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15. SUBJECT TERMS
Emerging contaminants, risk assessment, risk management,

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Emerging Contaminants Program

Program Update

Paul Yaroschak, Deputy Director
Chemical & Material Risk Management
Office of the Secretary of Defense
Trends

- **Use of Precautionary Principle**
  - 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**
  - Cradle to grave

- **Green Chemistry**

- **International, Federal, & State Toxic Substances Laws**
  - Restrictions or banning of chemicals/materials (e.g., BPA)
  - California Green Chemistry Law
  - Minnesota “Toxic Free Kids Act”
  - Pending TSCA\(^1\) reform

\(^1\) Toxic Substances Control Act
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.
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)
Sulfur Hexafluoride (SF6) is used in radar systems (e.g., AWACS); helicopter rotor-blade leak tests; discharge testing in fire suppression systems; electrical switch gear; and propulsion systems for specific weapons (e.g., MK-50 torpedo) in service and under design.

Likelihood of Toxicity Value/Regulatory Change

1. Probability that Greenhouse Gas emission initiatives will restrict use/availability of SF6

Completed January 2008
EC Watch List – Sep 2010

- Tungsten alloys
  - Sodium Tungstate
- **Tetrachloroethylene (PCE)**...de-listed
- **Dioxin**...de-listed
- 1,4-dioxane*
- Nanomaterials
- **Perfluorooctyl sulfonate (PFOS)**
- **Di-nitrotoluenes (DNT)**
- Nickel

- Cadmium
- Manganese
  - Cerium
  - Cobalt
  - Antimony
- **Perfluorooctanoic acid (PFOA)**...moved from action list
  - Phthalates ...recently added
  - Diisocyanates ...recently added
  - TCE ...moved from action list
  - Perchlorate ...moved from action list

- Phase I Impact Assessment completed
* To be re-assessed
Perchlorate...downgrade to watch list
Royal Demolition eXplosive (RDX)
  • Cyclotrimethylenenitrinitramine
Trichloroethylene (TCE)...downgrade to watch list
Hexavalent Chromium (Cr6+)
Naphthalene...pending downgrade to watch list
Beryllium (Be)
Sulfur Hexafluoride (SF6)
Lead

Phase II Impact Assessment completed.
Lead – Why on the Action List?

- Evolving science & regulations pose a risk to range operations...most munitions contain lead

- Lead-free electronics pose a risk to DoD supply chain...short-circuiting in components
RDX – Why on the Action List?

- Most munitions contain RDX
- RDX residues on ranges can present risk to groundwater and thus range use
- EPA is using old toxicity values that don’t incorporate latest toxicity research by Army
- Toxicity values greatly affect cleanup costs
Downgrading Perchlorate to Watch List

• **Risk Management Actions have reduced risk**
  - Latest (April 2009) DoD Policy in a series ensures releases are addressed
    • Sampling database with over 50,000 samples
    • Releases mainly contained on installations & remedial actions underway/completed
  - DoD R&D played a key role…Isotopic analysis technique differentiates between natural & man-made sources
  - Congressional, press, and EPA briefings to dispel perchlorate myths
    • Main message: DoD not the major source of drinking water contamination
  - Army R&D on perchlorate substitutes paying dividends
    • New ground burst simulators being deployed

• **GAO Review on perchlorate contamination in U.S. completed July 2010**
  - No recommendations…implies that DoD releases under control…notes non-DoD sources (e.g., fertilizer) contributing to contamination
Downgrading TCE to Watch List

• **Risks to Cleanup Program Costs**
  – DoD & EPA developed interim toxicity levels to avoid regional inconsistencies & disputes
  – Final EPA risk assessment supersedes interim levels but are about the same
  – Cleanups handled routinely by DERP
  – Vapor intrusion issues remain…RMAs underway to address

