

Overview of USD-AT&L Memo on Cr⁶⁺ and Other Regulatory Issues

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Introduction

- **USD-AT&L Memo April 8, 2009 “Minimizing the Use of Hexavalent Chromium (Cr⁶⁺)”**
- **A lot of concern over whether DoD can replace Cr⁶⁺-containing materials and processes without sacrificing performance (i.e., will implementing replacements increase life-cycle costs?)**
- **This Workshop focuses on engineering solutions, data, implementations**
 - **Where is it feasible to replace Cr⁶⁺ (also Cd, VOCs)**
 - **Where alternatives improve performance**
 - **Where alternatives are inadequate and there is a need for better options**
- **Objective is to foster information transfer, collaboration and coordination**

Cr⁶⁺ Regulatory Drivers

- **Globalization of Regulation – European Union environmental requirements affecting market access (ELV, WEEE, RoHS, REACH)**
- **Policy evolution in U.S. – Questions about adequacy of existing regulatory framework**
- **Greening of the supply chain – Sustainability has evolved from the margin to the mainstream as a competitive advantage on the commercial front (shift in corporate procurement policies)**

NEXT ON THE HORIZON

- **NIOSH hexavalent chromium recommendation**
- **EPA Residual Risk Requirements related to air emissions**

DoD Memo on Cr⁶⁺



THE UNDER SECRETARY OF DEFENSE
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ACQUISITION,
 TECHNOLOGY
 AND LOGISTICS

APR - 8 2009

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS

SUBJECT: Minimizing the Use of Hexavalent Chromium (Cr⁶⁺)

Cr⁶⁺ is a significant chemical in numerous Department of Defense (DoD) weapons systems and platforms due to its corrosion protection properties. However, due to the serious human health and environmental risks related to its use, national and international restrictions and controls are increasing. These restrictions will continue to increase the regulatory burdens and life cycle costs for DoD and decrease materiel availability. OSD, DoD Components, and industry have made substantial investments in finding suitable replacements for Cr⁶⁺ for many of the current DoD applications. In particular, a number of defense-related industries are minimizing or eliminating the use of Cr⁶⁺ where proven substitutes are available that provide acceptable performance for the application.

This is an extraordinary situation that requires DoD to go beyond established hazardous materials management processes. To more aggressively mitigate the unique risks to DoD operations now posed by Cr⁶⁺, I direct the DoD Military Departments to take the following actions:

- Invest in appropriate research and development on substitutes.
- Ensure testing and qualification procedures are funded and conducted to qualify technically and economically suitable substitute materials and processes.
- Approve the use of alternatives where they can perform adequately for the intended application and operating environment. Where Cr⁶⁺ is produced as a by-product from use or manufacture of other acceptable chromium oxides, explore methods to minimize Cr⁶⁺ production.

- April 8 '09 USD AT&L issued memo restricting Cr⁶⁺ use, unless no cost-effective alternatives with satisfactory performance
- Requires Program Executive Officer (PEO) and Corrosion Control and Prevention Executive (CCPE) to certify if no acceptable alternative

Intent of the Memo

- **Eliminate use of chromate materials and processes in new weapons systems unless there are no satisfactory alternatives**

“The Defense Acquisition Regulation Council will prepare a clause for defense contracts prohibiting use of Cr⁶⁺containing materials in all future procurements unless specifically approved by the Government.”

- **Eliminate Cr⁶⁺ in legacy systems when they are modified or overhaul methods updated**

“Application of this policy to legacy systems will be limited to modifications where alternatives can be inserted in the system modification process and updated maintenance procedures.”

PEO must take manufacturability and performance into account

- **Cost-effectiveness**
- **Any change in performance**
- **Acceptable ESOH for alternative**
- **Long term availability**
- **Technical feasibility, $MRL \geq 8$**
 - **Ready for at least low rate production**
 - **Stable production methods**
 - **QA/QC established**
 - **Adequate supply chain for limited production**

Cr⁶⁺ use can continue if alternatives not acceptable

Defense Federal Acquisition Regulation Supplement (DFARS) Modification

- Defense Acquisition Regulation Council has drafted a Proposed Rule for the DFARS – will be published in Federal Register for Comment
- Prohibition on Use of Cr⁶⁺: “Except as [separately] provided, no DoD contract may include a specification or standard that results in a deliverable containing [Cr⁶⁺] or the use of [Cr⁶⁺] in performance of a DoD contract.”
- Exception: “Prohibition does not apply if the use of [Cr⁶⁺] is specifically authorized at a level no lower than a flag officer or member of SES from the PEO or equivalent level, in coordination with Corrosion Control and Prevention Executive. Forward any requests for approval of [Cr⁶⁺] in a deliverable item to the cognizant technical representative for evaluation and, if necessary, authorization by the appropriate official.”

