

OSHA Silica Standard

“One Year Later”

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OSHA Silica Standard

What is Silica...

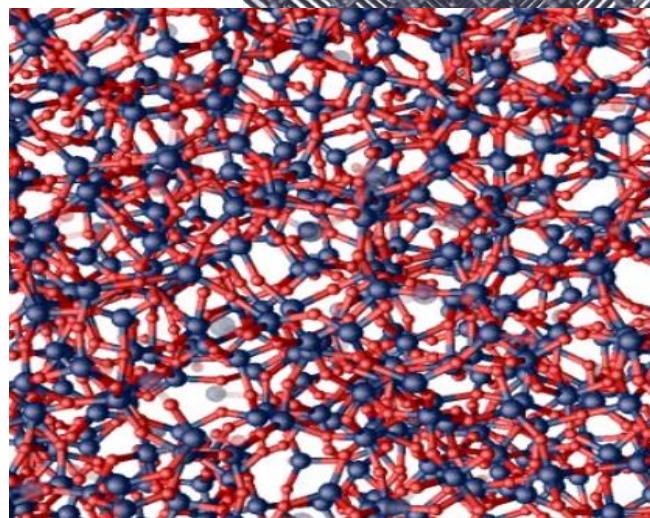
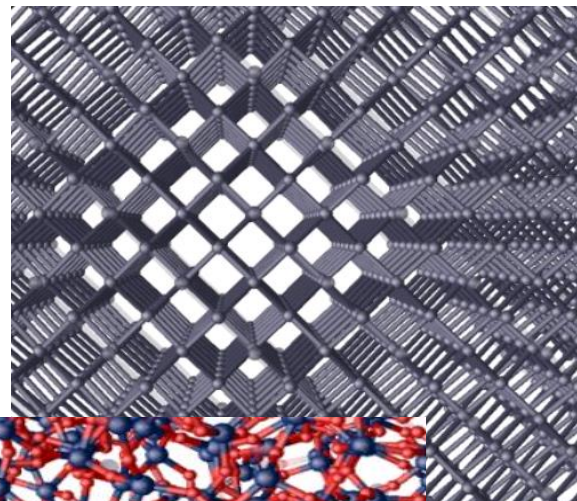
What are the exposure limits...

Why was the rule issued and how much will it cost...

Is the rule here to stay...

Crystalline vs Amorphous Silica?

- ❑ Chemical compound is silicon dioxide (SiO_2)
- ❑ Makes up majority of the planet's crust
- ❑ 3 mineralogical forms
 - ❑ Quartz – most common
 - ❑ Cristobalite
 - ❑ Tridymite
- ❑ Crystalline silica is significantly more hazardous than amorphous
- ❑ Classified as Group One Human Carcinogen by IARC in 1997 (also by NTP) – warning must be included on SDS of silica containing products

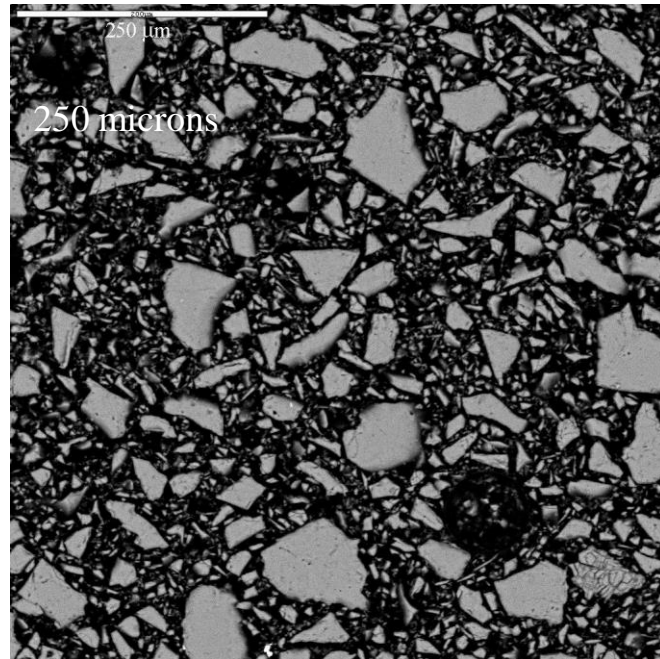


Sand vs. Respirable Silica (Quartz)

Sand



Respirable Silica (Quartz)



Respirable silica is 100 times smaller than ordinary sand on a beach



Where do we find silica?

- ❑ Crystalline silica is present as an ingredient in the following:
 - brick; block (50 – 60% with block up to 90%)
 - concrete and mortar (25 – 70%)
 - slate (20 – 40%, but can be up to 80%)
 - dimensional stone (granite, sandstone) (70 – 90%)
 - engineered stone products (countertops etc.) (70 – 90%)
 - stone aggregate (60 – 95%)
 - tile (30 – 45%)
 - asphalt filler (<5%)
 - roofing granules (50 – 75%)
 - plastic composites (varies)
 - soils (varies)
 - wallboard joint compounds, paint, plaster, caulking and putty (<5%)

Must Comply with Respirable Silica “Permissible Exposure Limits” (PEL)

- ❑ OSHA Construction Job Sites

- ❑ Current (from 1971)

- 250 $\mu\text{g}/\text{m}^3$

- September 23, 2017

- 50 $\mu\text{g}/\text{m}^3$ (80% ↓)

- ❑ OSHA General Industry (Mfg) and Maritime

- ❑ Current (from 1971)

- 100 $\mu\text{g}/\text{m}^3$

- June 23, 2018

- 50 $\mu\text{g}/\text{m}^3$ (50%↓)

- ❑ If less than the 25 $\mu\text{g}/\text{m}^3$ Action Level (AL), then rule does not apply

What is the OSHA Permissible Exposure Limit (PEL) for Respirable Crystalline Silica (RCS)?

