Closing the Loop:
An Assessment of the Life Cycle of Beryllium-Containing Materials in the Department of Defense

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Today’s Presentation Outline

• Background
• Purpose
• Study Design
• Findings
• Recommendations
• Next Steps
Chemical & Material Risk Management Directorate

• Purpose: To integrate science, technology, and policy to achieve a more sustainable future regarding the assessment, selection, and management of chemicals and materials within the DoD.
  • Facets: Acquisition ESOH, Chemical Management, Green Procurement, Emerging Contaminants (ECs)

• Goals: Proactively address future challenges; sustain the DoD mission; lower life cycle costs; drive innovation; avoid crises
DoD’s Scan, Watch, Action Process for ECs

- **Scan**
  - Over-the-horizon
  - EC News
  - Possible DoD impacts
  - Phase I Assessment
  - Probable high DoD impacts
  - Phase II Assessment

- **Watch**
  - Risk Management Options to ECGC

- **Action**
  - Approved RMOs become Risk Management Actions (RMAs)

**Notes:**
- Probable high DoD impacts and possible DoD impacts are assessed in phases I and II, respectively.
- Risk Management Options to ECGC are considered for further action.
- Approved RMOs are then categorized as RMAs.
Beryllium as an EC

• Be is an Action List EC
  • Why? High risk of impacts to DoD resulting from changes in regulatory occupational exposure standards and limits
    • Impacts likely to ESOH, Readiness & Training, and O&M
  • Risk Management Options (RMOs) developed to address potential impacts
This Study

• Study Purpose
  • Address Be RMO #3

• Study Goals
  • Clarify and highlight gaps in life cycle knowledge by tracking DoD beryllium-containing materials through acquisition, purchase, use, maintenance, and end-of-life management
  • Recommend opportunities to close these gaps
Life Cycle of a Product

1. Design and Production
2. Packaging and Distribution
3. Use and Maintenance
4. Recycling of Materials and Components
5. Recovery
6. Extraction of Raw Materials
7. Natural Resources
8. Incineration and Landfilling
9. Disposal

Reuse

CTC
Concurrent Technologies Corporation
Study Design

• Objectives:
  • Identify supply chain members who have role in DoD life cycle of Be-containing materials
  • Review written documentation concerning management of Be-containing materials at each life cycle stage
  • Conduct case studies that track select Be-containing materials used in DoD weapons systems and platforms through their DoD life cycle to identify current practices for Be-related activities
Study Design

- End-of-Life Management
- Production
- Fabrication
- Acquisition/Distribution
- Use & Maintenance

Supply Chain Members
- DoD
- Military Departments
- Installations
- Shops

Written Documentation
- DoD
- Military Departments
- Installations
- Shops

Work Practices
- DoD
- Military Departments
- Installations
- Shops
Case Study

• Copper beryllium landing gear bushings

• Low altitude navigation and targeting infrared for night (LANTIRN) pod system
Findings

- Beryllium taxonomy is not comprehensive nor standardized

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<thead>
<tr>
<th>Category</th>
<th>Reference</th>
<th>Description</th>
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<tbody>
<tr>
<td>Strategic, Critical Material</td>
<td>Strategic Materials Protection Board Report, December 2008</td>
<td>High purity beryllium metal</td>
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<tr>
<td></td>
<td>DoD 4160.21-M, Defense Materiel Disposition Manual</td>
<td>Beryllium metal, as billets, and beryllium copper master alloy, as ingots</td>
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<td>High Temperature Alloy</td>
<td>DoD 4160.21-H, Defense Scrap Yard Handbook</td>
<td>High temperature alloy group 62: Beryllium</td>
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DoD Written Documentation as a Strategic/Critical Material
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Recommendations

- **Strategic Policy & Procedure Development**
  - Clarify and standardize the beryllium taxonomy
  - Encourage a DoD-wide Precious Metals and Strategic Materials Recovery Program
  - Ensure existing installation- and shop-level materials management policies and procedures contain instructions for safe handling and recovery of Be
  - Ensure full utilization of existing Be recovery and recycling facilities (at OEM or BWI)
Recommendations

• Workforce Education & Training
  • Ensure personnel responsible for end-of-life management are trained to identify recoverable quantities of strategic, critical materials per existing written policies and procedures
  • Develop training to ensure supply chain members are aware of a new DoD-wide Precious Metals and Strategic Materials Recovery Program
Next Steps

• Review draft findings and publish draft report
• Finalize report and discuss recommendations with affected parties
• Present findings and recommendations to EC Steering Committee
Thank You

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