Managing Chemical & Material Risks—DoD Emerging Contaminants Program Update

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Emerging Contaminants Program Genesis

• ~2004 – Perchlorate detections in groundwater & drinking water cause national concern
  – Disputes between DoD and regulators over response actions
  – Training/testing on 2 ranges curtailed
• 2005/6 – DoD forms EC Work group with EPA & Environmental Council of States
  – EC Definition & three policy papers developed & approved
    1) What triggers actions for EC releases?  
    2) How to determine toxicity values for risk assessments  
    3) EC Risk Communication
• 2009 – DoD issues EC policy instruction
  – Key elements based on DoD-EPA-ECOS policy papers

What is an Emerging Contaminant?

• Chemicals & materials that have pathways to enter the environment and present real or 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.

Part 1 – Emerging Contaminants (ECs) Program Structure

EC “Scan-Watch-Action” Process

Program Strategic Priorities

Approved, Technology and Logistics

Emerging Contaminants Program Update

Defining for Federal Remediation Technologies Roundtable

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SF6 Phase I Impact Assessment

Sulfur hexafluoride (SF6) is used in radar systems (e.g., AWACS aircraft); helicopter rotor blade leak testing; discharge testing in fire suppression systems; electrical switch gear; and propulsion systems for specific weapons (e.g., MK-50 torpedos) in service and under design.

Likelihood of Toxicity Value

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

Regulatory Change

- Probability
- Occurrence

Severity of Impact

- H
- L
- X
- ●
- ■
- ▲

Ec Program Scorecard

- Potential ECs screened — over 580
- Phase I Impact Assessments completed — 39
- Phase II Impact Assessments completed — 11
- All current/former action list chemicals completed.
- Risk Management Actions (RMAs) — 66

EC Watch List January 2016

- Cobalt
- Antimony
- Flame retardants (6)
- Dichlorocyanates
- NDMA
- DNT
- DNAN
- NTO
- TCE...moved from action list
- Perchlorate...moved from action list
- Strontium...added March 2015
- Chlorinated paraffins...added June 2015

EC Action List January 2016

- Royal Demolition Explosive (RDX)
- Hexavalent Chromium (Cr6+)
- Naphthalene
- Beryllium
- Sulfur Hexafluoride (SF6)
- Lead
- Phthalates
- 1-Bromopropane
- TBBPA...added by EGC in Dec 2015

- Phase II Impact Assessment completed.
Part 3 – Risk Management Actions

Example Risk Management Actions Completed
- Perchlorate research; DoD Policy; Over 50,000 samples taken; Congressional Myth-busters brief
- Hexavalent chromium research; DoD policy memo; Defense Federal Acquisition Regulation
- SF6 policy on capture & recycling
- Beryllium life cycle study
- Development of innovative naphthalene dosimeter for fuel handlers
- RDX toxicological studies
- Coordination with Program Manager for chem/bio protection equipment related to phase-out of phthalates

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Part 4 – Response to EC Releases

Examples of ECs That Can Impact Groundwater & Drinking Water
- Perchlorate
- RDX
- 1,4-dioxane
- Strontium
- PFOA & PFOA
- Lead

Process for EC Releases

Key Triggers & Response Actions for EC Releases
1. Trigger: Release or suspected release of EC by DoD
   Action: Confirmation sampling & initial characterization to determine if exposure exists

Policies
1. “Emerging Contaminants” DoDI 4715.18
3. Safe Drinking Water” DoDI 4715.05
4. PL 112-239, NDAA 2013, Section 313, requires DoD to issue policy for assessing past environmental exposures. OSD (EHS/ES) is developing a DoD instruction to assess past exposures modeled on requirements for current exposures in DoDI 6055.05, “Occupational and Environmental Health.”
Key Triggers & Response Actions for EC Releases

1. **Trigger:** Release or suspected release of EC by DoD
   **Action:** Confirmation sampling & initial characterization to determine if exposure exists

2. **Trigger:** Confirmed pathway & receptor for EC exposure
   **Action:** Eliminate “unacceptable” exposure via risk management actions

3. **Trigger:** Peer reviewed toxicity standard (e.g., RfD) is published; Don’t need MCL
   **Action:** Site is integrated into DERP for site-specific risk assessment and possible remedial action

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Three Scenarios Where Exposure Exists

- **Scenario 1** – An RfD and a PHA, MCL, and/or cleanup standard exists
- **Scenario 2** – A peer-reviewed RfD exists; the RfD may or may not be listed in IRIS; the RfD may be used by EPA to publish a PPRTV or an RfD may be listed in a state database.
- **Scenario 3** – No peer-reviewed RfD exists, thus no value in IRIS. These will be rare cases, if any, and handled on a case-by-case basis.

