National Update on Silica

Howard Marks – Nat’l Asphalt Pavement Assoc.
NAPA EH&S Programs: Striving for EH&S Excellence
Protecting industry employees and the environment

- Regulatory advocacy w/ Congress & Agencies
- EH&S compliance assistance (e.g., SDS, Silica, SPCC, HoS)
- Science-based classifications
- Community (health) concerns
- Online WZS training @ www.asphaltapavement.org/safety
- Diamond Achievement: self-assessing for continuous improvement
- Environ. Product Declaration
- NAPA Care Benevolent Fund
Compliance with OSHA’s Silica Rule

➢ Known health hazard and top priority for U.S. OSHA

➢ Construction Rule effective June 2017 (extended) & fully enforceable now; General Industry Rule effective June 2018

➢ NAPA’s current guidance focuses on construction obligations and plant exposure

➢ Reduces occupational Permissible Exposure Limit (PEL) to 50 “units” across all sectors

➢ Reduced construction PEL by 5-times; Gen’l industry PEL cut in half

➢ Use of “Table 1” controls reduce compliance obligations for construction
Rule’s compliance obligations: big picture

- Employers must ensure exposure below PEL for all activities

- Basic premise of rule: specific engineering controls identified for many jobs/tasks/activities in “Table 1” – Construction only

- Other major obligations (guidance @ www.asphaltpavement.org/silica)
  
  ✓ Document exposure if not following Table 1
  
  ✓ Designate a “Competent Person” (construction only)
  
  ✓ Develop a written Exposure Control Plan
  
  ✓ Update Hazard Communication
  
  ✓ Maintain all appropriate records
**Table 1 entries – Controls identified for Construction**

- Stationary masonry saws
- Handheld power saws
- Handheld power saws for fiber cement board
- Walk-behind saws
- Drivable saws
- Rig-mounted core saws or drills
- Handheld / stand-mounted drills
- Dowel drilling rigs for concrete
- Vehicle-mounted drilling rigs for rock and concrete
- Jackhammers and handheld powered chipping tools
- Handheld grinders for mortar removal (tuckpointing)
- Handheld grinders for other than mortar removal
- Walk-behind milling machines and floor grinders
- Small drivable milling machines
- Large drivable milling machines
- Crushing machines
- **Heavy equipment and utility vehicles to abrade or fracture silica materials**
- **Heavy equipment and utility vehicles for grading and excavating**
Table 1 controls vs. assessment

➢ Table 1 controls generally involve equipment/activities with the following engineering controls:
  ✓ water suppression
  ✓ vacuum systems
  ✓ enclosed cabs with HEPA filters

➢ If an employer chooses NOT to implement engineering controls:
  ✓ must measure exposure
  ✓ “Action Level” at ½ PEL
  ✓ restrict access/dedicated clothes
  ✓ medical monitoring / PPE / etc.
Milling operations and controls

- All milling machines now have both “enhanced” water suppression AND vacuum controls; many since ~3 years ago
  - Water-spray allows milling only to 4-inches any pavement
  - Both controls allow milling to any depth in asphalt only
- Reasonably priced retrofits available
- Some contractors sub-out full-depth milling
- “enhanced” water (+/- surf.)
- Small mills require water suppression only + surfactant (detergent) [Table 1]
  - Applicability to skid steer w/ mill head
  - Enclosed cab as best practice
Brooming & sweeping controls

➢ Not as straight-forward

➢ Table 1: heavy equipment and utility vehicles that ..... 
  ✓ abrade or fracture silica-containing material ...
  ✓ do NOT abrade or fracture

➢ If abrading: enclosed cab + water suppression (if grounds-crew present)

➢ If not abrading: water suppression *OR* enclosed cab when operator is only one engaged in activity

https://www.youtube.com/watch?v=SY49tv-WC5M
The next Table 1 entry is heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials. These include activities such as fracturing or abrading rock and soil; demolishing concrete or masonry structures; and loading, dumping, and removing demolition debris.

The operator must be in an enclosed cab. Modern heavy equipment already comes equipped with enclosed, filtered cabs that meet the requirements of Table 1. See the section on Enclosed Cabs for more information on how to make sure that the cab meets the requirements of the rule. When other employees are engaged in the task, water, dust suppressants, or both must also be applied as necessary to minimize dust emissions.

Respiratory protection is not required for heavy equipment operators and laborers who assist heavy equipment operators during demolition activities involving silica-containing materials when the operator exits the enclosed cab and is no longer actively performing the task, the operator is considered to have stopped the task. However, if other abrading, fracturing, or demolition work is performed by other heavy equipment and utility vehicles in the area while an operator is outside the cab, that operator is considered to be an employee “engaged in the task” and must be protected by the application of water and/or dust suppressants.
Heavy equipment and utility vehicles used for tasks such as grading and excavating do not involve demolition or the fracturing or abrading of silica. Tasks include earthmoving, grading, and excavating; other activities such as moving, loading, and dumping soil and rock; and dumping and grading of ballast in the railroad industry, which is generally subject to OSHA’s Construction standards.

