



Environment, Safety and Health Bulletin

Update – Hexavalent Chromium

DOE/EH-0697

2006-01 (Update)

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Special Operations Reports are issued to initiate management actions in response to events whose subject matter represents significant Departmental safety concerns.

Environment, Safety and Health (ES&H) Alerts are issued to initiate immediate action on potentially significant safety issues.

Environment, Safety and Health (ES&H) Bulletins are issued to share information and recommend actions on potential safety issues.

Safety Advisories are issued to provide information to the DOE Complex on potentially significant safety or health issues.

PURPOSE

This Bulletin provides the most recent information on a safety concern that may impact operations at Department of Energy (DOE) facilities, and updates ES&H bulletin 2006-01 (January 2006).

BACKGROUND

Hexavalent chromium (Cr(VI)) compounds contain chromium in its +6 valence state. Cr(VI) compounds are present in stainless steel and certain paints. Also, before 1994, powders containing Cr(VI) compounds were often added as rust inhibitors to recirculation-type industrial cooling water systems. The manufacture, use, servicing, and decommissioning of products or facilities that contain Cr(VI) compounds may result in occupational exposures or releases to the air, water, or soil through emissions, effluents, or waste disposal.

DOE records show that in 2005, there were four welding incidents resulting in overexposures to Cr(VI). In addition, legacy contamination in recirculation-type cooling systems may cause occupational exposures at DOE sites if the heels of partially dissolved and trapped solutions of Cr(VI) compounds are found inside piping, valves, heat exchangers, and pumps during decommissioning, dismantling and disposition (D&D) activities that involve cutting or burning. D&D activities may also generate chromium-containing hazardous wastes, as defined in 40 CFR 261, which require special handling and worker training. Furthermore, releases of reportable quantities of chromium-containing wastes or compounds require reporting to government agencies in accordance with 40 CFR 302.

WHAT ARE THE HAZARDS?

All Cr(VI) compounds are potential human carcinogens. Exposure to certain of these compounds is known to increase the risk of lung cancer. Other adverse health effects from Cr(VI) exposures include nasal and sinus cancers, kidney and liver damage, nasal and dermal irritation and ulceration, and eye irritation and damage. Occupational exposures occur mainly among workers who handle chromate-containing pigments, spray paints, or coatings, operate chrome plating baths, or weld or cut metals, such as stainless steel, that contain chromium.

CHANGES TO THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARD FOR Cr(VI)

On February 28, 2006, OSHA lowered its permissible exposure limit (PEL) for Cr(VI) from 52 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) of air as an 8-hour, time-weighted average to $5 \mu\text{g}/\text{m}^3$ because it has determined that

the risk for lung cancer in workers exposed to Cr(VI) increases at levels below the original PEL. Because 10 CFR 851, *Worker Safety and Health Protection*, requires DOE contractors to comply with all OSHA safety and health standards, the effectiveness of engineered controls and use of adequate respiratory protection should be re-evaluated in light of the new Cr(VI) PEL.

MINIMIZING EXPOSURES DURING WELDING, TORCH CUTTING, OR BURNING OF Cr(VI)-CONTAINING MATERIALS

- Sample and monitor the breathing air zone for contaminants.
- Wear appropriate respiratory protection.
- Use an approved airline respirator rather than an air-purifying fume respirator to provide the best protection, particularly in an enclosed space where local ventilation is impractical.
- Use special care when welding or cutting in a confined space and provide additional exhaust ventilation as necessary.
- Use local exhaust ventilation and fume-extraction equipment to clear the breathing zone of particles and fumes.
- Ensure that exhaust-capture nozzles are placed properly and not too far from the work piece.
- Use a helmet and position the head to minimize exposure to fumes in the breathing zone.
- Read Material Safety Data Sheets (MSDSs) for all materials used in welding or cutting and heed all Cr(VI) warnings.
- Avoid torch cutting and burning of equipment having deposits suspected of containing Cr(VI).
- Select materials that do not contain chromium.

ADDITIONAL SOURCES OF INFORMATION

- Your Safety and Health Office
- Information on the web:
<http://www.osha.gov/SLTC/hexavalentchromium/>
<http://www.cdc.gov/niosh/topics/hexchrom/>

SUMMARY

- Exposures to Cr(VI) compounds can be avoided.
- Exposure to Cr(VI) compounds may lead to lung cancer.
- Update site safety practices to meet the new PEL for Cr(VI).