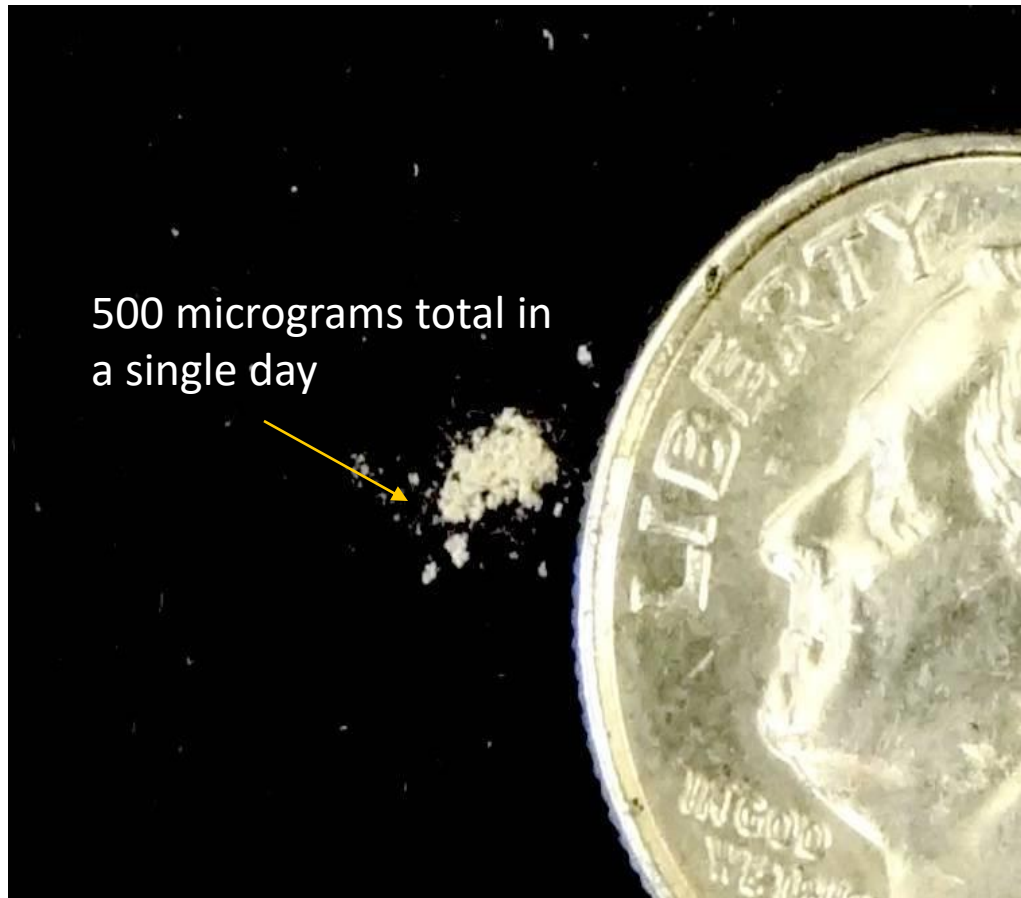


Photo: Geoff Plumlee, USGS

OSHA Permissible Exposure Limit (PEL) = 0.05 mg/m³ TWA

Calculated as an 8-hour Time Weighted Average

0.05 mg/m³ = 50 micrograms (μg)/m³

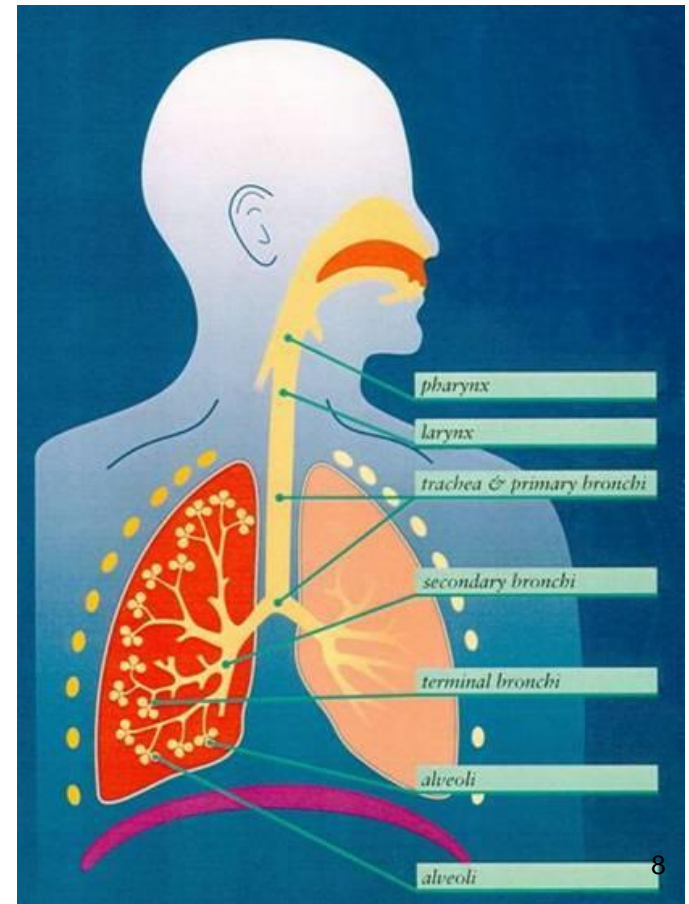
1 m³ of air = 1,000 liters

Normal breathing rate (moderate work, 1 work day) = 10 m³ (10,000 liters of air)

50 micrograms x 10 m³ = 500 μg

How Are Workers Exposed and Signs and Symptoms

- ❑ Respirable dust means the particle is small enough to penetrate the respiratory system (can't be expelled)
- ❑ Inhaled when cutting, sawing, grinding, drilling, and crushing the materials
- ❑ Also present during extraction, processing, transfer for storage and transit
- ❑ "Silicosis" is caused by breathing of dust containing silica
- ❑ The dust causes "fibrosis" or scar tissue formation in the lungs
- ❑ This reduces the lung's ability to extract oxygen from the air
- ❑ Silicosis - Shortness of breath and cough
- ❑ Other Symptoms - Fever, loss of appetite, and fatigue may indicate other diseases associated with silica exposure

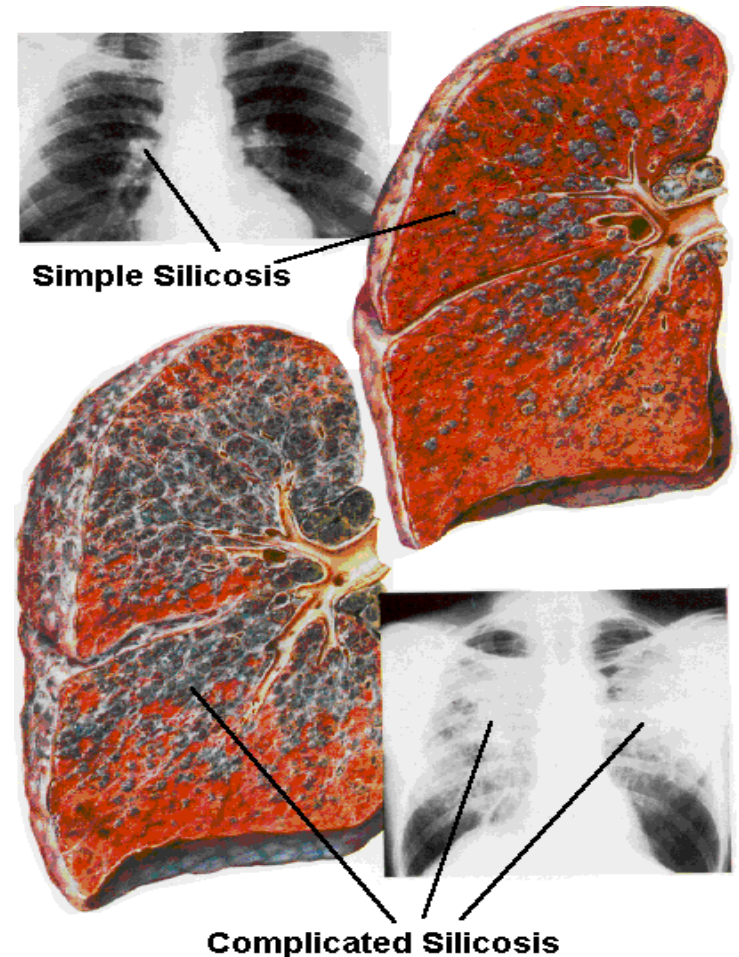


INDUSTRIES AFFECTED:

Mining; Pavement Milling; Construction; Industrial Sand; Oil & Gas Extraction; Agriculture; Stone Polishing

- The potential risk of health effects related to the exposure to respirable crystalline silica have been known for centuries.
- Recognized consequences associated with prolonged overexposure:

- **Silicosis**
- **Lung cancer**
- **COPD airways diseases**
- **Pulmonary tuberculosis**
- **Autoimmune disorders**
- **Chronic renal disease (NOT)**
- **Other health issues**





Health Hazards of Exposure to RCS

Understand the health hazards associated with exposure to respirable crystalline silica, including routes of exposure, sign/symptoms of exposure, and diseases associated with silica.

- Cancer
- Silicosis – chronic (15 to 20 yrs), accelerated (5 to 10 yrs) and acute (months to 2 yrs)
- Chronic obstructive pulmonary disease (COPD) – chronic bronchitis
- Auto-immune disease – lupus; rheumatoid arthritis
- Kidney disease (US Circuit Court did not decide it was a health risk)



OSHA Litigation Outcome: Rule Upheld

- ❑ Industry challenged rule on 5 grounds: Court ruled OSHA did provide “substantial evidence” that the rule:
 - 1) would reduce a “significant risk of material impairment of harm”, but not renal – did not need to decide this specific issue
 - 2) is technology feasible for the foundry, hydraulic fracturing and construction industries
 - 3) is economically feasible for the foundry, hydraulic fracturing and construction industries
 - 4) can prohibit housekeeping methods that cause silica exposure, such as dry sweeping or using compressed air
 - 5) Claimed rule violated APA through inadequate time for comment on data in the record
- ❑ Court panel (M. Garland) rejected all, and remanded rule, at Union’s request for consideration of “medical removal” provision



Enforcement Guidance

- ❑ Draft enforcement guidance 9/27/16 was 100+ pages long (no longer on website).
- ❑ Revised Interim guidance issued 10/19/17 is under 10 pages.
- ❑ Regional/Local Emphasis Program inspection guidance published in 10/16 – still in effect.
- ❑ Local Emphasis Program, Region V (eff. 10/16)
- ❑ Denver Regional Emphasis for Stone Cutting (effective 10/16).



Revised Interim guidance issued 10/19/17

□ Housekeeping:

- Using sweeping compounds (e.g. non-grit, oil or wax-based) is an acceptable dust suppression housekeeping method.

□ Operator Rotation:

- Note: The respirable crystalline silica standards do not prohibit employers from rotating employees to different jobs to achieve compliance with the PEL.



OSHA's Economic Analysis?

