

Emerging Contaminants - The New Frontier -

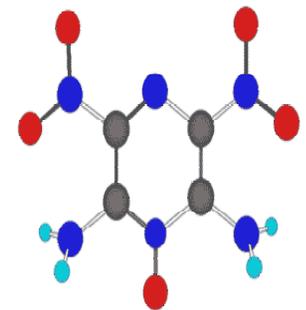


Emerging Contaminants Overview

What is an Emerging Contaminant?

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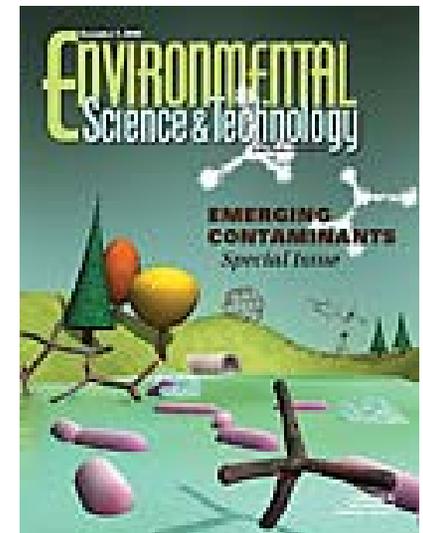
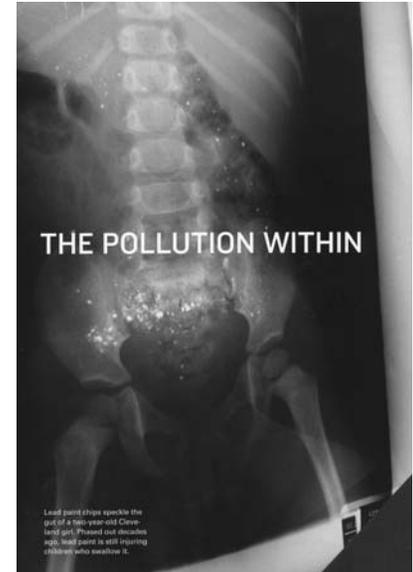
- **Chemicals & materials with:**
 - Perceived or real threat to human health or environment
 - Either no peer reviewed health standard or an evolving standard
- **May have:**
 - Insufficient human health data/science
 - New detection limits
 - New exposure pathways



National & International Interest

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- **National Geographic Magazine - Oct 06**
- **ES&T Magazine - Dec 06**
- **USGS Survey of 139 streams in 30 states**
 - ECs found in 80% of streams
- **Renewable Nat'l Resources Foundation Report**
- **European Union – REACH**
 - Unless pre-registered, chemicals can't be sold
 - Tox data must be submitted to European Chemicals Agency



How Can ECs Affect DoD?