DFARS Modification

- **Exception:** “Prohibition does not apply to legacy systems and their related parts, subsystems and components that already contain [Cr⁶⁺]. However, alternatives to [Cr⁶⁺] shall be considered during system modifications, follow-on procurements of legacy systems, or maintenance procedure updates.”
- **Actual DFARS clause would state:** “Unless otherwise specified by the Contracting Officer, the Contractor shall not provide any deliverables under this contract (or use materials in the performance of this contract) that contain [Cr⁶⁺] in a concentration greater than 0.1% by weight in any homogeneous material. The Contractor is financially liable for any damages resulting from use or delivery of any materials that contain unapproved [Cr⁶⁺].”
- **Terminology (“homogeneous material”)** is consistent with language in RoHS

OSHA Cr⁶⁺ Permissible Exposure Limit

- Issued in February 2006
- PEL is 5 $\mu\text{g m}^{-3}$ 8 hr time-weighted average (TWA)
- Aircraft painting operations
 - 25 $\mu\text{g m}^{-3}$ allowed in paint hangar
 - PPE required to reach 5 $\mu\text{g m}^{-3}$ for worker

OSHA's Approach

<p><i>Factors OSHA Must Consider</i></p>	<p><i>OSHA's Conclusion in Setting Final PEL</i></p>
<p>Health Risk</p>	<p>Still “significant risk” at PEL of 5 $\mu\text{g}/\text{m}^3$</p>
<p>Technical Feasibility</p>	<p><u>Aerospace Painting</u> – PEL of 5 $\mu\text{g}/\text{m}^3$ not technologically feasible*</p>
<p>Economic Feasibility</p>	<p><u>Electroplating</u> – PEL of 5 $\mu\text{g}/\text{m}^3$ is economically feasible, but NOT 1 $\mu\text{g}/\text{m}^3$</p>

“Significant Risk” in Final Standard: Cr⁶⁺ vs. Other OSHA Risk Estimates

Standard	Cancer Risk (per 1000)	Final Rulemaking Date
Asbestos	6.7	June 1986
<i>Benzene</i>	<i>10</i>	<i>September 1987</i>
Formaldehyde	.0056 – 2.64	December 1987
<i>Cadmium</i>	<i>3 – 15</i>	<i>September 1992</i>
1,3-Butadiene	1.3 – 8.1	November 1996
Methylene Chloride	3.6	January 1997
<i>Chromium VI</i>	<i>10 – 45</i>	<i>February 2006</i>

NIOSH Draft Hex-Chrome Criteria Document

- Issued on 14 November 2008
- Lowers recommended exposure limit (REL) for hex-chrome from 1 $\mu\text{g}/\text{m}^3$ to 0.20 $\mu\text{g}/\text{m}^3$, a level that NIOSH claims carries a 1:1000 risk of cancer death to workers
- NIOSH cites two studies of chromate chemical production workers that demonstrate a “significant risk of lung cancer mortality to workers exposed to hex-chrome at the previous REL”
- Document available at www.cdc.gov/niosh/topics/hexchrom/
- NIOSH held public meeting on new criteria on 22 January 2009
- Post-meeting submissions from companies and organizations plus peer reviews submitted and currently being reviewed by NIOSH; information available at <http://www.cdc.gov/niosh/docket/nioshdocket0144.html>

EPA “Residual Risk” Standards Limiting Cr⁶⁺ Air Emissions

- EPA sued by several environmental interest groups in early 2009 to review and update several air emission standards whose mandatory review deadlines had lapsed
- Industry MACT Standards under review for Cr⁶⁺
 - ◆ Electroplating, chromic acid anodizing, and related processes
- Regulatory Approach
 - ◆ Review of existing technology-based standards
 - ◆ Evaluate “residual risk” or risk remaining after achieving MACT
 - ◆ Limit cancer risks to no higher than 100-in-1 million
 - ◆ Revised MACT standards as necessary
- Recent info is that because of litigation, EPA will skip issuing Advanced Notice of Proposed Rulemaking and will instead go to proposed rulemaking sometime before mid-2010
- Surface finishing industry discussing data and control technologies and practices with EPA this summer