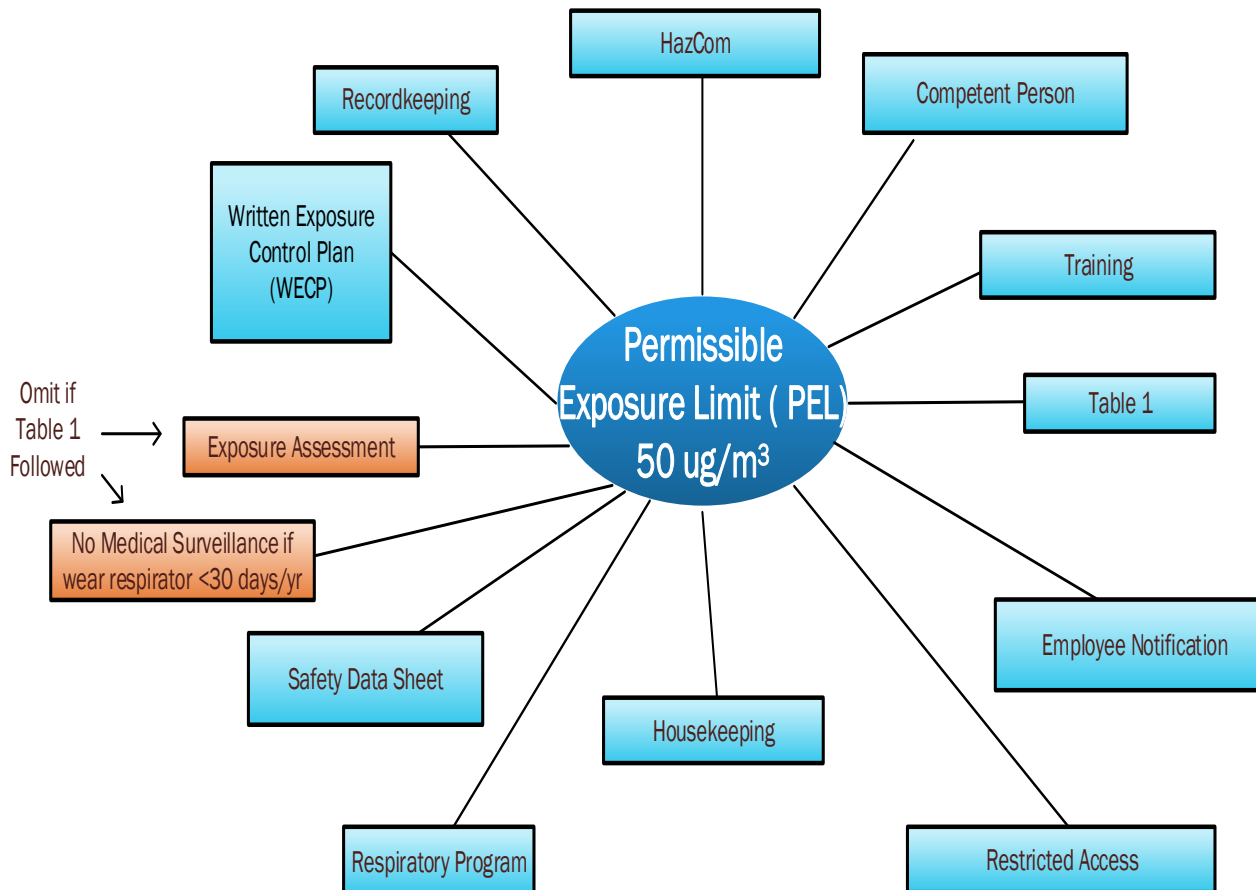
- ❑ Total Annualized Costs: \$1.030 billion including:
 - Engineering controls: \$664.5MM
 - Respirators: \$32.9MM
 - Medical surveillance: \$96.4MM
 - Familiarization & Training: \$95.9MM
 - Regulated Area: \$2.6MM
 - Written Exposure Control Plan: \$44.3MM
- ❑ Annualized Benefits Monetized: \$8.687 billion
 - Costs of prevented fatal lung cancers, silicosis and other respiratory diseases
- ❑ Net benefits: \$7.657 billion



Approach to Managing Exposure to Silica

Employers must use a multi-faceted approach to managing Silica....

Construction - Prepare Plans and Programs



It is not my Dust!

- Because, what you don't want to happen is to recreate the Tammany Hall ring of “employers” pointing their fingers at the next employer and not willing to take any claim of responsibility for dust over exposure.



Construction Job Site: *Who is Responsible for this Dust?*





Responsibilities Managing Silica Dust at a Multi-Employer Construction Job Site

- ❑ Project Constructor/General Contractor/Controlling Entity
 - Written Exposure Control Plan-Address surface and windblown dust on Job Site
 - Assign Competent Person - Coordinate job site activities to minimize the silica exposure to all Subcontractors' employees and identify and enforce restricted areas provision
 - Conduct air sampling to ensure overexposures are not occurring due to common area dust
- ❑ Subcontractor/Employer
 - Written Exposure Control Plan-Define Job Tasks / Control Methods to ensure PEL is not exceeded
 - Manage Dust by Engineering Controls then Work Practice Controls then Respiratory Protection
 - Assign Competent Person(s); Coordinate with the Project Constructor; Train your employees
- ❑ Job Site Supervisor
 - Ensure implementation of the Written Exposure Control Plan on the Job Site
 - Ensure engineering controls are implemented and that employees are trained in their use
- ❑ Employee
 - Read, understand and demonstrate knowledge and understanding of WECP
 - Use the engineering controls, follow work practices, use respirators when required, and report issues



Silica Exposure Control Program - Culture

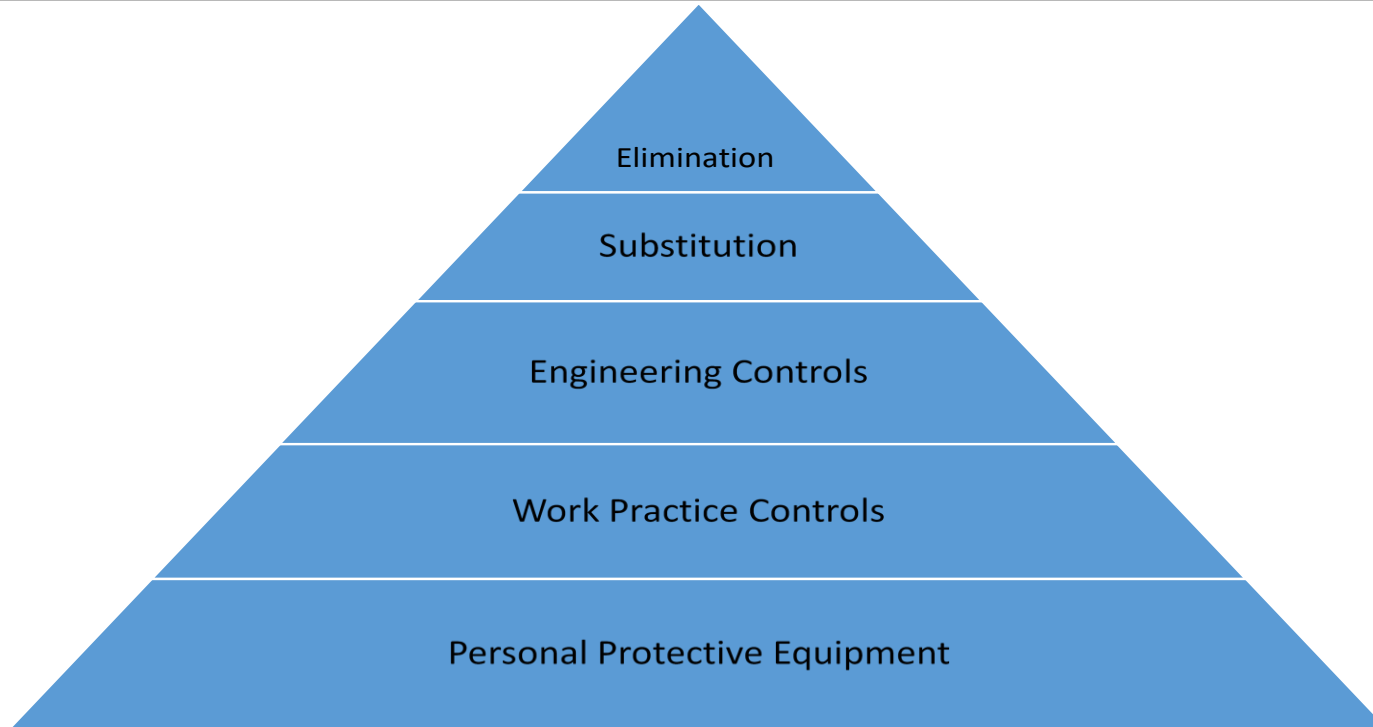
□ **ABC COMPANY - SILICA EXPOSURE CONTROL PROGRAM**

□ **1.0 INTRODUCTION AND PURPOSE**

It is the policy of ABC Company (“ABC”) to take precautions to eliminate potential hazards in the workplace. This Silica Exposure Control Program (“Program”) applies to ABC personnel who are potentially exposed to Respirable Crystalline Silica (“RCS”) because of their work activities or proximity to the work activities where RCS may be generated.....

(review template provided)

Hierarchy of Controls



What Tools does an Employer have to Address Silica?

