

## Resources:

- ▶ The NIOSH document “Best Practice Engineering Control Guidelines to Control Worker Exposure to Respirable Crystalline Silica during Asphalt Pavement Milling”  
[www.cdc.gov/niosh/docs/2015-105](http://www.cdc.gov/niosh/docs/2015-105)
- ▶ NAPA Best Practice Bulletin 1/12, “Operational Guidance for Water Systems During Milling Operations”  
[http://store.aem.org/download/Milling-Water\\_Best%20Practices\\_01-12-12.pdf](http://store.aem.org/download/Milling-Water_Best%20Practices_01-12-12.pdf)
- ▶ NIOSH Engineering and Physical Hazards Reports  
[www.cdc.gov/niosh/surveyreports/](http://www.cdc.gov/niosh/surveyreports/)
- ▶ NIOSH Workplace Safety & Health Topics: Silica  
[www.cdc.gov/niosh/topics/silica/](http://www.cdc.gov/niosh/topics/silica/)
- ▶ OSHA Silica, Crystalline  
[www.osha.gov/dsg/topics/silicacrystalline/](http://www.osha.gov/dsg/topics/silicacrystalline/)
- ▶ CPWR – Work Safely with Silica  
[www.silica-safe.org](http://www.silica-safe.org)

## Organizations

National Asphalt Pavement Association (NAPA)

National Institute for Occupational Safety and Health (NIOSH)

CPWR – The Center for Construction Research and Training

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## FIELD GUIDE

# for Controlling Silica Dust Exposure on Asphalt Pavement Milling Machines

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# The Facts About Silica

According to the National Institute for Occupational Safety and Health (NIOSH),

- ▶ inhaling **respirable crystalline silica can cause silicosis**, a debilitating and potentially fatal lung disease. Silica exposure has also been associated with lung cancer, chronic obstructive pulmonary disease (COPD), and renal disease
- ▶ at least **1.7 million American workers** in a variety of industries and occupations, including construction, are exposed to respirable crystalline silica and many workers' exposures exceed current occupational exposure limits
- ▶ **0.05 mg/m<sup>3</sup>** is NIOSH's respirable crystalline silica **Recommended Exposure Limit (REL)** to reduce the risk of developing silicosis, lung cancer, and other adverse health effects
- ▶ **silica dust controls** such as ventilation controls used in combination with water-spray controls on asphalt pavement milling machines **can consistently reduce exposures** below the NIOSH REL and the proposed Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL)

## Silica/Asphalt Milling Machine Partnership

These guidelines and the dust controls that are now available on half-lane and larger asphalt pavement milling machines are the result of a successful ten-year collaborative effort by industry, management, labor, and government through the Silica/Asphalt Milling Machine Partnership. The Partnership was established in 2003 to find a way to control workers' exposure to respirable crystalline silica during asphalt pavement milling in highway construction. Members of the Partnership include the National Asphalt Pavement Association, numerous paving contractors, all U.S. and foreign manufacturers of milling machines sold in the U.S., the Association of Equipment Manufacturers, the International Union of Operating Engineers, the Laborers' International Union of North America, the Occupational Safety and Health Administration, the Federal Highway Administration, and the Centers for Disease Control and Prevention National Institute for Occupational Safety and Health.

## What You Can Do to Reduce Silica Dust Exposure

**Recognize the hazard.** Milling, cutting, or otherwise disturbing asphalt pavement can create airborne dust containing silica. Pay attention to wind direction and any visible dust emissions.

**Use ventilation and water-spray controls on asphalt pavement milling machines.** Water-spray plus ventilation controls are collectively considered to be the best practice approach to asphalt pavement milling dust control. Ventilation controls used in combination with water-spray controls can consistently reduce exposures below the NIOSH REL. Typical ventilation controls designed to reduce silica exposures on asphalt pavement milling machines include a collection hood, fan, and ductwork as shown in Figure 1. Milling machines should also be designed to allow the operator to temporarily turn the ventilation control off when milling into the wind. If the ventilation control can be shut off, however, then a feature should be in place to automatically turn the ventilation control back on when it has been off for longer than 60 minutes. Water-spray controls should always remain ON regardless of wind direction.

**Always use water-spray controls on asphalt pavement milling machines that do not have ventilation controls.** When ventilation controls are unavailable, water-spray systems that are properly designed, operated, and maintained can provide a significant reduction in the milling machine's dust generation.

For more information on the design of controls and the methods used to test them, refer to the NIOSH document "Best Practice Engineering Control Guidelines to Control Worker Exposure to Respirable Crystalline Silica during Asphalt Pavement Milling."

