SPECIAL REPORT

NATIONAL ASPHALT PAVEMENT ASSOCIATION
5100 Forbes Boulevard, Lanham, MD USA 20706-4407
TF: 888.468.6499 PH: 301.731.4748 FX: 301.731.4621
www.asphaltpavement.org

Written Silica Exposure Control Plans For Road Construction Activities

OSHA's Silica Rule requires employers in the road construction sector to know and control employee exposure to respirable silica. Among the regulations is a requirement to develop and maintain a written silica exposure control plan. This special report discusses this requirement, along with information on identifying common possible silica-generating activities associated with road construction. A sample exposure control plan template is included. For additional resources related to OSHA silica regulations, visit *www.AsphaltPavement.org/silica*.

Introduction

As part of their regulatory obligation to provide a safe working environment, OSHA requires under 29 CFR 1926.1153(g)(1) all construction sector employers to develop and implement a written exposure control plan that includes, at a minimum, the following elements:

(i) A description of the tasks in the workplace that involve exposure to respirable crystalline silica;
(ii) A description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to respirable crystalline silica for each task;
(iii) A description of the housekeeping measures used to limit employee exposure to respirable crystalline silica; and
(iv) A description of the procedures used to restrict access to work areas, when necessary, to minimize the number of employees exposed to respirable crystalline silica and their level of exposure, including exposures generated by other employers or sole proprietors.

Also, under 29 CFR 1926.1153(g)(2-4), employers must:

- Review and evaluate the effectiveness of the written exposure control plan at least annually and update it as necessary.
- Make the written exposure control plan readily available for examination and copying, upon request to covered employees, their representatives, OSHA and NIOSH.
- Designate a competent person to make frequent and regular inspections of job sites, materials, and equipment to implement the written exposure control plan.

Measuring and Documenting Airborne Crystalline Silica Exposures

Although the employer's designated "Competent Person" (CP; see NAPA's Special Report 219) is not required to develop the written exposure control plan, the CP is required to implement it. To develop and implement such a plan, the employer and/or CP must understand the potential for airborne crystalline silica exposure associated with road construction activities. This may be accomplished by personal exposure sample monitoring of the specific task and activities, or by using "objective data" that is representative of exposures from the tasks and activities.

Objective data can be obtained through air monitoring from industry-wide surveys; area monitoring of the employer's tasks and activities in combination with exposure profile mapping; published articles on monitoring of specific task or activities; air monitoring of similar activities; air monitoring from a public or private database that collects and shares such information; or by estimating airborne respirable crystalline silica levels using the method outlined in OSHA's Small Entity Compliance Guide (p. 35). The guide allows employers to use "direct-reading instruments to measure real-time levels of respirable dust in the air. If the employer has information on the percentage of respirable crystalline silica in that dust (for example, from the analysis of a bulk sample or information from a safety data sheet), he or she can then calculate the level of respirable crystalline silica in air." Real-time, hand-held direct-read dust monitors are easy to use and are readily available for rental. NAPA does not endorse specific equipment; however, the TSI DustTrak™ DRX handheld aerosol monitor is an example of a unit capable of making the necessary measurements.

> **Example:** NIOSH's EPHB Report No. 282-17a, which investigated dust control technologies during milling activities, compares real-time dust levels with airborne crystalline silica levels and bulk-material samples containing crystalline silica. For asphalt pavement samples containing aggregate, an average of 28.5% of the material was comprised of crystalline silica (see pp. 35–36) and approximately 5–15% crystalline silica was contained in respirable dust samples (see Table 11). Using this information, one can assume that typical aggregates in Michigan (where the study was conducted) contain about 30% crystalline silica and might release an average of about 10% crystalline silica in respirable dust during milling processes.

Traditional industrial hygiene (IH) sampling for respirable crystalline silica is often the preferred way to measure employee exposure and can be accomplished by a certified industrial hygienist (CIH). The permissible exposure limit (PEL) for silica is 50 µg/m^3, but this is a time-weighted-average (TWA), which means an employee cannot exceed that airborne concentration averaged over the course of an 8-hour workday.

Unlike several other PELs, OSHA does not prohibit the use of administrative controls to reduce individual exposures to respirable crystalline silica. For example, utilizing two employees, each working 4 hours on the same task, will in essence reduce their TWA exposure in half, assuming no other exposure occurs. While it is not recommended that employee rotation be used to maintain exposure below the PEL, OSHA recognizes there are bona fide reasons for rotating employees.

NOTE: If a silica-generating activity is identified on the Silica Rule's Table 1 list of OSHA-approved controls for specific activities, there is no obligation to monitor such activities so long as an approved control, as specified in Table 1, is used for the activity.

Common Road Construction Activities With the Potential for Silica Exposure

The following common road construction activities may have the potential for silica exposure. These activities include both preparatory work and pavement application tasks.

