Workers in many different occupations are exposed to hexavalent chromium (Chromium (VI)), increasing the risk of developing serious adverse health effects. Occupational exposures occur mainly among workers who handle pigments containing dry chromate and spray paints and coatings containing chromate; operate chrome plating baths; and weld or cut metals containing chromium, such as stainless steel. Stainless steel welding involves the greatest exposure to Chromium (VI).

Sources of hexavalent chromium

<table>
<thead>
<tr>
<th>Uses</th>
<th>Chromium (VI) chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigments for paints, inks, plastics</td>
<td>Lead chromate (yellow, chrome green, molybdenum orange), zinc chromate, barium chromate, calcium chromate, potassium dichromate, sodium chromate</td>
</tr>
<tr>
<td>Anti-corrosion coatings</td>
<td>Chromic trioxide (chromic acid), zinc chromate, barium chromate, calcium chromate, sodium chromate, strontium chromate</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>Chromium (VI) is given off when stainless steel is cast, welded, or plasma torch cut</td>
</tr>
<tr>
<td>Textile dyes</td>
<td>Ammonium dichromate, potassium chromate, sodium chromate</td>
</tr>
<tr>
<td>Wood preservatives</td>
<td>Chromium trioxide</td>
</tr>
<tr>
<td>Leather tanning</td>
<td>Ammonium dichromate</td>
</tr>
</tbody>
</table>

Other sources include chrome plating, smelting of ferrochromium ore, and impurities present in portland cement.

How hexavalent chromium can harm employees

Hexavalent chromium exposure can occur through direct contact or it can enter the body by breathing air containing the contaminant or by being swallowed. Workplace exposure to Chromium (VI) may cause the following health effects:

- **Cancer** — Chromium (VI) is classified as a known carcinogen. Workers exposed to hexavalent chromium in the workplace have much higher rates of lung cancer.

- **Respiratory system effects** — Chromium (VI) is a respiratory tract irritant 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. If the damage is severe, the nasal septum (wall separating the nasal passages) develops a hole (perforation).

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

**Eyes** — Chromium (VI) is an eye irritant. Direct eye contact with chromic acid or chromate dusts can cause permanent eye damage.

**Skin effects** — Chromium (VI) compounds are not only powerful skin irritants but also can be corrosive. Contact with non-intact skin can also lead to chrome ulcers. These are small crusted skin sores with a rounded border. Ulcers can penetrate deep into soft tissue or become the site of secondary infections. They heal slowly and leave scars. Common sites for these ulcers include the nail root, knuckles and finger webs, back of the hands, and forearms.

Some workers develop an allergic skin reaction, called **allergic contact dermatitis**. This occurs from handling liquids or solids containing hexavalent chromium. Once a worker becomes sensitized, contact with even small amounts can cause a serious skin rash. Allergic contact dermatitis is long-lasting and more severe with repeated skin contact.
OR-OSHA requirements

OR-OSHA has adopted regulations to protect workers exposed to Chromium (VI) in the workplace.

The hexavalent chromium standard requires employers to:

- Limit eight-hour time-weighted average hexavalent chromium exposure in the workplace to 5 micrograms or less per cubic meter of air.
- Perform personal air monitoring at least every six months if initial monitoring shows worker exposure at or above the action level (2.5 micrograms per cubic meter of air calculated as an eight-hour time-weighted average).
- Provide appropriate personal protective clothing and equipment when there is likely to be 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 permissible exposure limit.
- Provide respiratory protection as specified in the standard.
- Provide medical exams:
  - Within 30 days of initial assignment for workers who are or may be exposed at or above the action level for 30 or more days a year
  - Annually
  - To workers exposed in an emergency situation
  - When employees experience signs or symptoms of adverse health effects associated with Chromium (VI) exposure
  - At employment termination

Resources


Related resource links

Federal OSHA

- www.osha.gov/SLTC/hexavalentchromium/index.html
- www.osha.gov/Publications/OSHA_small_entity_comp.pdf

NIOSH

- www.cdc.gov/niosh/topics/hexchrom/