• **Risks Related to Continued Use**
  – About 80% of DoD use at Anniston Army Depot (ANAD)
  – Major projects underway at ANAD to develop cleaning processes with substitutes

¹ Defense Environmental Restoration Program
Sulfur Hexafluoride (SF6) Background

• A non-flammable, non-toxic gas
  – Excellent dielectric properties but high global warming potential

• Used in DoD weapons systems & platforms

• DoD risks
  – Restricted availability & possible cost increases of 25 times current cost

• RMOs
  – Capture & recycling policy signed
  – SF6 bank feasibility being studied by DLA
  – Increased R&D on substitutes
Beryllium (Be) Background

- Lightweight, non-magnetic metal used in DoD weapons systems & platforms
  - Strategic, critical material…requires reliable production source
  - Very toxic…OSHA exposure level at 2.0 ug/m³ (8-hr TWA)…industry action level is 0.2 ug/m³

- DoD risks
  - Occupational exposures during O&M activities

- RMOs
  - Response to National Research Council recommendations
    - Key Issues: Use of Be Lymphocyte Proliferation Test for DoD?
  - Life cycle study underway…focus on exposures and recycling
Other Risk Management Actions

• **Naphthalene**
  – A constituent in fuels…possible carcinogen
  – Developed a real-time dosimeter via SBIRP¹…new technology
  – Will determine more accurate exposure to fuel handlers
  – Exposure testing in FY-11 after human testing approval

• **Hexavalent chromium (Cr6+)**
  – DoD minimization policy signed
    • DFAR clause to minimize new uses being finalized after public comment
  – Accelerated corrosion testing protocol being developed
  – Pilot study funded on minimizing legacy uses
    • Work with specification owners to specify suitable substitutes
  – DoD-wide database established on suitable substitutes - managed by DDR&E, SERDP/ESTCP office

¹ Small Business Innovative Research Project
EC Program Highlights

• Screened 391 potential ECs
• Completed 24 Phase I Impact Assessments
  – Deployed “groupware” decision software
• Completed 7 Phase II Impact Assessments
  – Beryllium, lead, sulfur hexafluoride (SF6), hexavalent chromium, naphthalene, trichloroethylene (TCE), perchlorate\(^1\), & RDX\(^2\)
• 47 Risk Management Options (RMOs) developed & turned into Risk Management Actions (RMAs)
  – 27 in-progress, 19 completed, 1 deferred (low risk)

\(^1\) Perchlorate was original EC – no Phase II assessment but RMOs developed and approved by ECGC
\(^2\) A defense related explosive compound
Questions & Discussion

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Extra Slides
How Can ECs Affect DoD?

• **Cause adverse health effects on operating forces, DoD employees, and/or public**
  – Human health protection paramount
• **Reduce training/readiness**
  – Restrictions on use of ranges
• **Restrict availability and/or cost of materials or chemicals**
  – Adverse impact on mission-critical applications & industrial base community
• **Increase O&M and/or cleanup costs**
  – Resource drain from mission needs
Planned FY-11/12 Phase I Impact Assessments

- Nanomaterials…completed Nov 2010
- Cobalt
- Antimony
- Phthalates
- Diisocyanates
Challenges

• **Getting data on chemical/material use in DoD**
  – What, where, and how much?

• **Getting knowledgeable Subject Matter Experts for Phase I Assessments**

• **Communicating EC risks to developers, PMs, and industry**
  – Posting on “Acquisition Community Connection” web site has helped
  – Acquisition Program Support Reviews should help

• **Catch-22**
  – Safer chemicals/materials require T&E for DoD applications
  – T&E affects cost & schedule of programs, thus avoided
# Phase I Impact Assessment Process

## Likelihood of Toxicity Value/Regulatory Change

1. **Likelihood of Toxicity**

2. **Value/Regulatory Change**

## Scoping and Data Collection

## Impact on DoD Functional Areas

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## Results:

- Recommendation – Move to Action List?
- Initial Risk Management Options