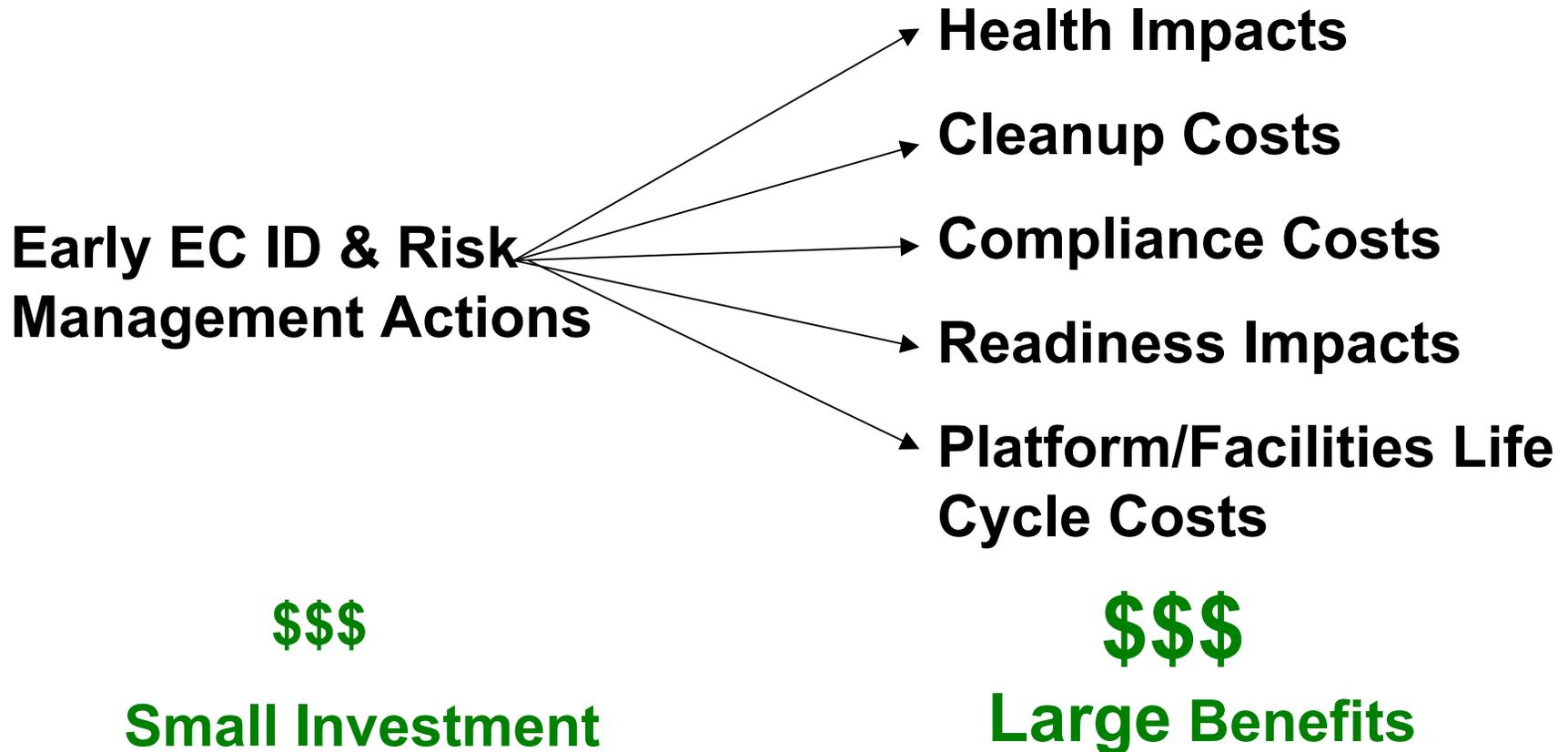
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- **Adverse health effects on operating forces, DoD employees, and/or public**
 - Human health protection paramount
- **Reduced training/readiness**
 - Restrictions on use of ranges
- **Restricted or non-availability of material**
 - Adverse impact on mission-critical applications & industrial base
- **Increased O&M and/or cleanup costs**
 - Resource drain from mission needs

The Need for Action

Proactive vice Reactive

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The Vision

Imagine if the largest industrial complex in the nation could...

