Hexavalent Chromium Minimization Strategy
**Report Documentation Page**

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<th>1. REPORT DATE</th>
<th>MAY 2011</th>
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<td>2. REPORT TYPE</td>
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<td>3. DATES COVERED</td>
<td>00-00-2011 to 00-00-2011</td>
</tr>
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<td>4. TITLE AND SUBTITLE</td>
<td>Hexavalent Chromium Minimization Strategy</td>
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<td>5a. CONTRACT NUMBER</td>
<td></td>
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<td>5b. GRANT NUMBER</td>
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<td>5c. PROGRAM ELEMENT NUMBER</td>
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<td>5d. PROJECT NUMBER</td>
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<td>5e. TASK NUMBER</td>
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<td>5f. WORK UNIT NUMBER</td>
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<td>6. AUTHOR(S)</td>
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<td>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</td>
<td>Office of the Secretary of Defense, Chemical &amp; Material Risk Management, Washington, DC, 20301</td>
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<td>8. PERFORMING ORGANIZATION REPORT NUMBER</td>
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<tr>
<td>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</td>
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<td>10. SPONSOR/MONITOR’S ACRONYM(S)</td>
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<tr>
<td>11. SPONSOR/MONITOR’S REPORT NUMBER(S)</td>
<td></td>
</tr>
<tr>
<td>12. DISTRIBUTION/AVAILABILITY STATEMENT</td>
<td>Approved for public release; distribution unlimited</td>
</tr>
<tr>
<td>13. SUPPLEMENTARY NOTES</td>
<td>Presented at the NDIA Environment, Energy Security &amp; Sustainability (E2S2) Symposium &amp; Exhibition held 9-12 May 2011 in New Orleans, LA.</td>
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<td>14. ABSTRACT</td>
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<td>15. SUBJECT TERMS</td>
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<td>16. SECURITY CLASSIFICATION OF:</td>
<td></td>
</tr>
<tr>
<td>a. REPORT</td>
<td>unclassified</td>
</tr>
<tr>
<td>b. ABSTRACT</td>
<td>unclassified</td>
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<tr>
<td>c. THIS PAGE</td>
<td>unclassified</td>
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<td>17. LIMITATION OF ABSTRACT</td>
<td>Same as Report (SAR)</td>
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<td>18. NUMBER OF PAGES</td>
<td>16</td>
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<td>19a. NAME OF RESPONSIBLE PERSON</td>
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Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std Z39-18
Operating Environment & Trends

• **Use of Precautionary Principle**
  – We must understand health & environmental effects before using chemicals

• **Biomonitoring – What’s showing up in humans?**
  – Centers for Disease Control’s national biomonitoring & California voluntary program

• **Evolving Risk Assessment Science & Process**

• **Strict Chemical Management & Green Chemistry**
  – Cradle to grave management

• **International, Federal, & State Toxic Substances Laws**
  – EPA’s Chemical Actions Plans & “Chemical Safety for Sustainability”
    • Restrictions or banning of chemicals/materials
  – California Green Chemistry Law
  – European Union’s “REACH” regulation for chemical management
  – Pending TSCA\(^1\) reform

\(^1\) Toxic Substances Control Act
Chemical & Material Risk Management
Directorate Portfolio

- Emerging Contaminants Program
- Green Chemistry & DoD Chemical Management Program
  - DoD REACH Strategic Plan signed in July 2010
- E.O. 13514 “Environmental, Energy, & Economic Performance”
  - Strategic Sustainability Performance Plan signed June 2010
- ESOH Policies & Procedures for DoD Acquisitions
  - Use of Life Cycle Assessment to inject sustainability considerations into acquisition process
Initiative - DoD Hexavalent Chromium Minimization

Cr$_{6+}$

Non-Chrome Primer

Cr(II) and Cr(VI) by IC-ICP-DRC-MS

Cr(II)  - 25 ppt Standard
Desired DoD Paradigm Shift

- Default use of Cr6+
- “Promotion” of substitutes
- Can result in business as usual

- Default use of substitutes
- Use of Cr6+ if no substitute can meet performance requirements
- Bias for change

Note: The required performance shouldn’t be based on Cr6+ but on a level of acceptable performance for the application
Three Part Cr6+ Strategy

Minimization Policy
Sets the Desired Course

Legacy Project
Minimizes Cr6+ in Existing Specs

Defense Federal Acquisition Rule
Minimizes Cr6+ in New Acquisitions
DFAR for Cr6+  
(Defense Federal Acquisition Regulation)

• **Purpose:** “Minimize hexavalent chromium in items acquired by DoD”
• Does not totally ban the use of hexavalent chromium
• Does provide a strong forcing function to use substitutes…where they can meet performance requirements
• **Supports Executive Orders 13423 & 13514**
  – “reduce and minimize the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of.”
DFAR for Cr6+
(Defense Federal Acquisition Regulation)

• For new systems...requires executive level approval for deliverable with Cr6+...must certify no acceptable substitute

• Otherwise, limit is 0.1% by weight in homogeneous material
  – Homogeneous material cannot be mechanically disjointed into different materials and is of uniform composition throughout

• Limit does not apply to legacy systems and sustainment contracts

• For legacy systems...evaluate substitutes during system modifications & maintenance, as practical
  – Legacy system defined as any program that has passed Milestone A as defined in DoD Instruction 5000.02
Practical Implications of Cr6+ DFAR

- Affects mainly paints and primers
- Does not apply to Cr6+ produced as a by-product of manufacturing
- Will not affect chrome plating, anodizing, washing, conversion coatings
- Will help small businesses who have developed non-chromate products & processes
- Will help reduce use of Cr6+ where practical
Summary

The DoD policy is proactive but practical
– It strikes the right balance between mission performance & the move to sustainable chemicals & materials

The chemical management world is changing...those who adapt early will be stronger

Know what you are buying...know what’s in your products
**Initiative - Sustainable Chemicals & Materials Consortium**

- Only at the idea stages thus far
- Brainstormed with industry at the recent Association of Climate Change Officers meeting
- Concept:
  - Coordinated, voluntary effort among DoD and industries
  - Identify, test, and evaluate sustainable chemicals & materials
  - Share information and lessons learned
  - Identify & break barriers to implementation
Questions & Discussion

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Back-up Slides
DoD Hexavalent Chromium Minimization Policy

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.
- Update all relevant technical documents and specifications to authorize use of the qualified alternatives and, therefore, minimize the use of materials containing Cr⁶⁺.
- Document the system-specific Cr⁶⁺ risks and efforts to qualify less toxic alternatives in the Programmatic Environment, Safety, and Occupational Health Evaluation for the system. Analyses should include any costs/schedule risks and life cycle cost comparisons among alternatives. Life cycle comparisons should address material handling and disposal costs and system overhaul cycle times/costs due to any differences in corrosion protection.
- Share knowledge derived from research, development, testing and evaluations (RDT&E) and actual experiences with qualified alternatives.
What is an Emerging Contaminant?

- Chemicals & materials that have pathways to enter the environment and present potential unacceptable human health or environmental risks...

  and either

  - do not have peer-reviewed human health standards

  or

  - Standards/regulations are evolving due to new science, detection capabilities, or pathways.
EC “Scan-Watch-Action” Process

Review literature, periodicals, regulatory communications, etc.

Monitor events; Conduct Phase I qualitative impact assessment

Conduct Phase II quantitative impact assessment; develop & rank RMOs*

Risk Management Options (RMOs) to ECGC

Approved RMOs become Risk Management Actions (RMAs)