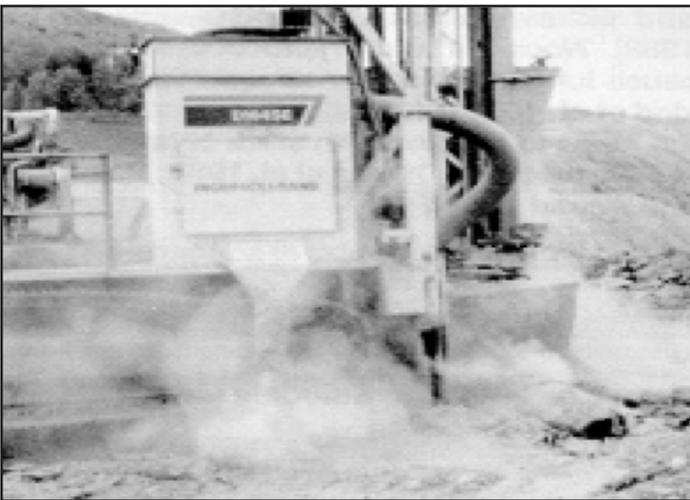


Controlling Silica Exposures in Construction While Operating Vehicle-Mounted Drilling Rigs

Silica is a mineral that is found in stone, soil and sand. The amount of silica in soil and rock may vary widely depending on the local geology. Breathing in silica dust can cause silicosis, a serious lung disease. Using rock-drilling rigs mounted on trucks, crawlers, or other vehicles to drill into rock, soil, or concrete may expose workers to hazardous levels of airborne silica. The small particles easily become suspended in the air and, when inhaled, penetrate deep into workers' lungs. This fact sheet describes ways to protect workers from silica dust when using vehicle-mounted drilling rigs.



Earth-drilling rigs operated with no dust controls may produce high levels of silica in the air. (Photo courtesy of NIOSH).

Combined Control Methods for Silica Dust

There are three main methods used to control silica dust during earth and rock drilling. OSHA recommends that drill operators always use a combination of these dust-control techniques. They are:

- **Dust collection systems;**
- **Wet methods;** and
- **Operator isolation.**

Dust Collection Systems

Best practices when using dust-collecting equipment for rock drills include using a movable duct attached to a shroud, a flexible rubber skirt that encloses the drill hole opening and captures cuttings that come through the hole. Equipment

without these controls can be retrofitted by the manufacturer or a mechanical shop.

Dusty air is pulled from inside the deck shroud through a flexible duct to primary and secondary filter media. The primary filter or dust separator often includes a self-cleaning back-pulse feature that dumps the collected particles to the ground. Secondary release of particles to the air is minimized by a dump shroud.

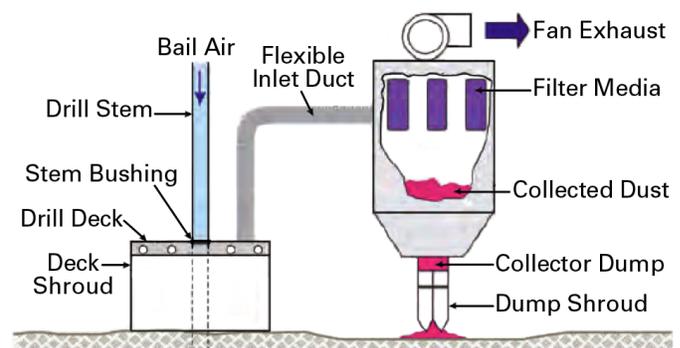


Diagram of dust control systems for rock drills, including deck shrouds for the drill bit and the discharge or dump shroud. (Illustration courtesy of NIOSH).

The dust collection system works best when good design and maintenance practices are implemented by skilled and properly trained operators:

- **Deck Shroud Design:** Use a one-piece shroud that fully encloses the area around the drill bit. Repair or replace torn or missing pieces and make sure that gaps are sealed.
- **Adequate Airflow:** The dust collector must be designed to draw more air than the bailing air used to flush out cuttings from the drill hole.

A rule of thumb is that dust collector air volume should be three times the bailing air volume.

- **Discharge or Dump Shroud:** A shroud or sleeve enclosing the dust collector discharge area guides particles to the ground, thereby reducing dust that would otherwise become airborne.
- **Fan Exhaust Placement:** Extend the dust collection system exhaust port so the dusty air releases *away* from workers. Clogged ducts and filters restrict dust collector airflow. Remove dust that collects on filters and in flexible ducts.
- **Fan Maintenance:** Dust can damage the fan motor, blades and drill bits. Replace worn parts. Check for too much vibration in fan belts, coupling and belt alignment, and worn or broken belts, blades, mounting bolts and bushings.
- **Filters:** Replace clogged or damaged air filters and avoid exposure to dust when cleaning or replacing filters.

Wet Methods

The proper use of wet methods requires a trained and skilled operator. In wet drilling, too much water can create mud slurry at the bottom of the hole that can trap the bit, coupling and steel extensions. Too little water will not effectively control escaping dust.

- **Water Injection at Bit:** In wet drilling systems that use forced air (bailing air) to flush cuttings from the hole, water is added to the bailing air at the drill head. Small particles join to form larger particles, thus reducing escaping respirable dust.
- **Water Injection at Dust Collector Exhaust:** Adding small amounts of water into the air discharge duct can significantly reduce the release of silica dust in the dump area. When adding water to the discharge duct, slowly increase the rate until there is no visible dust. Check the duct interior daily and clear dust deposits that may form in it.

Operator Isolation

Drill operators using rigs with enclosed cabs can reduce their silica exposure by staying inside

the cab as much as possible during drilling. To be effective, the cab must be well-sealed and well-ventilated. Ensure that door jambs, window grooves, powerline entries and other joints are tightly sealed.

Enclosed cabs should have air conditioning so that operators can keep windows and doors closed. Use a high-efficiency particulate air (HEPA) filter. Upgrade equipment by installing aftermarket ventilation and air conditioning systems if needed.

If possible, position equipment so that operators and others are upwind of escaping visible dust.

Respiratory Protection

Operators of rock-drilling rigs working in enclosed, well-ventilated and sealed cabs should not have elevated silica exposures. Operators and helpers working outside a sealed cab may need to wear respirators even where wet methods and dust collection systems are used. The level of respiratory protection needed depends on the time spent outside the cab, wind direction and speed, and the amount of silica found in the rock or soil.

Where control methods do not reduce silica exposures to OSHA's permissible exposure limit, respirators are required, and employers must have a written respiratory protection program in accord with [OSHA's Respiratory Protection standard](#). It must include the following:

- How to select a respirator;
- Fit testing;
- Directions on proper use, maintenance, cleaning and disinfecting;
- Medical evaluations of workers; and
- Training.

For more information on how to determine proper respiratory protection, visit OSHA's web site at www.osha.gov.

For more detailed information on controlling silica exposures when operating vehicle-mounted rock drilling rigs, refer to OSHA Publication 3362, [Controlling Silica Exposures in Construction](#).

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For assistance, contact us. We can help. It's confidential.



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