- ❑ Local Exhaust Ventilation – Negative Pressure and Blowing Ventilation
 - Tools, hoods, venturi fans
- ❑ Water, water, and more water
 - (Integrated – no water hoses or bottles/nail in the pail)
- ❑ Enclosure – HEPA intake filter and HVAC (windows and doors must remain closed)
- ❑ Barrier – physical barrier or distance

Construction - Silica

Competent Person

29 CFR 1926.1153(b) an individual who is capable of identifying existing and foreseeable respirable crystalline silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them. **The competent person must have the knowledge and ability necessary to fulfill the responsibilities set forth in paragraph (g) of this section.**

- 1926.1153(g) – Written Exposure Control Plan



Competent Person's Knowledge Universe

- Silica Construction: 29 CFR 1926.1153(g)(4) states:
 - “The employer shall designate a competent person to make frequent and regular inspections of the job sites, materials, and equipment to implement the written exposure control plan.”
- Based on the preamble to 29 CFR 1926.1153, and the competent person requirements in other construction safety standards, the competent person must be knowledgeable about the following at a minimum in order to ensure that the site-specific exposure control plan is fully implemented.

Competent Person WECP – Responsibilities Onsite

- ❑ Must **continuously** be at job site to implement/manage WECP – Use Job Board and post name of Competent Person
- ❑ Know which **equipment/tasks involve exposure** to silica, anticipate necessary controls.
- ❑ Conduct **frequent and regular** inspections of the work site to ensure the WECP is being fully and properly implemented. Cannot visit occasionally, must be at job site.
- ❑ Ensure proper use of **engineering controls and work practices**.
- ❑ For tasks requiring **respiratory protection**, ensure the correct respiratory protection is provided, properly worn and maintained.

Competent Person WECP – Responsibilities

Onsite *continued*...

- ❑ Coordinate activities with other general contractors and other subcontractors to eliminate/reduce silica exposure
- ❑ Ensure correct housekeeping measures are deployed to reduce exposure.
- ❑ Identify Restricted Access Areas and enforce procedures to restrict access to these work areas.
- ❑ Able to identify situations that could result in high exposures.
 - e.g. – equipment failure, repositioning employees
- ❑ Have a copy of and understand OSHA's silica standard, AL and PEL requirements.
- ❑ Understand health hazards of silica & how to reduce exposures.
- ❑ Understand medical surveillance program, if necessary.

Table 1 - What is it.....only applies to Construction

18 19 Equipment & Task-Specific Compliance Solutions

- Engineering & Work Practice Control Methods, and
- Required Respiratory Protection & Minimum Assigned Protection Factor (APF) for shifts < 4 hrs & those > 4 hrs



Table 1 is based on Work Tasks & Equipment

1. Stationary masonry saws
2. Handheld power saws
3. Handheld power saws for cutting fiber-cement board (blade diameter of 8" or less)
4. Walk-behind saws
5. Drivable saws
6. Rig-mounted core saws or drills
7. Handheld and stand-mounted drills
8. Dowel drilling rigs for concrete
9. Vehicle-mounted drilling rigs for rock and concrete
10. Jackhammers and handheld powered chipping tools
11. Handheld grinders for mortar removal (i.e., tuck pointing)
12. Handheld grinders for uses other than mortar removal
13. Walk-behind milling machines and floor grinders
14. Small drivable milling machines
15. Large drivable milling machines
16. Crushing machines
17. Heavy equipment and utility vehicles used during demolition
18. Heavy equipment and utility vehicles for grading & excavating



The 19th Task in Table 1

19. OSHA and Industry noted in their briefs and the Court appears to have adopted their position that the “nineteenth task is performed by ground crews assisting equipment operators.”

Equipment/Task	Engineering & Work Practice Control Methods	Required Respiratory Protection & Minimum APF
(xii) Handheld grinders for uses other than mortar removal	<p>For tasks performed <u>OUTDOORS</u> only:</p> <ul style="list-style-type: none"> Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. <p>OR</p> <ul style="list-style-type: none"> Use grinder equipped with commercially available shroud and dust collection system. Operate maintain tool in accordance with manufacturer's instructions to min. dust emissions Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism. <p>- When used Outdoors</p> <p>- When used Indoors or in an Enclosed Area</p>	<p>Outdoors</p> <p>≤ 4 hours / shift = NONE ≥ 4 hours / shift = NONE</p> <p>≤ 4 hours / shift = NONE ≥ 4 hours / shift = NONE</p> <p>≤ 4 hours / shift = NONE ≥ 4 hours / shift = APF 10</p>

Handheld Grinder – Full Contact

No controls being used on this grinder operating flush on flat surface. Does not comply with Table 1.



Handheld Grinder – Full Contact

Control method for grinder operating on flush surface includes LEV. Complies with Table 1.



Reality on the Work Site-Grinding on the Edge



Engineering Control-Grinding on the Edge – Dust Collection System

Grinding on the edge is not a Table 1 task. LEV is not effective and water may not always be feasible.



Engineering Control-Wet Grinding on the Edge - Center Feed

This is a center fed Flex grinder with GFCI. Observation is that it worked very well – waiting on results. We measured how many feet he grinded that day in order to assess the effectiveness of the tool and the need for respiratory protection. Complies with Table 1, but at a general industry site.



Engineering Control-Wet Grinding on the Edge with Goose Neck

Flex Grinder with water applied thru an adjustable goose neck. Because of the different orientations the grinder is used, it became difficult to adjust the goose neck all the time. Also, the operator would not always turn off the grinder to adjust the goose neck. Discontinued the use of the goose neck.



Grinder vs. Scraping Stone



Grinder vs. Scraping Stone or Rebar

This tool produces less respirable crystalline silica because the energy level produced is far less than grinding. What does the contract specification require?



Grinder vs. Handheld Scraper

This tool produces less respirable crystalline silica because the energy level produced is far less than grinding. What does the contract specification require?



Saw Cutting with Water

Effective use of a wet saw. Improvement made for this task is to place the saw in a cart that is ready made allowing the employee to be farther from the dust, and to be in a better ergonomic position. The RCS personal sample taken on this employee was in compliance with Table 1.





Terms & Definitions of Table 1

- **Integrated vs. Retrofitted** (*related to equipment*)
 - Integrated means controls designed for use in conjunction with the tool. Also, “commercially available” indicates that control was appropriately designed for the tool and will be effective. Can include products that are custom made by aftermarket manufacturers which are intended to fit the make and model of the tool.
 - Example: No more water hoses, water bottles or “nail the pail”
 - Retrofitting equipment with a manufacture’s device does not automatically remove the tool from Table 1 if the retrofit is intended to be used in conjunction with the tool.
 - Example: Adding a water integrated system to a jackhammer