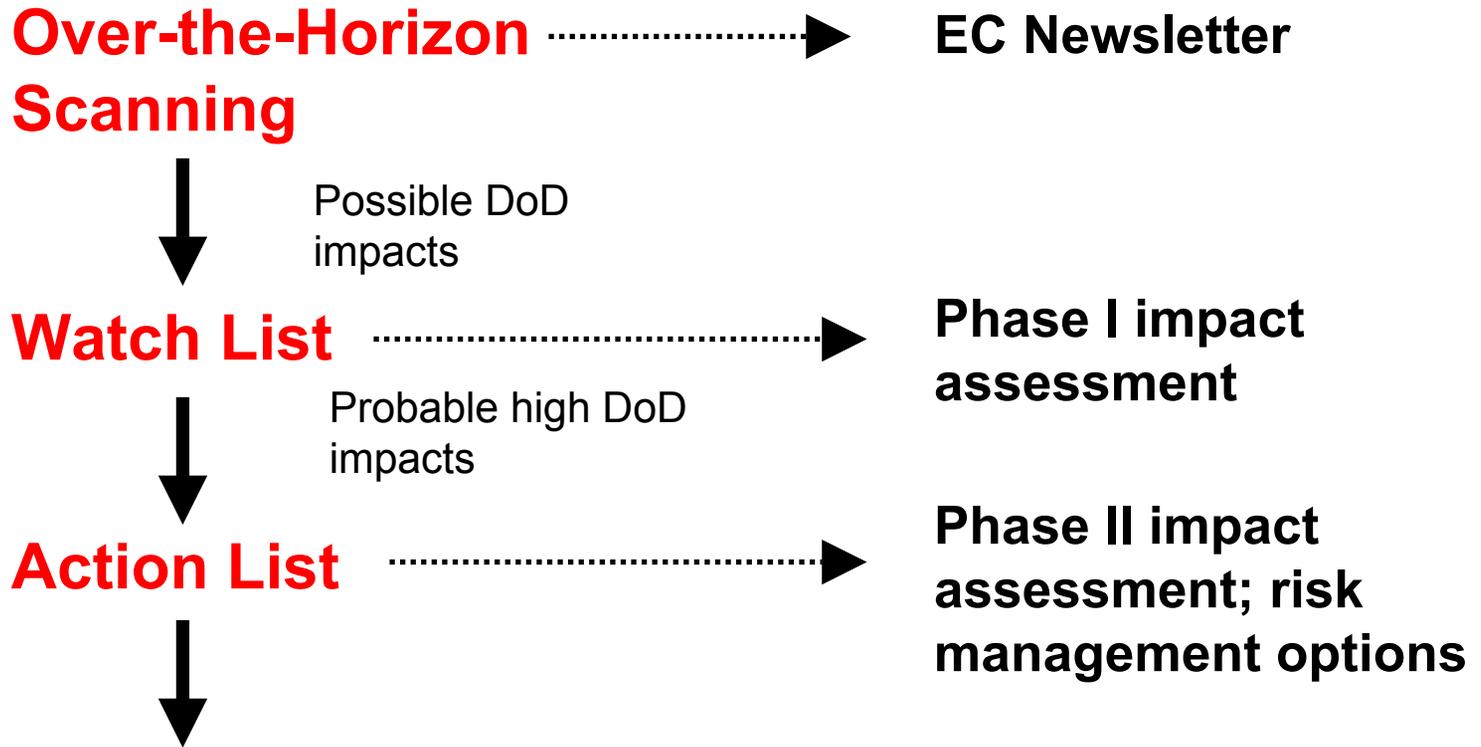
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- *Predict* which chemicals it used or might use pose human health and environmental risks and have a changed regulatory status.
- *Develop* a consensus evaluation of types & magnitudes of the risks in using/releasing the chemical.
- *Develop* risk management options and invest in high-payback actions.
- *Achieve and measure* risk reduction.

Emerging Contaminants Tracking & Assessment Process

EC Tracking Process

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Risk Management Options to EC-IPT

Phase I EC Impact Assessment

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1. **Probability of Regulation/Re-regulation**

2. **Impact on DoD Functional Categories**

Environment Safety & Health	Readiness & Training	Acquisition	O&M of DoD Assets	Cleanup
H	H	H	H	H
M	M	M	M	M
L	L	L	L	L

