

Understanding the History, Usage, and Regulation of Hexavalent Chromium [Cr(VI)]



Employees in the painting and coating industries are exposed to many toxic and hazardous chemicals. Unfortunately, in some circumstances, workers are not even aware of the dangers present in their places of work.

As recently as February 16, 2016, OSHA fined a company in Berlin, Connecticut over \$46,000 for not adequately protecting employees from the risks associated with working with Cr(VI), a toxic chemical found in many paints, primers, and coatings.

For your protection, here are some things you should be aware of regarding Cr(VI).

Understanding Hexavalent Chromium

Chromium is an odorless and tasteless metallic element found in nature. However, the mineral can be changed into other forms either chemically or mechanically. One man-made derivative or compound made from chromium is Cr(VI).



Hex Chrome is hazardous, toxic and causes cancer.

Cr(VI) is added to **paints, primers, and surface** coatings to increase durability and provide corrosion resistance.

Those who work with spray paints and coatings are at high risk of exposure and associated health problems. Cr(VI) is aerosolized during the paint or coating spray application and enters the body through Inhalation. It also enters the body if eyes or open skin comes into contact with the liquid or dust.

Cr(VI) is a toxic air contaminant (TAC) that causes a wide-range of both acute and chronic problems such as yellow teeth, shortness of breath, coughing, wheezing, bronchitis, pneumonia, skin ulcers, dermatitis, and lung, nasal, and sinus cancer. Cr(VI) also is hazardous in that it pollutes air and water.

Both the potential environmental and human impact of Cr(VI) is of great concern. Because of the serious health risks associated with Cr(VI), federal and state governmental agencies have developed regulations and guidelines to protect the public. In the United States, federal work safety limits as determined by The Occupational Safety and Health Administration (OSHA) are set at 5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) of air during an 8-hour period.

OSHA requires employers to monitor employee exposure, provide respiratory protection and PPE, have a medical surveillance program in place, and keep strict records of all those working with Cr(VI).

The European Union's agency for monitoring and regulating chemicals is called REACH. It stands for Registration, Evaluation, Authorization and Restriction of Chemicals. They have banned Cr(VI) and are in the process of phasing usage out. As of **September 21, 2017** use of Cr(VI) must be "sunsetting" or completely stopped.

It's important to know that cancer risk from Cr(VI) at the current permissible exposure limit (PEL) is higher than the associated risks of working with asbestos and benzene at their PELs.

- **Asbestos:** 6.7 deaths per 1000 workers
- **Benzene:** 10 deaths per 1000 workers
- **Cr(VI):** 10-45 excess lung cancer deaths per 1000 workers for 45 years of exposure at new PEL of 5 $\mu\text{g}/\text{m}^3$

Key Legislative Dates

1980

1980: The First Annual Report on Carcinogens is published by the National Toxicology Program and the Department of Health and Human Services.

Cr(VI) is listed as a human carcinogen.

1986

1986: The California EPA Air Resources Board (CARB) identifies Cr(VI) as a toxic air contaminant (TAC).

2001

2001: The California Air Resources Board (CARB) approves banning the use of hexavalent chromium coatings for motor vehicles and mobile equipment by Jan. 1, 2003.

2006

2006: OSHA mandates the aerospace industry reduce the use of Cr(VI) by 52% or face stiff fines.

The European Union's organization that oversees use of chemicals (REACH) bans the use of Cr(VI) in electronics. Use of Cr(VI) in other industries must be phased out over the course of the next few years.

2009

2009: OSHA reduces the permissible exposure limits again.

2010

2010: The US Department of Defense directs all branches of the military to "explore methods to minimize the use of and exposure to Cr(VI) and seek and evaluate less toxic alternatives.

2017

2017: Use of Cr(VI) is no longer permitted in Europe after September 21, 2017 per REACH regulations.