

DoD Emerging Contaminants Program

Acquisition, Technology and Logistics

Environmental Monitoring & Data Quality Workshop



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Operating Environment & Trends

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- **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 TSCA¹ reform

¹ Toxic Substances Control Act

What is an Emerging Contaminant?

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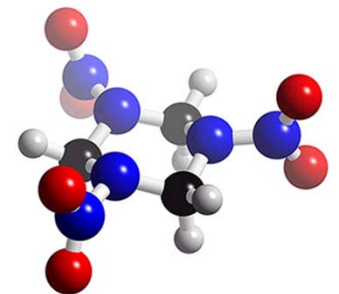
- Chemicals & materials that have pathways to enter the environment and present potential unacceptable human health or environmental risks...

and either

- do not have peer-reviewed human health standards

or

- Standards/regulations are evolving due to new science, detection capabilities, or pathways.



How Can ECs Affect DoD?

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- **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

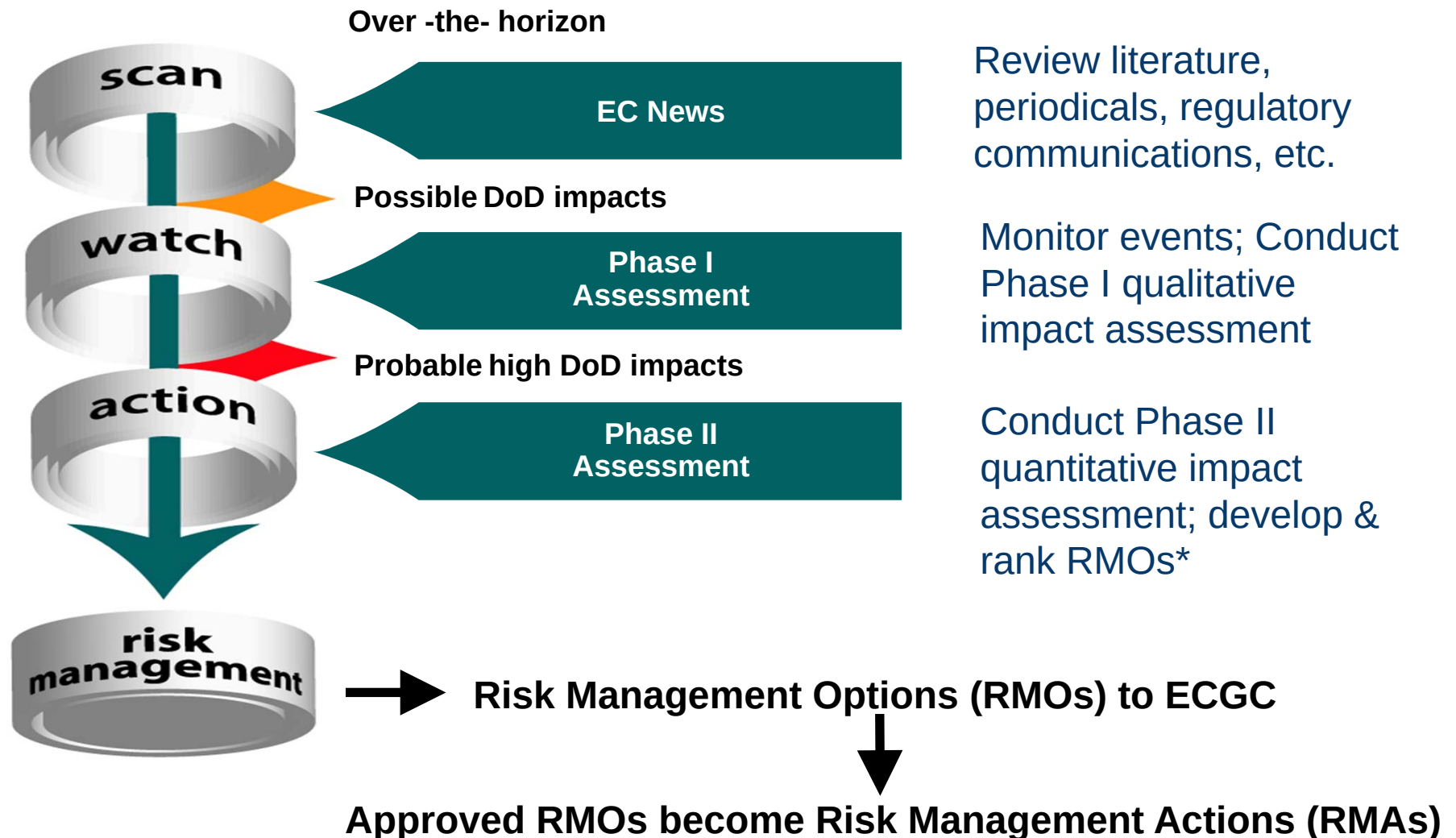
EC Examples – Past & Present

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- **Ozone Depleting Substances – Refrigerants, fire suppressants, solvents...phased out of production**
- **Perchlorate – Munitions/propellant oxidizer...highly water soluble...affects thyroid function...intense Congressional interest regarding DoD releases**
- **Hexavalent Chromium – Heavy metal used in weapons systems/platforms...revised 10-fold reduction in Permissible Exposure Level (PEL)**
- **PFOA – Used to make fire retardant/high performance materials...bio-persistent....95% phase-out by 2010...100% by 2016**
- **Naphthalene – Component of JP-8/fuels used throughout DoD. Proposed “carcinogenicity” listing by EPA. New toxicity levels could have major impacts**
- **Sulfur Hexafluoride – Global warming gas used in essential applications**

