

Hexavalent Chromium Hazards in Bridge Painting

Hexavalent chromium or Cr(VI) is a toxic form of chromium that can cause severe health effects to workers, including lung cancer. Chromium compounds are added to paints and primers to provide corrosion protection and reflective properties. Bridge painting activities such as abrasive blasting can expose workers to hazardous levels of Cr(VI). The OSHA Permissible Exposure Limit (PEL) for worker exposure to Cr(VI) is 5 µg/m³ as an 8-hour time-weighted average. OSHA requires construction employers to protect their workers from exposure to this hazardous substance under its [Chromium \(VI\) standard, 29 CFR 1926.1126](#).

The Dangers of Bridge Painting

Most bridge and highway steel structure paint coatings applied before 1980 contained toxic metals such as lead, cadmium and chromium. These additives were used to protect the steel from harsh road conditions and to provide a long-lasting protective coating.

Painters, helpers and other workers at these sites are exposed to these toxic metals while removing existing paint and primers in preparing for repainting or during maintenance work. Paint removal prior to repainting is typically done inside temporary enclosures made with canvas tarps or other materials to protect the environment. This enclosed workspace results in high levels of toxic dust from the old paint and the abrasive material used. Abrasive blasting using recycled steel shot or slag abrasives are common methods for removing old paint from steel structures. Slag abrasives can cause exposure to toxic metals and crystalline silica. Always check the safety data sheet for hazard information. Paint removal using needle guns or grinding is the usual method for spot removal in preparation for hot work and other maintenance tasks.

As the paint is removed, large quantities of tiny particles of paint become airborne and workers can inhale Cr(VI) dust if the paint or primer contains chromium. Current paint formulations of epoxy and urethane paints with zinc primers have mostly replaced the toxic lead and chromium-based coatings previously used on bridge and highway steel structures.



Photo courtesy: Flexaust, Inc. This equipment is shown for illustrative purposes only and is not intended as an endorsement by OSHA of this company, its products or services.

Small business owners should read OSHA's [Small Entity Compliance Guide for the Hexavalent Chromium Standards](#).

How Bridge Painters are Exposed

- **Removing old paint** containing chromium creates dust particles that workers can breathe in. Cr(VI) enters the bloodstream through the lungs and is carried to affect various body parts.
- **Eating, drinking or smoking** around paint dust particles or with contaminated hands and clothing can result in ingesting Cr(VI) which affects the digestive system and can also enter the bloodstream.
- **Cleanup or setup** of contaminated tarps, tools, clothing and other equipment can cause worker exposure to toxic dust.
- **Take-home exposure** from contaminated clothes, shoes and other items can result in family members being exposed to toxic metals.

Health Effects of Exposure to Cr(VI)

- Lung cancer and nasal and sinus cancer
- Eye, nose and throat irritation
- Nasal septum ulcerations and perforations, gastritis and gastrointestinal ulcers
- Contact dermatitis, irritation, ulcers and sensitization from skin contact

For more information on adverse health effects and preventive measures see [OSHA's Health Effects of Hexavalent Chromium Fact Sheet](#).

Engineering Control Methods to Reduce Exposure to Cr(VI) during the Removal of Paint from Bridges

- Conduct abrasive blasting in a fully enclosed area using tarps and a high efficiency dust collector.
- For large enclosures, use an exhaust ventilation system (see picture, above) to capture dust within the enclosure. This creates a negative pressure which pulls in fresh air from the outside. Also, position ventilation ductwork so that dust is drawn away from, and fresh air is brought to the workers.
- Use wet blasting, vacuum blasting with local exhaust ventilation, or centrifugal blasting, where possible.
- Use grinders with a dust collection system.

Key Activities and Work Practices for Reducing Cr(VI) Exposures

- Routine cleanup will minimize the accumulation of Cr(VI) dust.
- Use vacuums with high efficiency (HEPA) filters as well as wet cleaning methods to reduce dust.
- Avoid cleaning with compressed air.
- Ensure that all Cr(VI)-containing debris and contaminated items collected for disposal are placed in sealed impermeable bags or containers which have been properly labeled.
- Collect air samples to determine worker exposure and provide results to affected workers within 5 days. [See 29 CFR 1926.1126(d)]
- Periodically inspect and maintain all control equipment and ventilation systems.
- Do not bring contaminated clothing or other items home. [See 29 CFR 1926.1126(g)(2)]
- Provide handwashing facilities to prevent ingesting dust contaminated with Cr(VI). [See 29 CFR 1926.1126(h)(3)]
- Provide change areas with separate storage facilities for street clothes and for protective clothing and equipment. Keep contaminated clothing and equipment out of the clean change area. [See 29 CFR 1926.1126(h)(1) and (h)(2)]
- Provide eating and break areas which are as free as practicable of Cr(VI) contamination. [See 29 CFR 1926.1126(h)(4)]

PPE and Respiratory Protection during Abrasive Blasting and Grinding

- Abrasive blasting workers should use NIOSH-approved Type CE abrasive blasting respirators:
 - continuous flow respirators with a loose-fitting helmet/hood that has a protection factor of 25; or
 - continuous flow respirators with a tight-fitting facepiece that has a protection factor of 50; or
 - pressure demand respirators with a tight-fitting facepiece that has a protection factor of 1000.

Employers providing respirators to their workers must comply with OSHA's Respiratory Protection standard, 29 CFR 1910.134. For more information, see OSHA's [Safety and Health Topics page](#) on respiratory protection.

- Grinding workers should use, at a minimum, a NIOSH-approved half mask air-purifying respirator to protect against dust.
- If required, workers must wear hard hats, safety shoes, eye protection, gloves, hearing protection, coveralls or Tyvek suits, and use fall protection.

More Information

For more information on hexavalent chromium exposure, visit OSHA's website at www.osha.gov.

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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www.osha.gov (800) 321-OSHA (6742)**