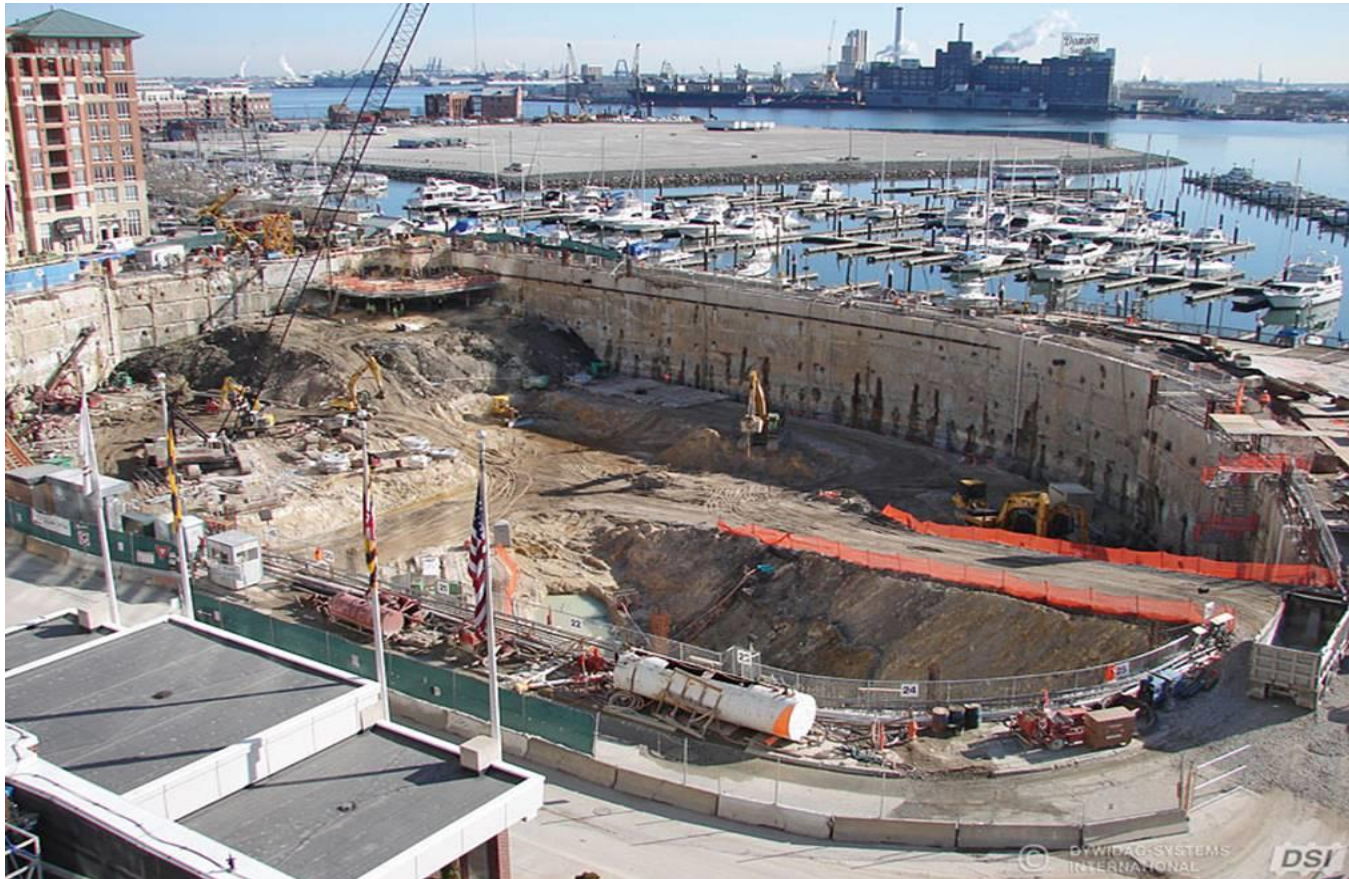
Terms & Definitions of Table 1

□ **Outdoors vs. Indoors or Enclosed Area**

- The term indoors or enclosed areas refers to work locations inside a building. Also, could include work locations surrounded by walls or barriers that restrict air flow and result in accumulation of persistent airborne dust.
- What is indoors? 2 to 4 walls and ceiling; large pool area; large garage open in front and closed on 3 sides.
- When does outdoors become indoors or an enclosed area? When it meets the standard above.

Terms & Definitions of Table 1

Outdoors or Indoors? What must employer do to prove sufficient airflow?





How is an “Hour” Calculated?

Table 1 requires respiratory protection based on an employee’s number of “*hours*” of exposure per work shift

- ☐ Cumulative hours? YES
- ☐ Contiguous hours? NO

Example 1: During 1 work day, an employee uses a handheld power saw 6 times for 15-minutes or less at different times of the day and not within the same hour. How should an “hour” be calculated to determine exposure hours?

Answer: 1.5 hours. Add the total hours of use.

Proving Compliance using Table 1

- ❑ Per 1926.1153(c), “fully and properly implement” you cannot be cited by OSHA - (81 FR 16702)
 - Not fully & properly complying with Table 1 removes contractor from Table 1.....Can be cited if > PEL and all feasible controls have not been implemented

Example:

- Contractor uses a hammer drill equipped with a shroud and dust collection system to drill anchors in the ceiling and, at times, there is some dust.
 - ❑ Assume everything is done correct, fully & properly implemented

Question: *Is the Contractor in compliance?*

Answer: *YES, check controls*



Table 1 and Dust is Produced

True or False: *When a contractor uses Table 1 and dust is produced is the contractor in compliance?*

Answer = True

- ❑ OSHA recognizes that small amounts of dust can be expected from equipment that is operated according to manufacturer's recommendations, however a noticeable increase in dust generation during operation of the tool is an indication that the dust controls are not operating correctly – employee and/or competent person should be able to observe this
- ❑ In cases where Respiratory Protection is required, OSHA assumes exposures are above the PEL



Exposure Assessment / Sampling Strategy



Exposure Assessment / Sampling Strategy

Goal: identify equipment/tasks to sample & begin developing a formal exposure assessment strategy.

- Review historical or objective data, if available.
 - Most likely, won't have objective data at this point in the process.
- Factors to consider: time task performed, proximity, relative dustiness, energy creating dust, quantity in use, percent silica, ventilation
- Define equipment/tasks for exposure assessment
- Sample employees with highest exposure in representative sampling – 1153(d)(2)(iii)(A) – OSHA will look for the worst 8 hours of exposure of a task even if the shift is > 8 hours

What Tasks to Sample and How Many Samples?

- ❑ Good Reference is NIOSH's Occupational Exposure Sampling Strategy Manual
- ❑ A walk-through of work areas presents clues:
 - Visible dust in the air
 - Dust settled around equipment
 - Excessive dust on clothing
 - Process equipment emitting visible dust
 - Dust regeneration sources such as vibrating equipment, lift trucks, housekeeping
 - Begin with those believed to be most highly exposed



Achieving Compliance for Work Tasks/Equipment Outside of Table 1 and for General Industry



Exposure Monitoring Must be Performed

- ❑ Exposures must be determined when:
 1. Equipment/Tasks not listed in Table 1 or for General Industry, or
 2. Employer does not fully implement controls and PPE required by Table 1
- ❑ Prove compliance by exposure monitoring:
 1. **Performance** option (*Air Monitoring or Objective Data*), or
 2. **Scheduled Monitoring** option

Goal = verify exposures < PEL-50 $\mu\text{g}/\text{m}^3$ 8-hour TWA 51

Performance Option

aka “Air Monitoring” or “Objective Data”

1926.1153(d)(2)(ii) – The employer shall assess the 8-hour TWA exposure for each employee on the basis of any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures to respirable crystalline silica. Burden is on employer. (81 FR 16763)

1. **“Air Monitoring Data”** is not well-defined, but could include historical data provided tasks are the same. Employer has flexibility.
2. **“Objective Data”** could include industry-wide surveys, NIOSH surveys, OSHA data, use of direct read instruments or other methodologies. Must reflect workplace conditions closely resembling or with a higher exposure potential than the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.



Scheduled Monitoring Option

1926.1153(d)(2)(ii)(A)

- Initial monitoring to assess the 8-hour TWA exposure for each employee on the basis of one or more personal breathing zone samples that reflect the exposure of employees on each shift, for each job classification, in each work area. Sample employees expected to have the highest exposure to silica.
- The employer may rely on existing data to satisfy this initial monitoring requirement. Preamble mentions 12 months look back. (81 FR 16759).

Ongoing Exposure Monitoring Obligations

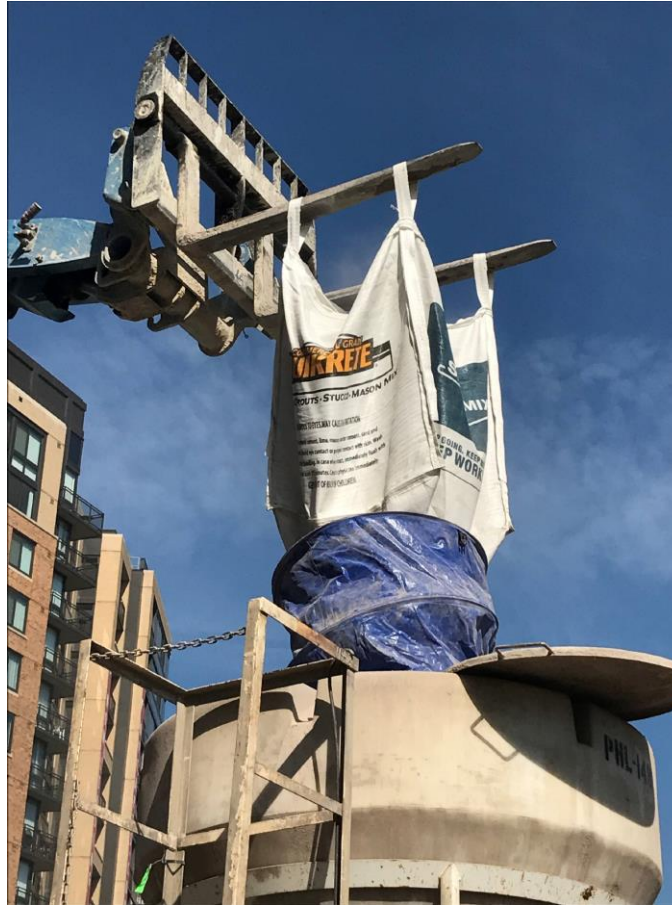
Silica Exposure Monitoring Results	Required Action
< Action Level 25 $\mu\text{g}/\text{m}^3$	No Additional Monitoring
\geq Action Level 25 $\mu\text{g}/\text{m}^3$ but < PEL 50 $\mu\text{g}/\text{m}^3$	Monitor again \leq 6 months
\geq PEL 50 $\mu\text{g}/\text{m}^3$	Monitor again \leq 3 months

- ❑ Next steps are determined by monitoring results
- ❑ Goal is to use all feasible controls to reduce exposure < PEL of 50 $\mu\text{g}/\text{m}^3$, or better yet < AL of 25 $\mu\text{g}/\text{m}^3$

Engineering Control-Collar for Cement Hopper



Engineering Control-Collar for Cement Hopper



Engineering Control-Barrier at Chute

Barrier made of plastic and duct tape and zip ties.



Engineering Control-Barrier Made of Plastic and Duct Tape



Engineering Control-Drum Mixer

Connect LEV
when dumping
bags of cement
into the drum
mixer.



Engineering Control-Water Integrated Jackhammer

Sampling showed that water applied at 500 ml/min was sufficient to maintain levels in compliance with Table 1.