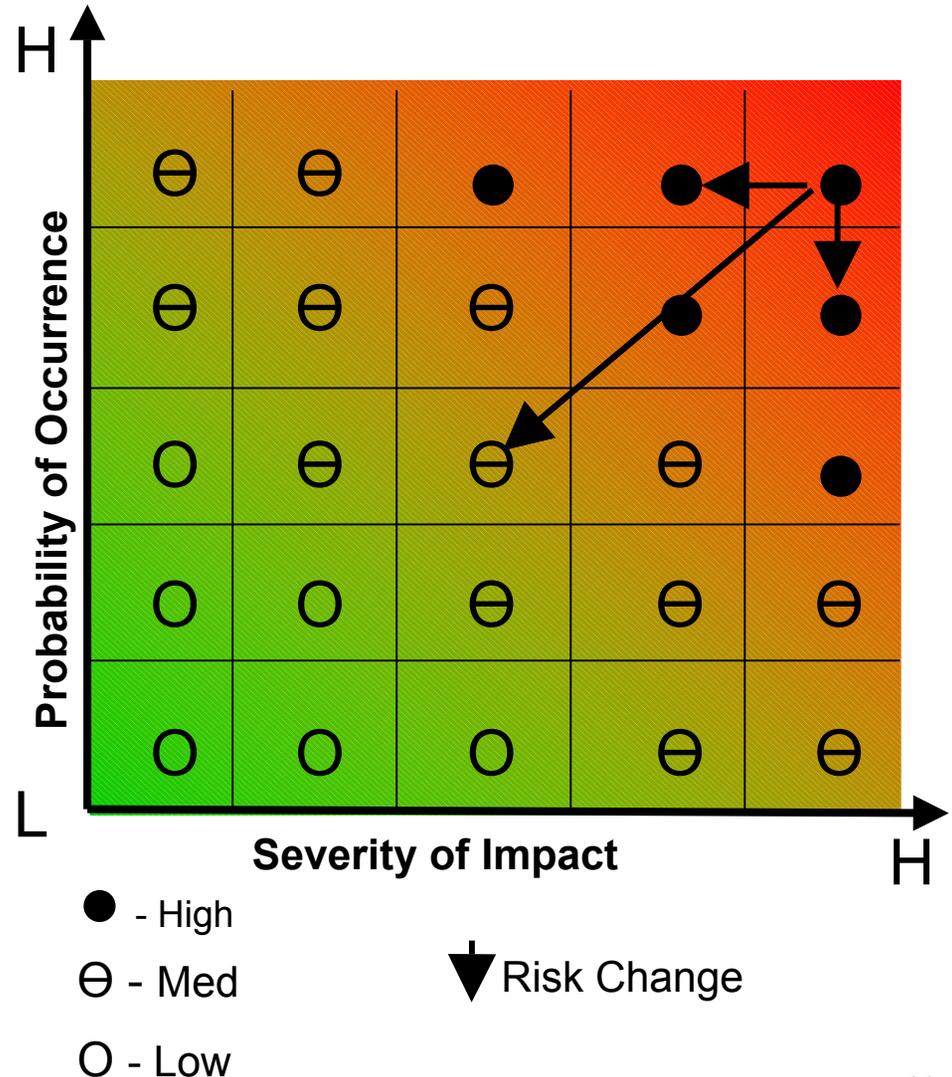
3. **Results**



- **Decision – Move to Action List?**
- **Initial Risk Management Options**

Plotting EC Risk to DoD

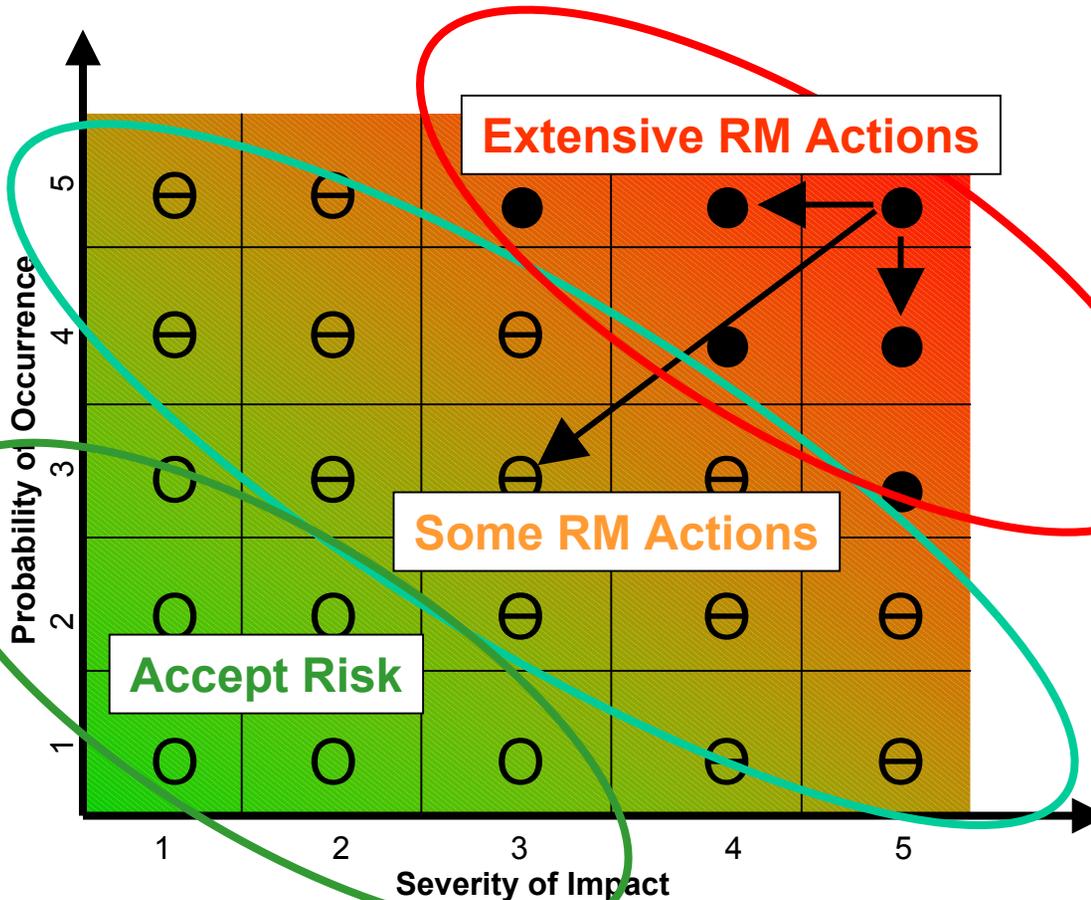
- High risk at top right
- Risk management actions move ECs to lower left...lower risk
- Seek to quantify risk reduction



Integrated Risk Management

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RM Options



- Fill tox science gaps
- RDT&E
- Material substitution
- Process changes
- Regulatory engagement
- Stockpile material
- Exposure assessment & monitoring
- Personal Protective Equipment (PPE)
- Acquisition changes
- Benchmark with industry
- Risk communication
- Training

EC Watch List

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- Tungsten & alloys
 - Tetrachloroethylene
 - Dioxin
 - N-nitrosodimethylamine (NDMA)
 - 1,4-dioxane
 - 1,2,3-trichloropropane (TCP)
 - Nanomaterials
 - Perfluorooctanoic acid (PFOA)
 - Dichlorobenzenes
 - Beryllium
 - Polybrominated biphenyl ethers (PBDEs)
 - Di-nitrotoluenes (DNT)
 - Naphthalene
 - Lead
 - Nickel
-  **Recently added**

Notes: - Impact assessments underway for all ECs except nanomaterials.

EC Action List

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- **Perchlorate**
- **Royal Demolition eXplosive (RDX)**
 - **Cyclotrimethylenetrinitramine**
- **Trichloroethene (TCE)**
- **Hexavalent Chromium**
- **Naphthalene**