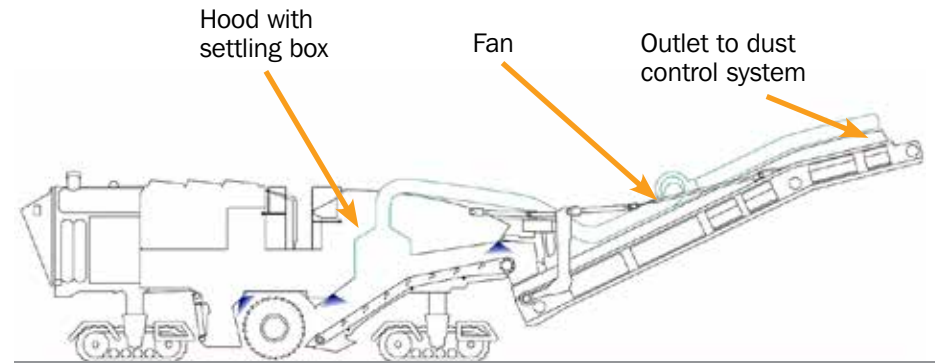


Figure 1: Asphalt pavement milling machine with silica dust controls (Illustration by NIOSH)

## Maintain your dust control systems and follow these tips:

- ▶ Locate the machine operator's manual that contains a maintenance schedule for the water-spray or ventilation controls. Each operator's manual should include detailed sketches, performance criteria, and troubleshooting instructions for equipment owners to use in their periodic inspection of the controls.
- ▶ Inspect and maintain the systems according to the manufacturer's recommendations and record the dates of periodic inspections in the operator's manual.
- ▶ Check the air-flow indicator to verify that the ventilation control is operating within the designed operating range. The manufacturer should attach a plate to the milling machine showing a simple diagram of the ventilation control and a list of field-maintenance procedures.
- ▶ Implement a water-spray and ventilation control system daily checklist to verify that the dust controls are being operated according to the manufacturer's instructions. An example of a daily checklist is shown below.

# Example Daily Dust Control Checklist

| WATER-SPRAY AND VENTILATION SYSTEMS DAILY CHECK LIST  |   |  |  |  |  |  |  |  |  |  |  |  |
|---|---|--|--|--|--|--|--|--|--|--|--|--|
| CHECK LIST COVERS 2 WEEK PERIOD. FILL OUT COMPLETELY DAILY PRIOR TO START-UP. SEND TO _____ WHEN FILLED UP      |   |  |  |  |  |  |  |  |  |  |  |  |
| EQUIPMENT #   | Fill in Date and Initials, Y = YES = ALL Items Functioning Correctly N = NO = Item not Functioning Correctly. |  |  |  |  |  |  |  |  |  |  |  |
| <b>WATER SYSTEM</b>   |   |  |  |  |  |  |  |  |  |  |  |  |
| DATE  |   |  |  |  |  |  |  |  |  |  |  |  |
| INSPECTOR   |   |  |  |  |  |  |  |  |  |  |  |  |
| WATER PUMP  |   |  |  |  |  |  |  |  |  |  |  |  |
| PUMP PRESSURE   |   |  |  |  |  |  |  |  |  |  |  |  |
| INSPECT IN-LINE FILTER  |   |  |  |  |  |  |  |  |  |  |  |  |
| SPRAY BAR   |   |  |  |  |  |  |  |  |  |  |  |  |
| NOZZLES   |   |  |  |  |  |  |  |  |  |  |  |  |
| FLASHING  |   |  |  |  |  |  |  |  |  |  |  |  |
| <b>VENTILATION SYSTEM</b>   |   |  |  |  |  |  |  |  |  |  |  |  |
| FAN OPERATES PER MFG.'S SPEC.   |   |  |  |  |  |  |  |  |  |  |  |  |
| VACUUM TUBES MEETS MFR. CFM   |   |  |  |  |  |  |  |  |  |  |  |  |
| VACUUM TUBES  |   |  |  |  |  |  |  |  |  |  |  |  |
| FLASHING / SEALING  |   |  |  |  |  |  |  |  |  |  |  |  |
| AT 50 OPERATING HRS OR MANUFACTURER'S RECOMMENDATION: INSPECT PIPES/HOSES - REMOVE HOSES & REMOVE DUST DEPOSITS |   |  |  |  |  |  |  |  |  |  |  |  |
| COMMENTS:   |   |  |  |  |  |  |  |  |  |  |  |  |

Table provided by Payne & Dolan, Inc.

## Be Your Best Advocate and Train Yourself

Ask equipment manufacturers for training on the operation, maintenance, and repair of the dust control systems. Equipment mechanics responsible for maintaining the water-spray and ventilation control systems on asphalt pavement milling machines may require specialized training. Milling machine operators should be trained on the control systems and be provided with the operating specifications (water quantity, water pressure, air velocity) that must be maintained in order for the control systems to be effective. Operators should also be trained to temporarily disable the ventilation control system when milling directly into the wind.

**Is your company thinking of purchasing a new half-lane or larger asphalt pavement milling machine?** Select manufacturers of machines that are fitted with both water-spray controls and ventilation controls that have passed the NIOSH capture efficiency test and field test described in Appendices A and B of the NIOSH document of best practices ([www.cdc.gov/niosh/docs/2015-105](http://www.cdc.gov/niosh/docs/2015-105)).