Housekeeping – Cleaning Hand Tools

Is this
acceptable
use of
compressed
air?





What is Objective Data?

- Where do you find it...
- Who has it...
- How much does it cost...

What is “*objective data*”?

- The burden is on the employer to show objective data is valid.
 - Workplace closely resembles or have greater exposures
 - Establish comprehensive data intake form – wind speed and direction, humidity, enclosed area or outdoor, ventilation, duration of task, etc.
 - Collect a statistically adequate number of samples – The number of samples will depend on the precision of the results for any give task.
 - Once sufficient data points are captured, draw conclusions about how the objective data can be used
 - Conclusion – Provided electrician drills <100 anchor holes 5/8” x 2”; immediately overhead; drill not equipped with dust extraction; work done in enclosed area; no ventilation; etc. etc., then exposure will range from x to y $\mu\text{g}/\text{m}^3$.



Sharing Exposure Monitoring Data

- Can contractors or industry associations share exposure monitoring data (“objective data”) with other contractors or their members/clients?
 - YES, provided the data is from workplace conditions that closely resemble or have greater exposure to comparative workplaces.
- What should contractors be aware of when searching for credible, valid monitoring data?
 - The data that they are using has been gathered and properly vetted so that employers can prove to OSHA the data is objective – burden on employer.



Ongoing Exposure Monitoring Obligations

Silica Exposure Monitoring Results	Required Action
< Action Level 25 $\mu\text{g}/\text{m}^3$	No Additional Monitoring
\geq Action Level 25 $\mu\text{g}/\text{m}^3$ but < PEL 50 $\mu\text{g}/\text{m}^3$	Monitor again \leq 6 months
\geq PEL 50 $\mu\text{g}/\text{m}^3$	Monitor again \leq 3 months



“Objective Data” Project – Objective Data Workbook

- ❑ General Information / Project Description
- ❑ Single Monitored Task Performed for 8 hours
- ❑ Multiple Monitored Task Performed for 8 hours
- ❑ Environmental Conditions during Sampling and attached Respiratory Protection
- ❑ Openness of Structure and Mechanical Ventilation
- ❑ Sampling Method and Results and Lab Analysis
- ❑ Employee Notification and affected employees

“Objective Data” Project – Main Data Input Form

PCI Objective Data

General Information:

Employee Information

<small>First Name</small>	<small>Last Name</small>	<small>Social Security Number</small>	<small>Sample Date MM/DD/YYYY</small>	<small>Sample ID</small>
Jim	Doe	555-11-6666	12/13/2017	123658978

Contact Person for Data

<small>First Name</small>	<small>Last Name</small>	<small>Email</small>	<small>Phone</small>
Peter	Rock	rock.p@gmail.com	(757) 603-4571

Project Description:

Company Name	PCI Member #	Project City	Project State
Titan Cement	12598634	Norfolk	<small>Select State</small> Virginia

Project Description	Other Description	Job Classification	Was employee monitored/sampled?
<small>Select Project</small>	<small>Please describe if no match to your process</small>	<small>Please describe</small>	<small>Please select Yes or No</small>
Erector - Parking garage		Supervisor	Yes

- Yellow boxes are requested input box to fill manual
- White boxes are drop down boxes to pick and choose
- Gray boxes are formula boxes, no input boxes
- Project Description offers a drop down of 10 projects covering most of the members works, with direct input available.

“Objective Data” Project – Monitored Task Performed

Task 1 Monitored:

Sample Date MM/DD/YYYY: 12/13/2017 Sample ID: 123658978

General Description of Task <i>Select Task</i>	Detail Description <i>No input</i>	Example of Task <i>No input</i>	Customized Process <i>Please describe if no match to your process</i>
Mixing - Drum Mixer	Task involves mixing grout or patch materials in a mixer drum. The process involves placing the water into the drum and then adding the grout or patch materials from bags or a hopper and then mixing with drum paddles.	Amount of grout or patch materials mixed (in pounds) and size of the drum mixer.	

- The General Description contains 27 different type of projects where sampling will occur. Tasks are contained in a drop down field, if a specific Project Description is not listed, there is an opportunity to define the project that is being sampled.
- Examples of more Specific Descriptions for each task that requires a direct input into the Objective Data Workbook.
- Each sample taken requires a new Objective Data Workbook be completed. However, up to four (4) tasks can be captured during a sampling period.
- Sampling each specific task even if < 8 hours is better objective data purposes.

“Objective Data” Project, Monitored Task Performed Cont’d-

Engineering Controls <i>Select Control</i>	Other Engineering Controls <i>Please describe if no match to your process</i>	Work Practice Control- Example <i>No input</i>	Work Practice Control <i>Please describe</i>
Water integrated		What percent of sampling time did crane operate with cab windows/door closed? What percent of sampling time did truck driver operate with cab windows closed?	
Dust Sampling:			
Start Sampling time <i>Please input Military Time</i>	Finish Sampling time <i>Please input Military Time</i>	Duration Minutes <i>No input</i>	
2300	100	120	
Start Sampling time (second) <i>Please input Military Time</i>	Finish Sampling time (second) <i>Please input Military Time</i>	Duration Minutes <i>No input</i>	
1710	1830	80	

- Examples of engineering controls and work practices that are contained in a drop down field and allow for direct input.
- Start and finish sampling in Military Time, duration will be calculated automatically

“Objective Data” Project, Data output

Cont’d-

SILICA EXPOSURE AIR MONITORING OBJECTIVE DATA RESULTS

Menu

Sample Date/ Sample ID		Employee Company Name	Project City	Project State	Project Description	Job Classification	Tasks Monitored	Specific Description of Sampled Task	Duration of Monitoring for Each Sample (minutes)	Engineering Controls	Engineering Controls - Other	Respiratory Protection - APF
12/13/2017	123658978	Titan Cement	Norfolk	Virginia	Erector - Parking garage	Supervisor	Mixing - Drum Mixer	0	120	Water integrated	0	25

Temperature Range (Start-End)	Humidity (Start-End)	Precipitation (Start-End)	Wind Speed / Gust (Start-End)	Openness of Structure	Mechanical Ventilation	Sample Method / Analytical Method	RCS Exposure based on 8-hour TWA (µg/m3)	Laboratory Performing Analysis and Address				
8	25%	0	8	Outdoors	Fan Blowing Dust Away from Generation Point	Parallel Particle Impactor @ 2.0 L/min	0.326	LAPCORP	436 High Point Ave	Norfolk	31456	Virginia

Exposure Assessment – Table 1 Tool with No Engineering Controls

No Engineering Controls on drill even though drill is included in Table 1.



Exposure Assessment – WECP Negates use of Engineering Controls

Exposure level were well below AL, thus employer will not purchase LEV. Employer can write WECP and not have to use LEV. (drill x holes above waist and x holes below waist).



Exposure Assessment Proves $< AL$, Thus Not Subject to the Standard

Objective data – All samples are under the AL, thus WECP states that employees who sand less than x square feet are below the AL and not covered by the Silica standard.



Written Exposure Control Plan

- Which contractors need to have a WECP?
- Who is responsible for implementing?
- What should be included?
- Where do copies need to be located?



WECP required even if Contractor is only following Table 1

- Have a copy onsite, implemented by Competent Person, readily available to all employees & OSHA
- Description of Equipment/Task involving exposure to respirable crystalline silica (RCS)
 - **Take verbatim from Table 1**
- Description of Engineering Controls, Work Practices and Respiratory Protection
 - **Take verbatim from Table 1**
- Description of Housekeeping Measures
- Description of Procedures used to Restrict Access
 - Restricted access is data-driven based on potential exposure
 - If potential exposure exists, then access should be restricted



WECP and Equipment/Tasks Outside of Table 1

- The WECP contains the same categories of information that are required by Table 1 plus
 - Description of Equipment/Task involving RCS exposure
 - Description of Engineering Controls, Work Practices and Respiratory Protection
 - Description of Housekeeping Measures
 - Description of Procedures used to Restrict Access



WECP – Handheld Grinder

- ❑ **Table 1 Task: Handheld grinders for uses other than mortar removal (dust collection system)**
- ❑ **Control Description:**
- ❑ Use drill equipped with commercially available shroud or cowl with dust collection system.
- ❑ Operate and maintain tool in accordance with manufacturer's instructions to ensure safe operation and minimize dust emissions.
- ❑ Dust collector must provide 25 cubic feet per minute (cfm) or greater airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.
- ❑ **Work Practices:**
- ❑ Examine grinder disk for signs of cracks, de-bonding, or excessive wear. Examine shroud to ensure it is not damaged and positioned correctly.
- ❑ Ensure airflow is adequate, able to be delivered continuously, and that hose does not become kinked.
- ❑ Use switch on vacuum to activate filter cleaning at a frequency recommended by manufacturer.
- ❑ Replace vacuum bag as needed to prevent overfilling.
- ❑ If visible dust increases, check controls and adjust as needed.
- ❑ When used indoors or in an enclosed area, general or exhaust ventilation may be necessary to prevent the accumulation of airborne dust in the work area.