Employers have two control options when the operator is the only employee engaged in the task and one option when employees other than the operator are engaged in the task. The first option requires the equipment operator to operate the equipment within an enclosed cab when the operator is the only employee in the area. Most heavy equipment already comes equipped with enclosed, filtered cabs that meet the requirements of Table 1. See the section on Enclosed Cabs for more information on how to make sure that the cab meets the requirements of the rule.

The second option requires the application of water and/or dust suppressants as necessary to minimize dust emissions. Water must be applied at rates sufficient to minimize release of visible dust. The following scenarios are examples of when the employer must use water and/or dust suppressants as necessary to minimize dust emissions: (1) equipment for grading and excavating is not equipped with enclosed, pressurized cabs or (2) employees other than the operator are engaged in the task. If water or dust suppressants are applied as necessary to minimize visible dust, the employer need not provide an enclosed, filtered cab for the operator.

Respiratory protection is not required for work with heavy equipment when it is operated from within an enclosed cab, or when water or other dust suppressants are used, regardless of task duration.

Earthmoving using a dozer equipped with enclosed operator cab. Photo courtesy of NIOSH.
Exposure assessment: all activities

➢ OSHA requires exposure assessment when using non-controlled equipment or when activity not Table 1 specified
  • (short duration) brooming, flaggers, truck drivers

➢ Employer must understand employee 8-hr TWA exposure
  • low PEL still allows elevated exposure for short durations

➢ Measuring airborne silica requires an IH and results lag

➢ OSHA allows alternative methods of exposure assessment

➢ Use of “real-time” dust monitor and silica content

➢ Aggregate silica content varies but dust exposures can be large and PEL low

➢ Rule of thumb: ~ 10% airborne silica

Exposure example: uncontrolled brooming

- Relevant if brooming not considered Table 1
- Short duration, uncontrolled, or non-specified activities
  - Dry saw cutting, truck drivers, drilling
- RCS should remain below Action Level of 25 µg/m³
- Direct-read dust monitors can be helpful in understanding potential exposures over short durations
  - 10% airborne silica content is good rule-of-thumb
- Should be part of Exposure Control Plan and reviewed by Competent Person
- Some type of exposure assessment required ... but
- Can rely on “objective data” / survey
Competent Person; HazCom; Recordkeeping

- Designate a Competent Person who “can identify existing and foreseeable ... silica hazards; is authorized to promptly eliminate or minimize silica hazards; [and] has the knowledge and ability to implement the written exposure control plan”

- CP duties include regular job site/equipment inspections;

- CP doesn’t need to remain on jobsite but does need authority to take prompt corrective action; recommend a crew chief, foreperson

- Comply with OSHA’s HazCom Standard: train workers on activities/tasks resulting in exposure, workplace protections, etc.

- Maintain records for 30 + years per Standard (29 CFR 1910.1200)
  - Air monitoring & objective data, medical records, MSDS, etc.
  - Procedures used to restrict access, when necessary to limit exposures (employee rotation/scheduling, signage)
Training: HazCom & Competent Person

➢ Employees shall demonstrate knowledge and understanding of:
   • Health hazards associated with respirable crystalline silica
   • Specific tasks that could result in exposure
   • Knowledge and understanding of the written exposure control plan
   • Purpose and description of the medical surveillance program, if/when needed

➢ Competent Person training is left up to the employer
   • Should at minimum include above
   • Should also demonstrate knowledge of Table 1 controls, appropriate PPE, and have the appropriate authority to investigate and stop work, if needed
Develop a Written Exposure Control Plan

- Employer must develop an exposure control plan that can be implemented by the Competent Person
  - can be generic (not project-specific)
- Plan must contain the following information:
  - Description of tasks involving exposure to respirable silica
  - Engineering controls, work practices, and respiratory protection for each task (e.g., water spray while brooming)
  - Housekeeping measures used to limit exposure
  - Procedures used to restrict access, when necessary to limit exposures (employee rotation/scheduling, signage)
- NAPA guidance/examples at www.asphaltpavement.org/silica
Written Exposure Control Plan for Roadway Milling

Company: ____XYZ Asphalt Paving Inc._______ Date: ___Sept. 23, 2017__________

Person Completing the Plan, Title: ____Guy Incognito, Paving Superintendent____

Competent Person: ____Guy Incognito____

Job site/location: All road (re)construction projects where existing asphalt pavement surfaces will be milled using a half-lane or larger coplaner mill.

Description of Task: Road mills with both an enhanced water suppression and vacuum ventilation system, as identified in Section 1926.1153, Table 1(xv) (“Table 1”), will be used to scarify and mill existing asphalt roadway at a depth of between 2 and 8 inches.

(Routine task, new task, Indoors/outdoors, task found on Table 1?)

☐ Part 590, 1910.1053 General Industry (References Table 1)
  - review necessary? Y or N

☐ Part 690, 1926.1153 Construction (Includes Table 1)
  - review necessary? Y or N
Engineering Controls: Roadway mills will have both enhanced water suppression and vacuum ventilation systems consistent with those listed in Table 1.

