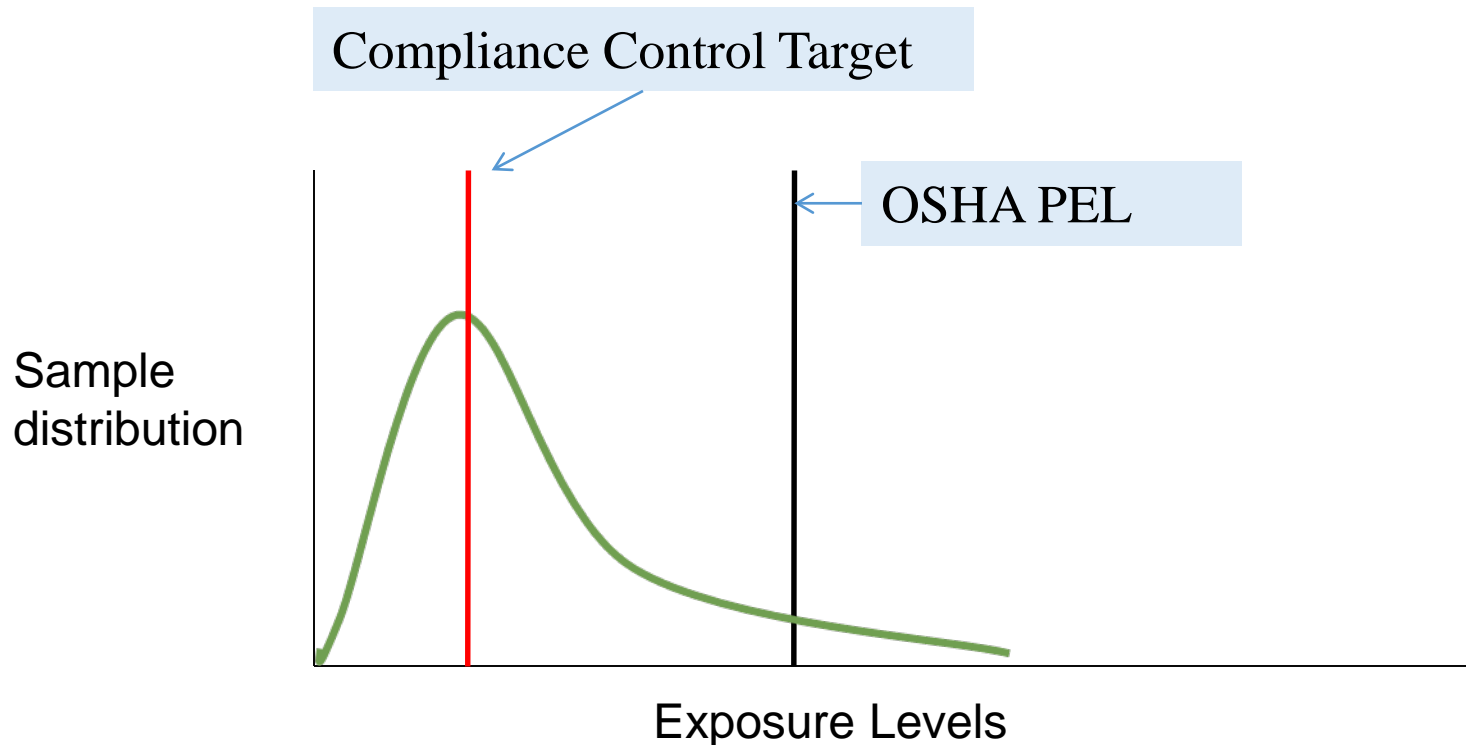


What does compliance with the PEL mean



With a mean exposure level at the PEL, half of exposures will exceed the PEL.

Control Target for Compliance Is Far Below PEL



Compliance requires mean exposure level of $20 \mu\text{g}/\text{m}^3$ to achieve 84% confidence of compliance with a PEL of $50\mu\text{g}/\text{m}^3$. ($10 \mu\text{g}/\text{m}^3$ to achieve 95% confidence)

Clean Room Technology Needed to Meet OSHA PEL

ISO 14644-1 Cleanroom Standards

Class	maximum particles/m ³						Silica Mass
	>=0.1 µm	>=0.2 µm	>=0.3 µm	>=0.5 µm	>=1 µm	>=5 µm	µg/m ³
ISO 1	10	2					
ISO 2	100	24	10	4			
ISO 3	1,000	237	102	35	8		
ISO 4	10,000	2,370	1,020	352	83		
ISO 5	100,000	23,700	10,200	3,520	832	29	
ISO 6	1,000,000	237,000	102,000	35,200	8,320	293	0.07
ISO 7				352,000	83,200	2,930	0.66
ISO 8				3,520,000	832,000	29,300	6.63
ISO 9				35,200,000	8,320,000	293,000	66.29

- 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

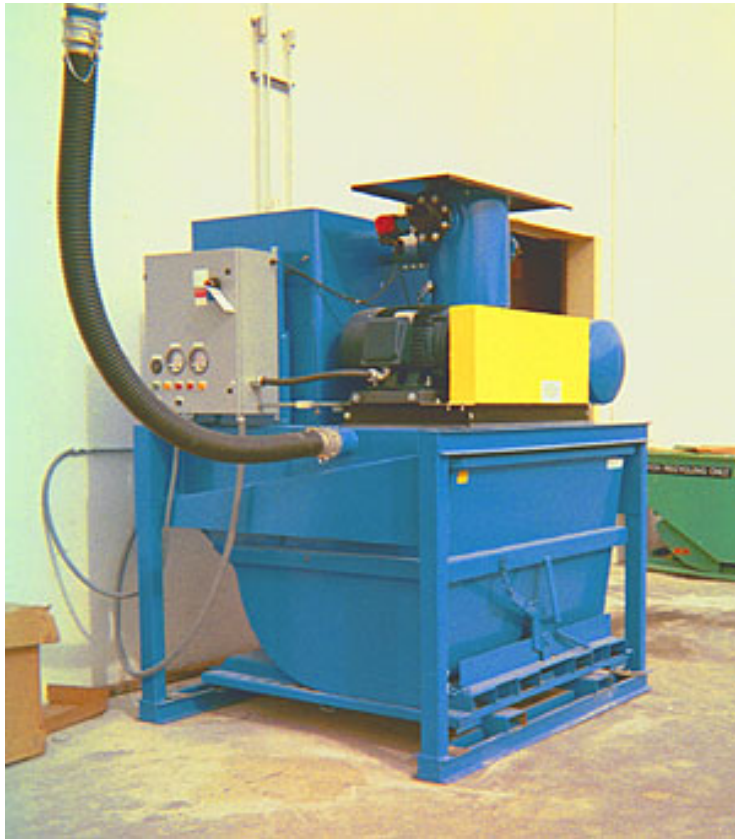
Diameter of Particle (microns)	Time to Fall 1 Foot (min)
100	0.02
5	2.5
2	14.5
1	54
0.5	187
0.25	590

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 $\mu\text{g}/\text{m}^3$

	OSHA Proposal	URS/ Environomics*	OSHA Final
Annual Cost (incremental)	\$41 million	\$2,188 million	\$47 million
Annual Cost as percent of revenue	0.15%	9.9%	0.19%
Annual Cost as percent of profit	3.7%	276%	4.4%

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

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

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 $10\mu\text{g}/\text{m}^3$ 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**



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