

Health Effects of Hexavalent Chromium

Hexavalent chromium (Cr(VI)) compounds are a large group of chemicals with varying properties, uses, and workplace exposures. The National Institute for Occupational Safety and Health (NIOSH) considers all Cr(VI) compounds to be occupational carcinogens. Workers may be harmed from exposure to hexavalent chromium. The level of exposure depends upon the dose, duration, and work being done.



Some industrial sources of hexavalent chromium are:

- fumes from welding stainless steel or nonferrous chromium alloys
- chromate pigments in inks, paints, dyes, and plastics
- chromates added as anti-corrosive agents to paints, primers, and other surface coatings
- chrome plating by depositing chromium metal onto an item's surface using a solution of chromic acid
- particles released during smelting of ferro-chromium ore
- impurity present in Portland cement



Workplace exposure to hexavalent chromium may cause these health effects:

- irritation or damage to the eyes and skin if hexavalent chromium contacts these organs in high concentrations
- irritation or damage to the throat, nose, and lungs if hexavalent chromium is breathed at high levels
- lung cancer in workers who breathe airborne hexavalent chromium

How hexavalent chromium affects ...

The skin

Some workers can also develop an allergic skin reaction called allergic contact dermatitis. This occurs when handling liquids or solids containing hexavalent chromium. Once an employee becomes allergic, brief skin contact causes swelling and a red, itchy rash that becomes crusty and thickened with prolonged exposure. Allergic contact dermatitis is long-lasting and more severe with repeated skin contact.

Direct-skin contact with hexavalent chromium can cause a non-allergic skin irritation. Contact with non-intact skin can also lead to chrome ulcers. These are small, crusted skin sores with a rounded border. They heal slowly and leave scars.

The throat and nose

Breathing in high levels of hexavalent chromium can cause irritation to the nose and throat.

Symptoms may include runny nose, sneezing, coughing, itching, and a burning sensation. Repeated or prolonged exposure can cause sores to develop in the nose and result in nosebleeds.

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The lungs

Some workers become allergic to hexavalent chromium so that inhaling chromate compounds can cause asthma symptoms such as wheezing and shortness of breath.

Some workers who breathe airborne hexavalent chromium could develop lung cancer.

Employees can inhale airborne hexavalent chromium as a dust, fume, or mist while:

- producing chromate pigments and powders; chromic acid; chromium catalysts, dyes, and coatings
- welding and hot working stainless steel, high-chrome alloys, and chrome-coated metal
- working near chrome electroplating

Steps required to protect workers from the health effects of hexavalent chromium

OSHA workplace standard requires employers to:

- Limit 8-hour, time-weighted average hexavalent chromium exposure in the workplace to 5 micrograms or less per cubic meter of air.
- Perform periodic monitoring at least every 6 months if initial monitoring shows employee exposure at or above the action level (2.5 micrograms per cubic meter of air calculated as an 8-hour time-weighted average).
- Provide appropriate personal protective clothing and equipment when there's likely to be a hazard present from skin or eye contact.
- Implement good personal hygiene and housekeeping practices to prevent hexavalent chromium exposure.
- Prohibit employee rotation as a method to achieve compliance with the exposure limit (PEL).
- Provide respiratory protection as specified in the standard.
- Make medical examinations available to employees within 30 days of initial assignment, annually, to those exposed in an emergency situation, to those who experience signs or symptoms of adverse health effects associated with hexavalent chromium exposure, to those who are or may be exposed at or above the action level for 30 or more days a year, and at termination of employment.

Requirements to protect workers from Cr(VI) exposure are addressed in specific OSHA standards for general industry, maritime, and construction.

General Industry (29 CFR 1910)

Maritime (29 CFR 1915, 1917, 1918)

Construction (29 CFR 1926)

If you have questions about the health effectiveness of hexavalent chromium, please contact a local West Bend Mutual Insurance loss control consultant.