Work Practices: Roadway milling operations typically involve between two and four individuals: an equipment operator and generally one or more grounds crew. Equipment is checked periodically, per manufacturers’ specification, and maintained in good working order. Individuals not part of the activity but who may sample material or check on the equipment do not require additional precautions because Table 1 controls are in place and are protective of individuals with the highest exposure potential.

Respiratory protection: N/A
(e.g., Use respirator with APF = 10 the entire time the task is being performed — See Table 1)

See Part 451 — Respiratory Protection rule (1910.134) for information on selection, training, and fit-testing requirements, as well as proper use instruction for respirators (i.e., no facial hair interfering with the respirator sealing surface).

Housekeeping: Milled surfaces are brushed using power brooms (see Power Brooming Activity), which employ continuous water suppression. Remaining material not broomed is removed using a pick-up machine similar to a small front-end loader (see Pick-Up Activity)

Procedures Used to Restrict Access to Work Area: NIOSH has published findings indicating it is unlikely for milling activities employing Table 1 measures to regularly exceed the PEL; therefore, it is unlikely others entering the work activity space will similarly be exposed to
Compliance for construction activities are now enforceable

Compliance activities are the employer’s responsibility; rely on common sense; understand/oversee role of consultant

Requires employer identification of job-task exposure

Milling Partnership successful: eliminated need for respirators
  • Mills will require controls (new or retrofit @ ~ $12-15k)
  • Small mills (skid-steer) only require water suppression

Power brooms will likely need water suppression/enclosed cab
  • If Table 1 applicable or exposure assessed
  • NAPA working to provide control information to OSHA

Identify company’s “competent person(s)” ... crew foreperson

Develop an Exposure Control Plan for all activities
General Industry Silica Rule

- Compliance for asphalt plants effective June 2018

- Requirements identical to Construction Rule except:
  - No “Table 1” for industrial activities & must include signage

- Requires employer identification of job-task exposure
  - Exposure assessment and documentation of control

  ✓ “The employer shall assess the exposure of each employee who is or may reasonably be expected to be exposed to respirable silica at or above the action level.”

  ✓ Chipping drum flights, baghouse maintenance, crushing / moving aggregate and RAP, QA lab aggregate screening, cleaning plant equip, sweeping/brooming, haul roads

- Use of real-time dust monitors has proven helpful
Exposure Assessment Requirements & Regulated Areas

➢ Can utilize either air monitoring data (e.g., IH) through “performance” or “scheduled monitoring” (when exceedances of the Action Level)

• Engineering / work practice controls are methods to reduce exposure below PEL

• If the PEL is still not reached respirators shall be used

• NAPA will continue to solicit industry for task-specific exposure info

➢ If exposure remains above the AL or PEL ... or ... if respiratory protection is used (> 30x)

• Numerous other requirements phase-in including medical surveillance

• Demarcate regulated areas / post signage / limit access / establish controls

DANGER

RESPIRABLE CRYSTALLINE SILICA
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
WEAR RESPIRATORY PROTECTION
IN THIS AREA
AUTHORIZED PERSONNEL ONLY
Asphalt Plant - Baghouse Maintenance

• **Task:** Team members pulled / replaced baghouse bags.

• **Results:** Median: 422.6 µg/M3

• **Additional Information:**
  • Approx. 96 bags were pulled.
  • Only natural ventilation used during this test.
Asphalt Plant - Chipping In Drum  
Scenario 1

• **Task:** Team members chipping material buildup from asphalt drum.

• **Results:** Median: 679 µg/m³

• **Additional Information:**
  • Team members working from ladders.
  • Utilizing pneumatic chipping hammers w/out source capture controls.
Asphalt Plant - Chipping In Drum
Scenario 2

• **Task:** Team members chipping material buildup from asphalt drum.

• **Results:** Median: 135.95 µg/M³

• **Additional Information:**
  • Team members working from elevated platform.
  • Utilizing pneumatic chipping hammers w/out source capture controls.
Asphalt Plant - Chipping In Drum

Scenario 3

- **Task:** Team members chipping material buildup from asphalt drum.
- **Results:** Median: 85.1 µg/M3
- **Additional Information:**
  - Team members working from elevated platform.
  - Exhaust fan on low pulling air into the drum and baghouse.
  - Utilizing pneumatic chipping hammers w/out source capture controls.
Asphalt Pavement Mix Production Facility Activities

Silica Exposure as 8-hr TWA (µg/m³)

- Loader Operator [n=16]
- General Yard Work [n=21]
- Skid Steer / Water Truck / Sweeper with enclosed cab [n=22]
- Skid Steer without enclosed cab [n=7]
- Plant Operator / Control Room [n=18]
- QA Lab Tech with local exhaust [n=18]
- QA Lab Tech without local exhaust [n=18]
- Baghouse Maintenance
- Drum Chipping

Values for non-detected exposure were entered at one-half LOD

Standard Microsoft box-whisker plot identifies all datapoints with outliers / local max / 75th percentile / mean / median / 25th percentile / minimum

Draft: for illustrative purposes only
Thank-you / Questions?

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