EC “Scan-Watch-Action” Process

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Phase I Impact Assessment Process

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1

Likelihood of Toxicity
Value/Regulatory Change

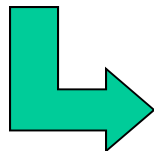
2

Scoping and Data Collection

3

Impact on DoD Functional Areas

ES&H	Training & Readiness	Acquisition/ RDT&E	POMD of DoD Assets	Cleanup
H	H	H	H	H
M	M	M	M	M
L	L	L	L	L



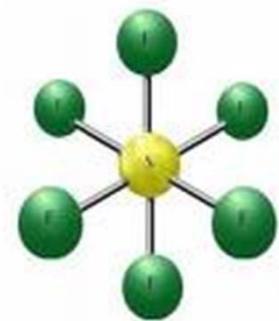
Results:

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

Sulfur Hexafluoride (SF₆) Background

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- A non-flammable, non-toxic gas – no human health concerns
- Extremely stable, with excellent dielectric properties (electrical insulation and arc-quenching)
- A high global warming potential – 22,800 times more potent than carbon dioxide (CO₂) – long lasting in the atmosphere
- Average global SF₆ concentration has increased by about 7 percent per year during the 1980s and 1990s



SF6 Commercial Uses

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- High-voltage electrical switchgear & transformers
- High-energy imaging equipment
- Research — atomic particle tandem accelerators



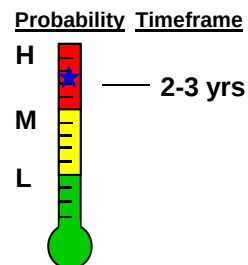
SF6 Phase I Impact Assessment

Completed January 2008

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Likelihood of Toxicity Value/ Regulatory Change

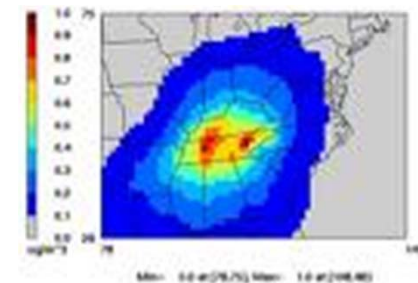
1. Probability that Greenhouse Gas emission initiatives will restrict use/availability of SF6



SF6 Military Uses

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- Pressurization/dielectric for aircraft targeting pods/avionics — Airborne Warning and Control System (AWACS) radar (e.g., E-3 Aircraft)
- Waveguide pressurization for shipboard targeting radar (e.g., MK 92 Fire Control System)
- Comprehensive Nuclear Test Ban Treaty monitoring and nuclear event detection



SF6 Phase I Impact Assessment

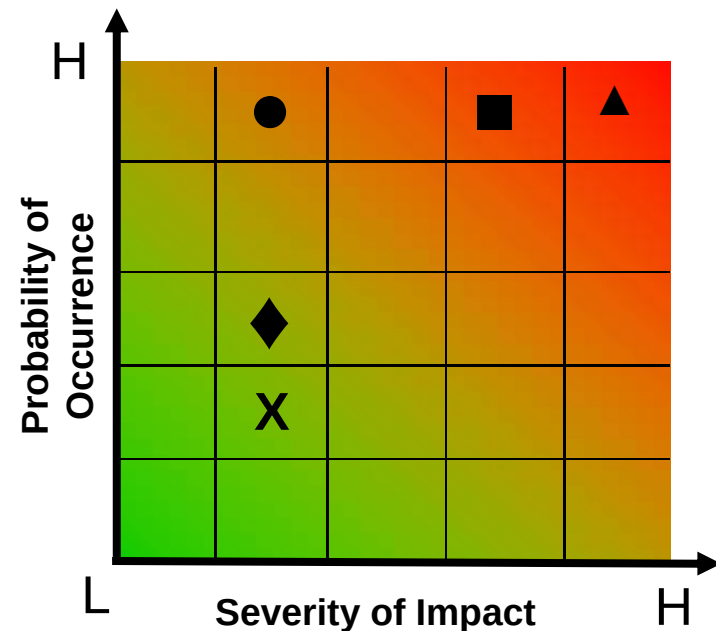
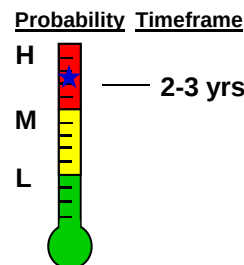
Completed January 2008