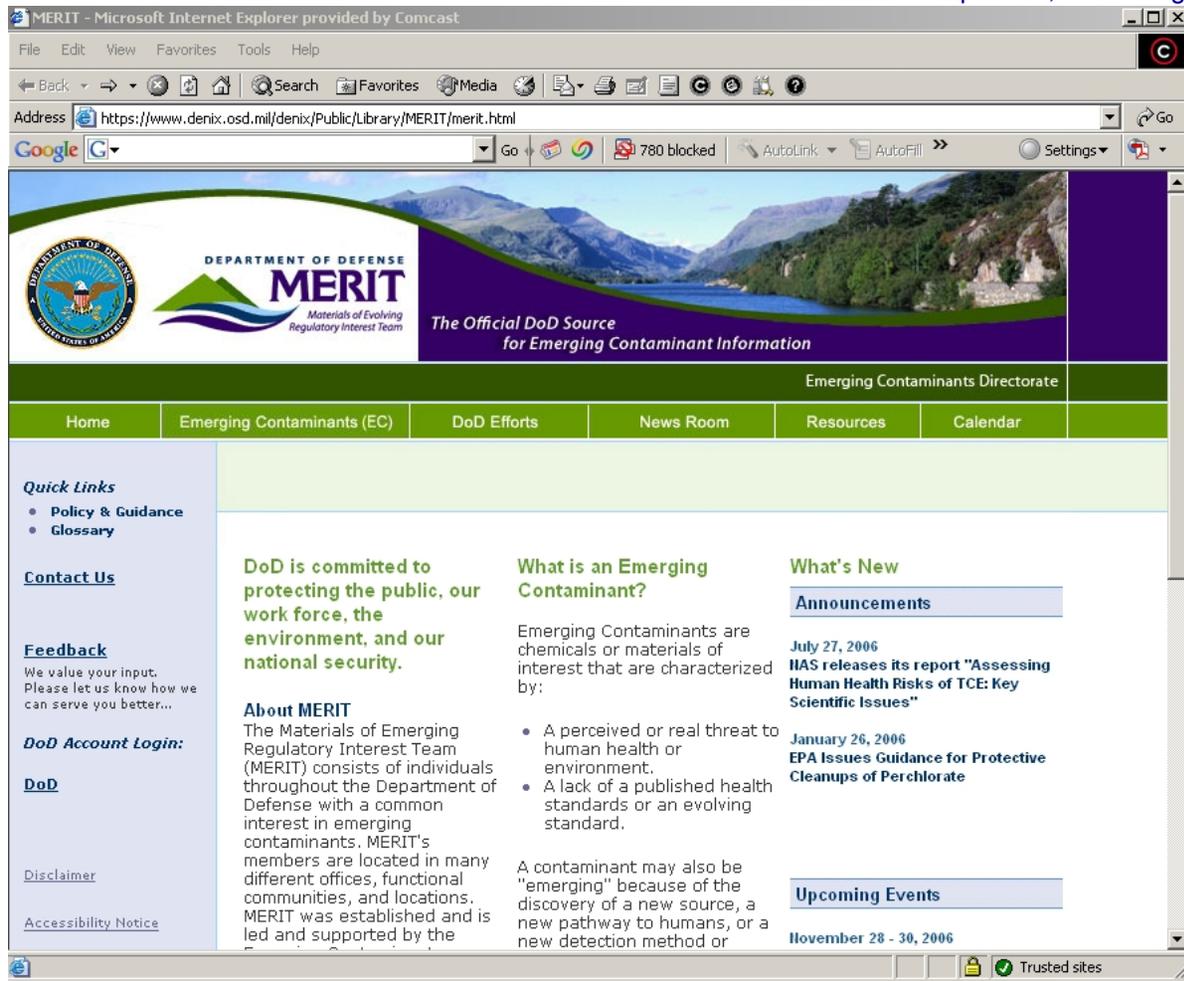
**Recently elevated
from Watch List**



Notes: - Some risk management actions underway including research on toxicity, substitutes, & treatment.

DoD EC Web Sites

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Public Site___<https://www.denix.osd.mil/denix/Public/Library/MERIT/merit.html>