REACH and chromates – issue for sustainment in Europe

- **REACH controls and restricts CMRs (carcinogenic, mutagenic, reprotoxic), defined in (Annex I of Directive 67/548/EEC, Packaging and Labeling of Dangerous Substances)**
- **Sodium Dichromate was put forward as a “pre-candidate substance” for inclusion in REACH Annex XIV (Authorization) in June 08**
 - ❑ **Decided not to prioritize for inclusion**
 - ❑ **ECHA intends to bring it up again by 2011**
 - ❑ **Listing has triggered downstream reporting requirements for Na dichromate**

“...the most effective option is to group and prioritise relevant chromium VI compounds, including sodium dichromate, together” (ECHA Committee Recommendations)

REACH Impact on DoD



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POTENTIAL IMPACT OF EUROPEAN REACH REGULATIONS ON DoD AND MILITARY EQUIPMENT MANUFACTURERS AND SUPPLIERS

VERSION 4



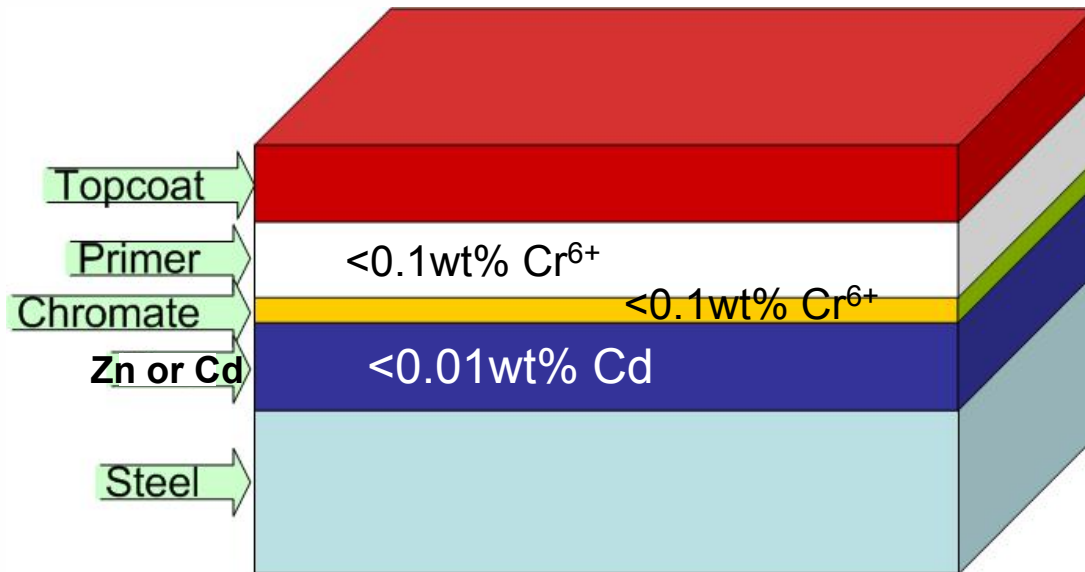
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- Issue for sustainment in Europe
- Loss of local EU sources of chemicals and processes
- Uncertain whether Cd permitted for military vehicles
- Defense Exemptions only in UK at present

European RoHS



- ❑ No homogeneous layer can contain $>0.1\%$ Cr^{6+} or $>0.01\%$ Cd by weight
- ❑ “Homogeneous layer” means any layer that cannot *in principle* be mechanically disjointed
- ❑ The chromate layer is a homogeneous layer, not the chromated Zn or Cd
- ❑ Pb-free solder required

- Companies selling electrical equipment and vehicle in the EU must certify RoHS compliance
- ❑ Aerospace and defense are currently exempt
 - ❑ No guarantee of permanent exemption
 - ❑ Military and aerospace are small markets compared with auto and consumer electronics
 - ❑ Loss of materials from market, reduction in processors, increased cost

HR 2420 – US RoHS?

- **HR Environmental Design of Electrical Equipment Act**
 - **Amends Toxic Substances Control Act**
 - **Looks like US RoHS**
 - **Same materials**
 - **Same definitions and limits**
 - **No aerospace or defense exemptions at present time**
 - **Currently in House Committee on Energy and Commerce**



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