WECP – Handheld Grinder

- ❑ **Respiratory Protection: If Table 1 is properly implemented**
- ❑ Outdoors-None \leq 4 hrs; None $>$ 4 hrs
- ❑ Indoors/Enclosed areas-None \leq 4 hrs; APF 10 $>$ 4 hrs
- ❑ Use respirator for entire time task is being performed.
- ❑ See respiratory protection plan for information on selection, training, fit testing, and use requirements.
- ❑ **Housekeeping:**
- ❑ Do not use compressed air or dry sweeping for removing dust and debris from work surfaces.
- ❑ Use a HEPA-filtered vacuum when cleaning.
- ❑ Dispose of vacuum bags in a sealed container.
- ❑ **Procedures to Restrict Access to Work Areas, if required:**
- ❑ Schedule work so that only employee(s) who is engaged in the task is in the area.
- ❑ Place signs and/or cones at the entrance to the work area to keep persons out of the work area.



How will OSHA prove
silica exposure?



Proving Silica Exposure on Site

- ❑ OSHA will review the employer's WECP.
- ❑ If following Table 1, OSHA will review tasks to ensure compliance with Table 1 and WECP – Will not sample.
- ❑ OSHA recognizes that small amounts of dust can be expected from equipment that is operated according to manufacturer's recommendations, however a noticeable increase in dust generation during operation of the tool is an indication that the dust controls are not operating correctly.
- ❑ If not complying with WECP, then OSHA can issue citation.



Proving Silica Exposure on Site – Cont'd

- ❑ If task not under Table 1, OSHA will conduct personal samples (8-hour TWA) of tasks they believe are exposed to respirable silica.
- ❑ If overexposure, OSHA can either issue a citation or resample depending on the body of evidence the employer is able to show that OSHA's sample was not representative – too high.

What happens when OSHA drives by and sees “Dust”?

- ❑ What should a contractor be prepared for?
 - Have the WECP on the job site (only document required on job site)
 - Have any inspection records of competent person on the job site
 - Have training records for employees working on the job site
 - Have copy of respiratory protection program and fit testing records
 - Have available medical surveillance written opinion (who, when examined per rule, any employee restrictions regarding respirator use)
 - OSHA talking with your employees!!!!



Employee Training

What an OSHA compliance officer may ask your employees...



Employee Training Per 1926.1153(i)1 & 2

- ❑ Employees must be able to “demonstrate knowledge and understanding”
- ❑ Employer’s Written Exposure Control Plan
 - Specific tasks in workplace that could result in exposures
 - Specific measures implemented to reduce/eliminate exposure, including engineering and work practice controls, and any respiratory protection
- ❑ Employees must also be trained on:
 - Contents of OSHA rule
 - Tool/Equipment operation & maintenance in accordance with manufacturer's instructions to minimize dust emissions.
 - Health hazards associated with exposure to RCS
 - If necessary, medical surveillance program elements



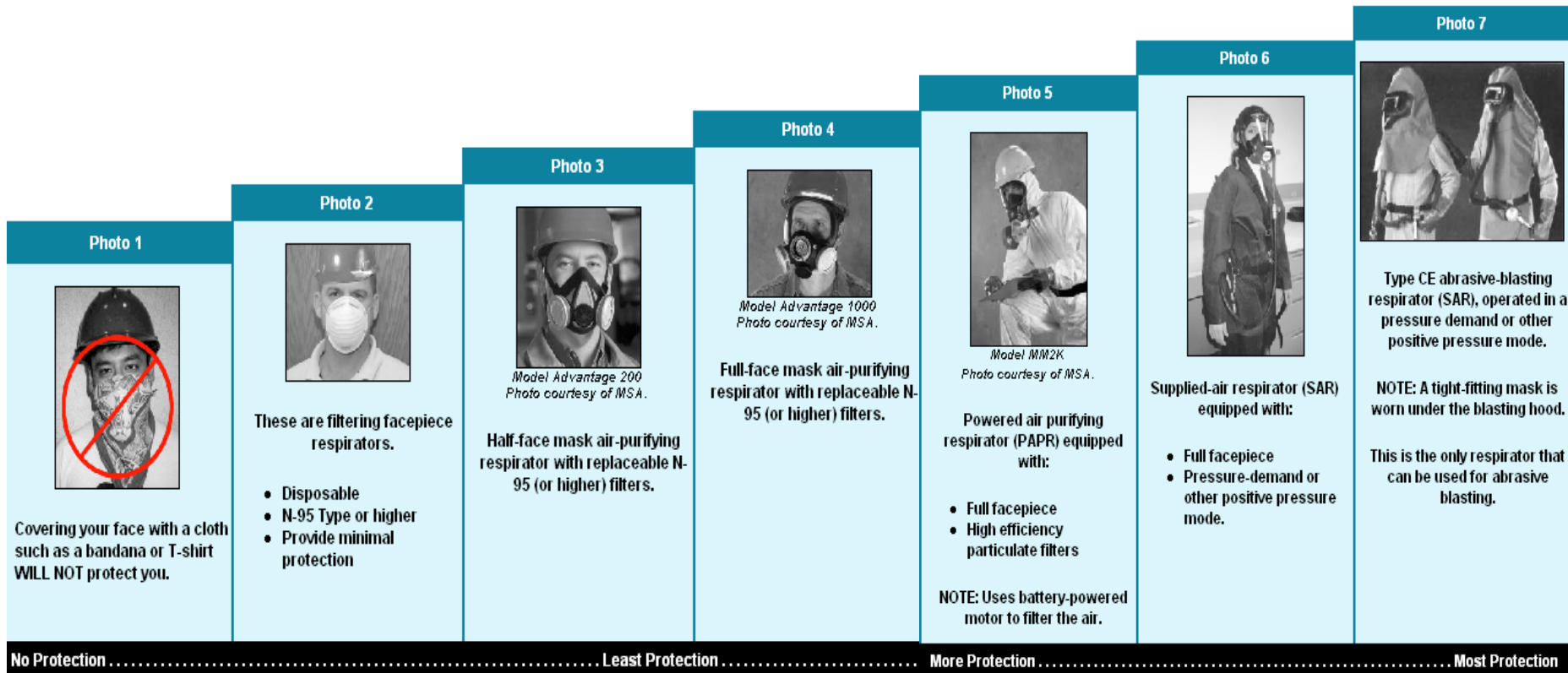
Respiratory Protection



Respiratory Protection – 1910.134

- ❑ For those tasks where respiratory protection is required, ensure that the designated respiratory protection is used, properly worn and maintained when not in use (i.e. cleaned, stored in protective bags/containers, not exposed to excessive heat/cold).
- ❑ Ensure that persons wearing Respiratory Protection have been fit tested and that records can be produced.

Respiratory Protection Determined by Results of Exposure Monitoring



Source: NIOSH Publication No. 2004-108: Silicosis: Learn the Facts!

Respiratory Protection is NOT Medical Surveillance

- Define the difference?
 - Respiratory Protection is triggered by employee exposure $>$ PEL, and
 - Construction - Medical Surveillance is triggered by the use of a respirator $>$ 30 days/yr.
 - General Industry – Medical Surveillance is trigger by performing a task in excess of the PEL for $>$ 30 days/yr.



Medical Surveillance



Medical Surveillance

- Employer must make medical surveillance available at no cost to employee
 - **Construction** - for each worker who uses a respirator for **30 days/yr**
 - **General Industry** – for each worker who is exposed > PEL for **30 days/yr**
- All exams and procedures must be performed by PLHCP – after initial, exam must be repeated every 3 years or more often if recommended Baseline exam includes:
 - past, present and anticipated exposure to RCS, dusts, and other agents affecting respiratory system,
 - history of respiratory system dysfunction and TB,
 - smoking status and history,
 - physical exam,
 - chest X-ray,
 - pulmonary function test,
 - testing for latent TB infection, and
 - any other tests determined appropriate by PLHCP.



Results of Medical Surveillance

- ❑ PLHCP must explain exam results to worker and any limitations on exposure, and provide written medical opinion to ER within 30 days that includes:
 - Date of exam
 - Statement that exam meets requirements of standard
 - Any recommended limitations on worker's use of respirators
 - IF employee provides written authorization, info on any recommended limitations to worker's RCS exposure, a statement that worker should be examined by specialist if chest X-ray is 1/0 or higher by B reader
- ❑ Employer must ensure worker gets copy of written medical opinion within 30 days.



Recordkeeping



Recordkeeping – How is your Company Managing Record Keeping?

- ❑ What is necessary? Capture and maintain – air monitoring data and medical surveillance data in accordance with 29 CFR 1910.1020
- ❑ Exposure measurements should include the following information:
 - Date of measurement for each sample taken.
 - Task monitored; sampling and analytical methods used.
 - Number, duration, and results of samples taken.
 - Identify of the laboratory that performed the analysis.
 - Type of personal protective equipment, such as respirators, worn by the employees monitored.
 - Name, social security number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored.