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PFOA/PFOS History

1949 – 3M begins producing PFOS compounds; used in “Scotchgard”
1999 – EPA begins investigating PFCs based on toxicity studies and prevalence in environment
Through 2001 – PFOS used in making AFFF (fire fighting foam)
2006 – EPA & 8 companies announce PFC Stewardship program for production phase-outs by end of 2015
June 2007 – DoD EC Program completes a Phase I Impact Assessment for PFOA & PFOS
* Assessment notes risk related to PFOS releases at AFFF sites
~2007-present – Services begin to identify sites; response actions delayed due to uncertainty in toxicological science
January 2009 – EPA issues Preliminary Health Advisories for PFOA & PFOS & indicates plans for full assessment of science
May 2012 – EPA issues UCMR #3 with PFOA & PFOS
February 2014 – EPA Office of Water issues draft risk assessment; when finalized will become new Lifetime Health Advisory

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Department of Defense Emerging Contaminants Program

Backup Slides
The Defense Context

Equipment, weapon systems, and platforms provided to the war-fighter are made from, and depend on, chemicals & materials. Vital chemicals & materials needed for production, performance, and sustainment of systems are increasingly at risk from becoming non-available.

Global Chemical Management 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 bio-monitoring & California voluntary program
- Strict Chemical Management & Green Chemistry
  - Cradle to grave
- Evolving Risk Assessment Science & Process
- International, Federal, & State Toxic Substances Laws
  - EPA Chemical Action Plans
  - California Green Chemistry Law
  - European Union’s REACH regulation
  - Pending Toxic Substance Control Act reform

Regulatory Trends

Develop prioritized list of toxic chemicals (e.g., REACH Chemicals of Very High Concern & EPA Chemical Action Plans)

Assess uses & exposures

Issue risk management actions/regulations (e.g., Restrictions or production bans)

How Can ECs Affect DoD?

- Present risks to 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
  - Diverts resources from core mission

EC Program Governance

EC Governance Council

EC Steering Group

Deputy Assistant Secretaries (ESOH)

EC Subject Matter Experts, Working Groups & MERIT

Perchlorate Management Strategy

- DoD Policies & Sampling/Characterization – Find the releases
  - DoD Sampling began ~15 years ago
  - DoD 2006 sampling policy memo required sampling in all media
  - California site prioritization protocol completed working with the state
  - DoD 2009 policy update uses EPA Preliminary Remediation Goal (PRG)
- Response via DERP¹ – Address the releases
  - Lack of MCL does not stop response actions
  - Published EPA reference dose (RfD) used for site-specific risk assessments
- Invest in R&D – Determine sources & substitutes
  - Over $114M invested
  - Perchlorate substitutes
  - Sources, sampling & analytical methods
  - Treatment technologies

¹ Defense Environmental Restoration Program
Lead – Why on the Action List?

- Evolving science & regulations may pose a risk to personnel & range operations...most munitions contain lead
- Lead-free electronics pose a risk to DoD supply chain...short-circuiting in components

Background for Lead Risk Management Actions Taken -

- DoD-Industry Consortium on lead-free electronics
  - Develop technologies to detect lead-free circuit boards
  - Develop viable lead-free solders
- RDT&E on lead free munitions
- National Academy of Sciences (NAS) Study for DoD
  - Concern: Lead exposures to personnel such as small-arms range instructors given new human health science
  - Conclusion: “A review of the epidemiologic and toxicologic data allowed the committee to conclude that there is overwhelming evidence that the OSHA standard provides inadequate protection for DoD firing-range personnel and for any other worker populations covered by the general industry standard.”
- Development of DoD-specific Blood Lead Level standards
  - Development of a DoD occupational exposure limit to follow