DoD Site___<http://intranet.dodmeritinfo.net>

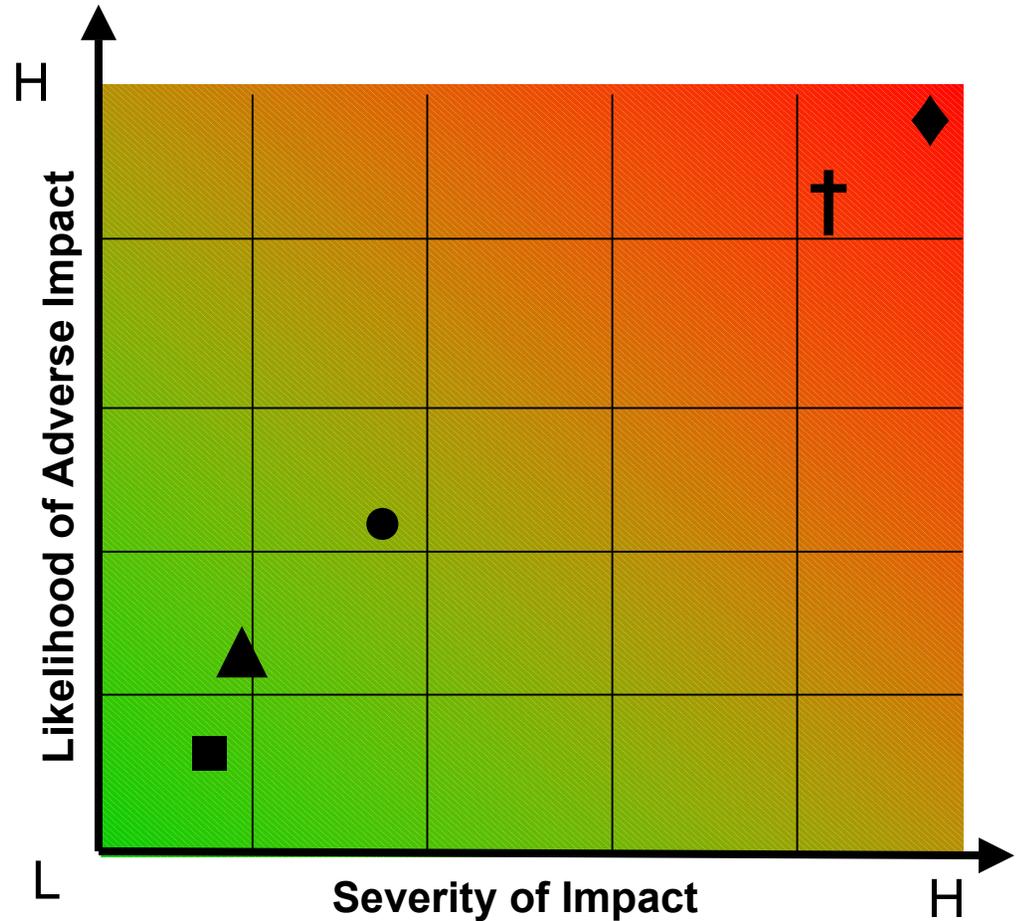
Impact Assessment Results

TCE Phase 1 Impact Assessment

Completed October 2006

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- ◆ ES&H
- Readiness & Training
- ▲ Acquisition/RDT&E
- O&M of Assets
- † Cleanup