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Sulfur Hexafluoride (SF6) is used in radar systems (e.g., AWACS aircraft); 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



- ◆ ES&H
- Training & Readiness
- ▲ Acquisition/RDT&E
- PO&MD of Assets
- X Cleanup

EC Action List — Jan 2011

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- ✓ **Royal Demolition eXplosive (RDX)**
 - **Cyclotrimethylenetrinitramine**
- ✓ **Hexavalent Chromium (Cr6+)**
- ✓ **Naphthalene**...pending downgrade to watch list
- ✓ **Beryllium (Be)**
- ✓ **Sulfur Hexafluoride (SF6)**
- ✓ **Lead**

✓ **Phase II Impact Assessment completed.**

EC Watch List – Jan 2011

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- ✓ Tungsten alloys
- ✓ Sodium tungstate
- ✓ 1,4-dioxane*
- ✓ Nanomaterials
- ✓ Perfluorooctyl sulfonate (PFOS)
- ✓ Di-nitrotoluenes (DNT)
- ✓ Nickel
- ✓ Cadmium
- ✓ Manganese
- Cerium
- Cobalt
- Antimony
- ✓ Perfluorooctanoic acid (PFOA)
- **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

Lead — Why on the Action List?

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- **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**



EC Program Scorecard

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- **Screened 413 potential ECs**
- **Completed 25 Phase I Impact Assessments**
- **Completed 7 Phase II Impact Assessments**
 - Beryllium, lead, sulfur hexafluoride (SF6), hexavalent chromium, naphthalene, trichloroethylene (TCE), perchlorate¹, & RDX²
- **54 Risk Management Options (RMOs) developed & turned into Risk Management Actions (RMAs)**
 - 39 in-progress, 11 completed, 3 pending, 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

Department of Defense Emerging Contaminants Program

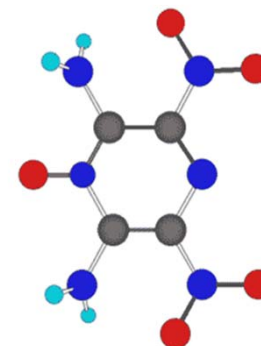
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Questions & Discussion

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Back-up Slides

Planned FY-11/12 Phase I Impact Assessments

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- **Nanomaterials...partially completed Nov 2010**
- **Diisocyanates...completed February 2011**
- **Phthalates...next**
- **Cobalt**
- **Antimony**

Latest Risk Management Actions

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- **Naphthalene**
 - Real-time dosimeter developed via SBIRP¹...new technology
 - Multi-agency funding approved...awaiting FY-11 OSD funding for approved human exposure testing
 - WET Center will independently test dosimeter accuracy
- **Hexavalent chromium (Cr6+)**
 - DFAR rule at OMB for review prior to FR publication
 - Accelerated corrosion testing protocol being developed by SERDP
 - Project underway by CTC on minimizing legacy uses
 - Work with specification owners to specify suitable substitutes
 - SERDP conference session show-cased successful substitute process projects including “project of the year”
 - Medium caliber gun barrels non-CR6+ process

¹ Small Business Innovative Research Project

Latest Risk Management Actions

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- **SF6**
 - Recovery/recycling policy memo signed 20 OCT by PD-USD(AT&L)
 - AF RDT&E
 - Infrared leak detection
 - SF6 substitutes for AWACs radar wave guide system
- **Beryllium**
 - Life-cycle study underway by CTC focusing on maintenance activity exposures and end-of-life
 - Visit to Hill AFB completed...interesting results
- **Perchlorate**
 - Field guide for use of isotopic analysis to be completed soon
 - Primary researcher and DoD-EDQWG collaborating

2010 ECGC Decisions

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1. Downgrade **Perchlorate** & **TCE** to EC Watch List
2. Endorse* **RDX** RMOs
3. Endorse* **Lead** RMOs
4. Terminate **Tungsten** work group
 - Nanomaterials work group to continue

*Note: “Endorse” means there is consensus within the Governance Council that the recommended actions are worthwhile. Individual OSD and Component Program Managers will make decisions on whether to fund & implement the actions in consideration of other program priorities. CMRM staff will track implementation progress and risk reduction.

Downgrading Perchlorate to Watch List

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- **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

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- **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 DERP¹
 - 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

How to Handle ECs Under DERP

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Key Factors to Consider Before Actions

- **Is there exposure or potential for exposure?**
 - What are pathways and receptors?
- **What's the status of toxicity values?**
 - IRIS, PPRTVs, Other (state)
- **Are other non-ECs present?**
- **Will the proposed treatment also remediate ECs?**
- **What are the potential risk management options?**
 - Watchful waiting (monitoring only)
 - Halt the plume
 - Remediation