Recordkeeping – How is your Company Managing Record Keeping?

- ❑ What is necessary? Capture and maintain – air monitoring data and medical surveillance data in accordance with 29 CFR 1910.1020
- ❑ Objective data
 - Crystalline silica-containing material in question
 - Source of the objective data
 - Testing protocol and results of testing
 - Description of the process, task, activity
 - Other data relevant to the process, task, activity, material, or exposures on which objective data were based.

Recordkeeping

□ Retention of Records

Document Type	Time Period
Medical Surveillance	Employed more than one year: duration of employment plus 30 years, Employed less than one year: term of employment as long as record given to employee upon departure
Exposure Records	30 years
Objective Data	As long as you rely on the record
Training	None
Safety Data Sheets	30 years

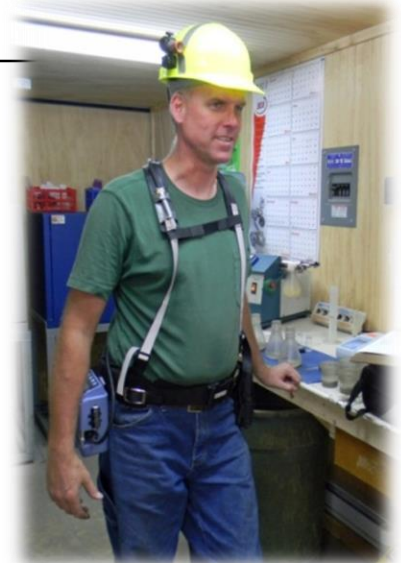


What can Construction Learn from MSHA?

How MSHA addresses respirable crystalline silica
and its “Permissible Exposure Limit”....

Video exposure monitoring (VEM)

NIOSH “Helmet-CAM” for dust assessment



Encourage the use of protective technologies and repairing of basic wear and tear on equipment.



Reduce your dust exposure
Cover or replace cloth seats

▶ **Did you know?**

Cloth chairs in mobile equipment, break rooms, and offices can hold **high levels of dust**

Use vinyl or leather seat covers or plastic chairs when possible



Findings based on NIOSH field studies
To learn more, visit go.usa.gov/x0Cs9



Reduce your dust exposure
Clean dust from work clothes

▶ **Did you know?**

Using clothes cleaning technology throughout the workday can reduce your exposure to respirable dust by up to **88%**

Launder clothes post-shift, including sweatshirts and coats, and use leather (not cloth) gloves to avoid dust buildup



Findings based on NIOSH field studies
To learn more, visit go.usa.gov/x0Cs9



To help maintenance of a new behavior, management must encourage and change critical behaviors in a positive manner.



Reduce your dust exposure
Tying bulk or mini-bags

▶ **Did you know?**

Folding bulk or mini-bag loading collars away from your breathing zone can reduce peaks in respirable dust exposure up to **92%**



When tying, fold bag collars away from you

Findings based on NIOSH field studies
To learn more, visit go.usa.gov/x0cs9



Besides encouraging protective practices, management must be willing to engage in small steps that may help reduce exposure.



Reduce your dust exposure
Spraying or hosing cleanup



Did you know?

Starting with a forceful stream of water during housekeeping (e.g., hosing down equipment, walls, beams, and the floor) can **elevate dust exposure**

During housekeeping, begin with a wide spray to wet everything down



Then use a narrow, forceful stream



Findings based on NIOSH field studies
To learn more, visit [go.usa.gov/XCS9](https://www.go.usa.gov/XCS9)





How many Silica Standards are there?

- ❑ OSHA PEL – $50 \mu\text{g}/\text{m}^3$
- ❑ OSHA AL – $25 \mu\text{g}/\text{m}^3$
- ❑ Coal – Formula that lowers the overall dust standard based on quartz level from $1.5 \text{ mg}/\text{m}^3$ with the goal of $100 \mu\text{g}/\text{m}^3$
- ❑ M/NM – Formula depends on quartz content of the sample with the goal of $100 \mu\text{g}/\text{m}^3$



Summary



Compliance Strategy Summary – Next Steps

- ❑ Review existing sample data to determine current state
- ❑ Review existing tasks that fall under Table 1
 - Determine degree of compliance for Table 1
 - Conduct gap analysis to determine what it takes to fully comply with Table 1
 - Fill the gaps through purchase of equipment and/or improved work practices
 - Develop WECP with required content



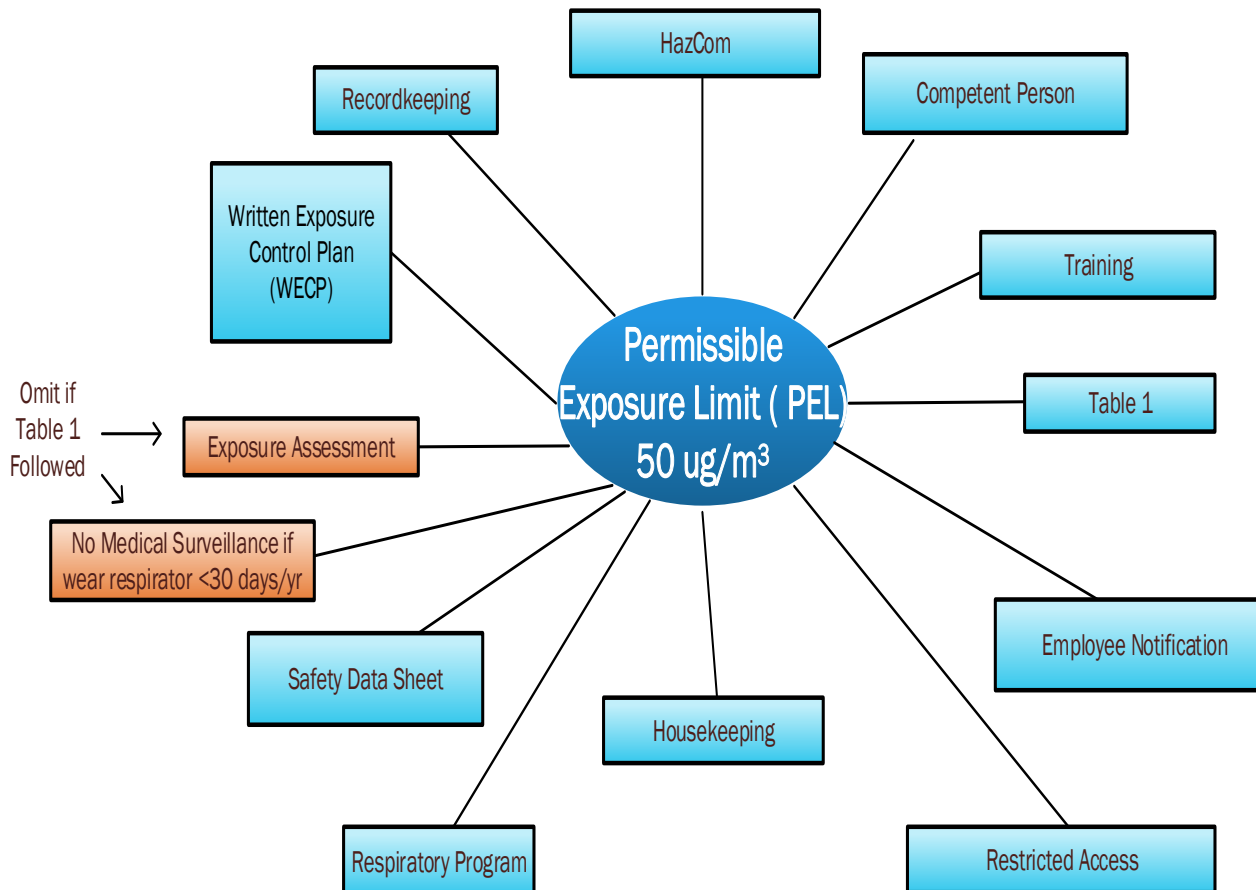
Compliance Strategy Summary – Cont'd

- ❑ Identify existing tasks not in Table 1
 - Conduct high-level risk assessment for these tasks
- ❑ Develop Exposure Assessment plan
 - Utilize Performance option or Schedule monitoring option and complete activity
- ❑ Review results from sampling
- ❑ Implement engineering and work practice controls
- ❑ Resample tasks that were overexposed – determine effectiveness of controls
- ❑ Develop WECP with required content

What a Competent Person should have at the work site?

- ❑ Create a binder that has the following documents:
 1. OSHA standard 1926.1153
 2. Silica Program and WECP for each task—use pocket cards
 3. Competent person power point
 4. Evidence of competent person training
 5. Evidence of employee training
 6. Respiratory protection program
 7. Copy of employee's fit testing record
 8. Medical restrictions for employee(s) use of respirator
 9. Audit form for competent person

Construction - Prepare Plans and Programs



Questions?

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