Paving Activities: A review of company-specific, industry-wide industrial hygiene exposure assessments indicate no meaningful exposure to airborne crystalline silica during asphalt pavement mix application and compaction. This is consistent with the physical characteristics of asphalt pavement mix, which is primarily comprised of aggregate coated with petroleum asphalt.

Milling Activities: Roadway milling activities qualify for application of the Table 1 control measures if a cold milling machine is fitted with OSHA-approved engineering controls. As of January 2017, all new half-lane and larger cold milling machines have the requisite engineering controls and many equipment manufacturers have made both vacuum and enhanced water control retrofits available for some older milling machines. Large cold milling machines that utilize both vacuum and enhanced water-suppression (as defined under the Standard) are allowed to mill any depth of asphalt pavement without additional controls. Table 1 Part (xv) also allows the use of a supplemental water spray control with surfactant on cuts of 4 inches or less in any substrate.

The operation of small drivable cold milling machines (smaller than half-lane), such as a skid-steer with a rotating mill attachment, require the use of supplemental water spray with a surfactant agent to qualify under Table 1 compliance methods. The use of an enclosed cab would provide additional protection for the equipment operator.

Other Milling, Sawing, and Jackhammering Activities: For walk-behind cold milling machines and other sawing, cutting, and pavement-impact machinery, such as jackhammers, the equipment must possess an integrated water-delivery system that continuously feeds water to the cutting or impact edge in order to qualify to use Table 1 compliance methods.

- For a number of activities (e.g., wet cutting, dowel drilling and jackhammering), Table 1 specifies that the exposure may not exceed 4 hours per shift, unless respiratory protection is worn. There are three important points to keep in mind when applying these provisions.

    1) The time spent on each of these activities without respiratory protection must be aggregated when determining if the 4-hour limit has been met.

    2) If the aggregate time spent on these activities exceeds the 4-hour limit, a respirator must be provided and worn for the entire time those tasks are being performed, not simply the portion of the shift that goes beyond 4 hours (81 *FR* 16726). Similarly, if

it becomes apparent an activity expected to be completed within 4 hours will not be completed in that timeframe, a respirator should be provided and worn as soon as the situation is realized. In enforcing this provision, OSHA is expected to use a "reasonably anticipated approach." In other words, the employer will not be charged with a violation based on 20/20 hindsight, but on what was reasonably expected, whether that expectation changed, and when it changed.

3) This is a situation in which employee rotation may be used to avoid requiring an employee to wear a respirator.

- Dry saw cutting activities do not qualify to use Table 1 compliance methods. If these activities result in exposures above the PEL, then they are presumed to be prohibited unless the employer can show that there is no feasible method, such as wet-cutting, that would reduce exposures below the PEL. In that event, respiratory protection would be required. Any and all controls or best practices associated with such activity must be documented in the written exposure control plan. Some activities may include using forced or compressed air to blow dust away from those conducting cutting activities; however, if this practice is conducted, see the below section on the use of compressed air for blowing out pavement cracks/joints.

Rubblizing, Earth-Moving, and Grading: OSHA-approved controls in Table 1 for other heavy equipment depends on whether or not the process has the potential to demolish, shear, abrade, or fracture silica-containing materials, such as aggregate.

For activities that abrade or fracture silica-containing materials (Table 1, Part (xvii)), such as hoe-ramming and rock-ripping, operating equipment from within an enclosed cab (meeting certain criteria described below) is required if only the operator is potentially exposed. If nearby workers outside the cab are also present in the potential exposure area, water suppression must also be used.

For activities that do not abrade silica-containing materials (Table 1, Part (xviii)), such as earth-moving, grading, and excavating, a dust-suppression system must be used if nearby workers could be exposed. If the equipment operator is the only employee engaged in the activity, either a dust-suppression system or an enclosed cab is an acceptable control.

- Criteria for enclosed cabs: in the discussion above, enclosed cabs used to comply with Table 1 or other requirements must have positive pressure with heat and air conditioning and draw in air through a HEPA-type filter. More specific requirements are identified in Table 1.

Road Brooming and Sweeping Activities: Power brooms and sweepers are not specifically identified in Table 1; however, their function and mechanisms are similar to equipment and activities identified in Table 1 (e.g., Parts (xvii) and (xviii)) that use water suppression or an enclosed cab to control potential airborne silica-bearing material. However, because power brooms and sweepers are not explicitly included in Table 1, personal exposure sample monitoring or the use of objective data is necessary to ensure controls are effective.