If you have any questions, please contact Dr. Bill McArthur by telephone at 301-903-9674 or by e-mail at bill.mcarthur@eh.doe.gov.

C. Russell H. Shearer
Acting Assistant Secretary
for Environment, Safety and Health



PREVENT EVENTS

Learning from Industry Experience

PREVENT EVENTS is intended for use by personnel during morning meetings, pre-job briefings, and work unit meetings to communicate key industry experience.

Management:

1. What training have we provided our workers on working with hexavalent chromium-containing materials?
2. Do we have written procedures for handling materials that contain Cr(VI) and chromium-containing wastes at our facilities?
3. Have we made available to our workforce the proper respiratory, welding and cutting, exhaust extraction, and monitoring equipment?
4. What have we done to meet the more stringent OSHA PEL during tasks such as welding and cutting of materials that contain Cr(VI) compounds?
5. Do we have legacy water recirculation-type cooling systems that may contain residual solutions of Cr(VI)-containing compounds and that will undergo D&D?

Supervisors and Workers:

1. What type of respiratory gear and clothing should we wear?
2. Will someone be monitoring the air space where we will be working?
3. Will there be local exhaust ventilation?
4. Are we using fume-extraction welding or cutting equipment?
5. Should an airline respirator be used instead of an air-purifying fume respirator?





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Safety and Health Topics

Hexavalent Chromium

Chromium hexavalent (CrVI) compounds, often called hexavalent chromium, exist in several forms. Chromates are often used as pigments for photography, and in pyrotechnics, dyes, paints, inks, and plastics. They can also be used for stainless steel production, textile dyes, wood preservation, leather tanning, and as anti-corrosion coatings.

The following questions link to information relevant to hexavalent chromium hazards in the workplace.



[What OSHA standards apply?](#)

[Standards](#) | [Regulatory Agenda](#) | [Federal Registers](#) | [Standard Interpretations](#)



[What is hexavalent chromium and what are its potential health effects?](#)

[Properties](#) | [Health Effects](#)



[How can I evaluate hexavalent chromium exposure?](#)

[Exposure Limits](#) | [OSHA Methods](#) | [NIOSH Methods](#)



[What are some possible solutions for workplace hazards?](#)



[What additional information is available?](#)

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In Focus

- [Hot Topics](#)

Safety and Health Topics

Hexavalent Chromium

- [OSHA Standards](#)
- [Hazard Recognition](#)
- [Exposure Evaluation](#)
- [Possible Solutions](#)
- [Additional Information](#)
- [Credits](#)

Accessibility Assistance

Contact the OSHA Directorate of Science, Technology and Medicine at 202-693-2300 for assistance accessing OSHA PDF materials.

In Focus

Hot Topics

- [Occupational Exposure to Hexavalent Chromium](#). OSHA Federal Register Final Rules 71:10099-10385, (2006, February 28). Also available as an 11.2 MB [PDF](#), 287 pages.
- [OSHA Issues Final Standard on Hexavalent Chromium](#). OSHA National News Release, (2006, February 27). OSHA will publish a final standard for occupational exposure to hexavalent chromium on February 28, 2006. The standard covers occupational exposure to hexavalent chromium (Cr(VI)) in general industry, construction and shipyards.
- On Jan. 17, 2006, the US Court of Appeals for the Third Circuit granted a six-week extension to OSHA to publish a final rule for occupational exposure to hexavalent chromium. The new deadline for publication is February 28, 2006. The agency requested the extension due to unanticipated delays as a result of Hurricane Katrina and the subsequent activation of OSHA's Worker Safety and Health Support Annex to the government's National Response Plan.
- On April 2, 2003, the US Court of Appeals for the Third Circuit directed OSHA to publish a proposed hexavalent chromium rule no later than October 4, 2004 and a final standard no later than January 18, 2006. The Court issued the ruling based on a recommendation from a court-appointed mediator trying to resolve a suit from Public Citizen Health Research Group seeking to require OSHA to promulgate a new standard on chromium.
- [OSHA Schedules Public Hearings on Hexavalent Chromium](#). OSHA Trade News Release, (2005, January 19).
- [Occupational Exposure to Hexavalent Chromium](#). OSHA Federal Register Proposed Rules 69:59305-59474, (2004, October 4).

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