

From the
Chemical & Material Risk Management Directorate,
Office of the Under Secretary of Defense for Acquisition, Technology & Logistics

Chemical & Material Emerging Risk Alert

Hexavalent Chromium (Cr(VI))

While the human health and environmental risks related to hexavalent chromium have been known for years, new scientific studies and risk assessments are resulting in even stricter standards that may result in higher life cycle costs for processes, controls and monitoring.

What is hexavalent chromium?

Chromium is a heavy metal that is used in various forms for protection against wear and corrosion. Hexavalent chromium (Cr(VI)) refers to chemical compounds that contain the element chromium in the +6 oxidation state.

How is hexavalent chromium used in the DoD?

Cr(VI) is used to protect parts in a variety of ship, automotive, aircraft, and computer components. It is used in hard-chromium plating of structural components, conversion coatings, paints and primers, and in specific electrochemical processes that thicken and toughen aluminum parts.

What are the main health and environmental concerns?

Workers who breathe Cr(VI) compounds for many years may be at increased risk of developing lung cancer. The general population may be exposed by inhaling air and eating food or drinking water containing Cr(VI).

How is hexavalent chromium regulated?

The Occupational Safety and Health Administration (OSHA) has established an 8-hour work shift permissible exposure limit of 5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) measured as Cr(VI). The Environmental Protection Agency (EPA) has established a national standard of 100 micrograms per liter ($\mu\text{g}/\text{L}$) for total chromium in water that may be consumed by people. Within the European Union, the use of hexavalent chromium in electronic equipment is largely prohibited by the Restriction of Hazardous Substances Directive.

What is the emerging risk?

The September 2010 release of EPA's Draft Toxicological Review of Hexavalent Chromium (75 FR 60454) provides scientific support for concluding that Cr(VI) may be cause cancer in humans via ingestion. This will be the first time that the EPA has published this type of risk rating for Cr(VI).

New studies and scientific risk assessments may result in even stricter public health standards. Publication of an oral cancer toxicity value may drive cleanup levels for multiple media, including soil and drinking water, several orders of magnitude less than existing risk-based standards based on current EPA IRIS values.

What should you do in response to this Alert?

Ensure compliance with the Under Secretary of Defense (Acquisition, Technology, & Logistics) policy of April 8, 2009, "Minimizing the Use of Hexavalent Chromium." Review any current uses of Cr(VI) and any sites with detected releases of chromium or Cr(VI) to determine how tightened standards may affect your activities. Ensure effective controls and monitoring are in place.

Review the Advanced Surface Engineering Technologies for Sustainable (ASETS) Defense database at www.asetdefense.org for information and technical data on alternatives for coatings and surface treatments, their performance, and availability.

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