Sweeping and Blowing Out Pavement Cracks or Joints: OSHA provides specific "housekeeping" rules in Section (f) of the Standard to address common activities conducted without water suppression or other controls:

> (1) The employer shall not allow dry sweeping or dry brushing where such activity could contribute to employee exposure to respirable crystalline silica unless wet sweeping, HEPA-filtered vacuuming, or other methods that minimize the likelihood of exposure are not feasible.
>
> (2) The employer shall not allow compressed air to be used to clean clothing or surfaces where such activity could contribute to employee exposure to respirable crystalline silica unless: (i) The compressed air is used in conjunction with a ventilation system that effectively captures the dust cloud created by the compressed air; or (ii) No alternative method is feasible.

Under Section 1926.1153(f), activities like dry sweeping or using compressed air to clean surfaces are prohibited, unless they can be controlled by water suppression or vacuum. If these types of controls are not feasible — for example, if state DOT materials specifications require dry saw cuts — then the employer should ensure the time-weighted average, activity-based exposure is below the PEL. As detailed in the above section on Measuring and Documenting Airborne Respirable Silica Exposure, ensuring exposure is below the PEL can be achieved through monitoring or the use of objective data.

Regardless of the exposure level, attention should be paid to minimizing employee exposure to airborne dust. Where dry-cutting is necessary, and the discharge cannot be effectively captured, one potentially viable approach is to have another employee blow compressed/fanned air across the cut, away from the workers. Restricting employee access to the process may also be prudent. Due to the short duration of these activities, it is not anticipated that employees' TWA for exposure to crystalline silica would exceed the Action Level, but this must be supported by an exposure assessment and the use of respiratory protection may be needed.

Developing the Written Exposure Control Plan

OSHA requires all construction industry employers to develop a written silica exposure control plan that:

1. Describes workplace exposures;
2. Includes ways to reduce exposure, such as appropriate engineering controls, work practices, and housekeeping methods; and
3. Restricts access to areas where high exposure levels may occur.

Many of these plans/programs are written to delineate potential exposure and controls by activity and/or piece of equipment.

Due to differences in activities across the road construction industry, a comprehensive one-size-fits-all written exposure control plan template is difficult to develop. However, multiple templates and programs are available, many free, to assist companies and their CP in developing an activity-based exposure control plan. Three such resources are noted below. When reviewing activities associated with potential silica exposure, an activity-specific and/or equipment-specific control plan may be warranted.

- The "Create-A-Plan" tool at www.silica-safe.org is an easy-to-use, web-based template for generating a customized plan. One shortcoming is that plans for activities without Table 1 controls are a bit more difficult to create with this tool.
- Brieser Construction has posted its Silica Exposure Control Plan, which can be used to develop a written exposure control plan; however, the information provided may be more detailed than necessary.
- Michigan OSHA (MIOSHA) provides a Sample Written Silica Exposure Control Plan with a concise template to aid in preparing the written exposure control plan for any activity.

Conclusion

Employers are charged with providing a safe environment for their workers. Under the Silica Rule for construction activities, this includes knowing and documenting potential exposure to respirable crystalline silica and applying appropriate exposure controls and/or personal protective equipment. Employers must have a written silica exposure control plan, as well as a designated competent person who is responsible for implementing the written plan.

For additional information about OSHA's Silica Rule and how it affects the asphalt pavement industry and road construction activities, visit www.AsphaltPavement.org/Silica.

Sample Written Silica Exposure Control Plans

The following pages include a sample silica exposure control plan developed from the MIOSHA template for roadway milling, an activity with an identified Table 1 control. A written control plan for an activity that does not align with Table 1, such as using compressed air to clean out pavement cracks, would require more specific information about actual or potential exposures, engineering controls, activity-duration limits, personal protective equipment, and access restrictions. This is only a sample and as such should not to be used without conducting an individualized assessment at a specific establishment, for specific materials being used, and for a specific activity.

For more information, contact NAPA Vice President for Environment, Health & Safety Dr. Howard Marks at hmarks@asphaltpavement.org or 301-731-4748.

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 cold milling mill.

Description of Task: Cold milling machines with both an enhanced water suppression and vacuum ventilation system, as identified in Section 1926.1153, Table 1(xv), will be used to scarify and mill existing asphalt roadway at a depth of between 1 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 cold milling machines 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 exposure levels that exceed PEL. Efforts to restrict employee access to the work activity/site are focused on ensuring physical safety.

(Signage, barricades, enclosures, spotters, work when area is cleared of other contractors to reduce exposure risk.)

Objective data use (Optional) — **Yes** or **No**

Data Source: NIOSH EPHB Report No. 282-17a

Data conditions from the source exactly matches the work conditions? **Yes** or **No**
(Same conditions, equipment, process, controls, material silica %, environmental, etc.)

Additional Notes:

Review this plan with all involved employees.

- Keep a copy of this plan at the jobsite.
- Provide this plan of action to the General Contractor.
- Review and update annually.