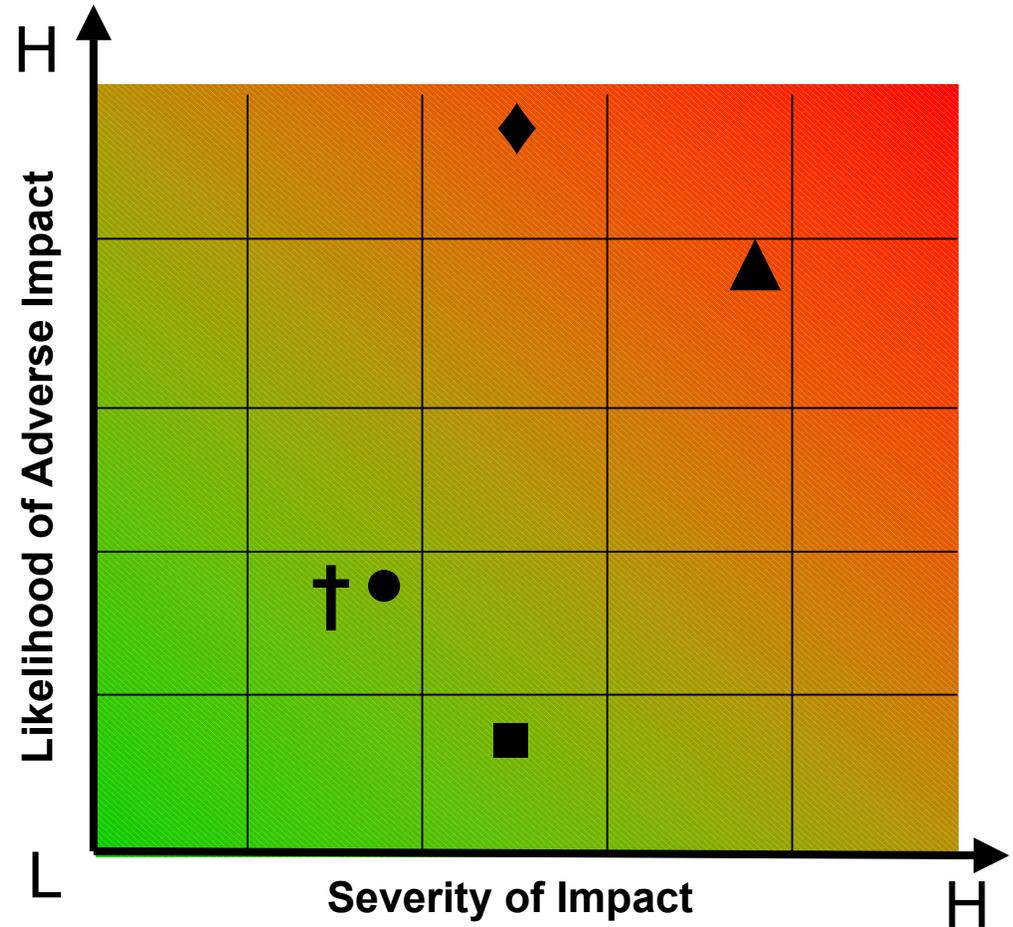


PFOA Phase I Impact Assessment

Completed January 2007

Acquisition, Technology and Logistics

- ◆ ES&H
- Readiness & Training
- ▲ Acquisition/RDT&E
- O&M of Assets
- † Cleanup



EC Issues & Risk Management Actions

ECOS-DoD Work Group Issues & Products

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- **Issue: How do states define ECs? What are ECs of concern?**
 - Product: State EC Survey
- **How can states & federal agencies send a consistent risk message to the public?**
 - Product: Risk communication paper
- **What values should be used if no IRIS value?**
 - Product: Provisional toxicity values paper
- **What conditions, requirements, authorities influence the decision to expend funds on EC response when threat to human health is not clear?**
 - Product: Action triggers paper

Tungsten Work Group

Maintaining Oversight On...

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- Embedded fragments studies of tungsten-metal composites by CHPPM...embedded in flesh
- Sodium tungstate toxicity studies by CHPPM...drinking water
- Tungsten fate & transport studies by ERDC...three installations including MMR
- Public Affairs Guidance
 - Messages
 - Q&A bank

Perchlorate Risk Management Actions

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- **DoD & EPA synchronized policies**
 - Requires sampling in various media
 - Sets a “level of concern” based on NRC peer review
- **California Site Prioritization Protocol**
 - Joint DoD-State initiative to cull & prioritize sites for sampling & risk management
- **\$114 M invested by DoD**
 - **Toxicity studies**
 - **Analytical procedures**
 - **Perchlorate Substitution**
 - **Treatment Studies**

Key Accomplishments...to date

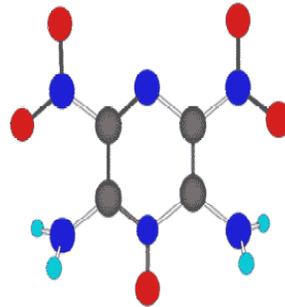
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- Chemical Risk Assessment – IRIS process improvements
- Designed & implemented “Scan-Watch-Action” process
 - Phase I impact assessments completed for 10 ECs
- DoD-EPA-ECOS Work Group on ECs
 - Four work products
- DoD EC Governance Council at SES/Flag level
 - 1st meeting Sep 06....approved four recommendations
- Formed EC Technical Advisory Board
 - NEHC, AFIOH, CHPPM
- Obtained EC Funding line for FY-08-13
- Material Champions designated
- EC Web site with EC info portal

Summary

- **EC management requires new thinking**
 - Proactive vice reactive
 - Make targeted investments before regulatory action
 - Base decisions on life cycle costs
- **Efficient process being established for tracking, assessing and developing risk management options**
 - Leverages existing assets/resources
- **Potential large payback**
 - Protects people, mission and assets

Questions & Discussion



Backup Slides

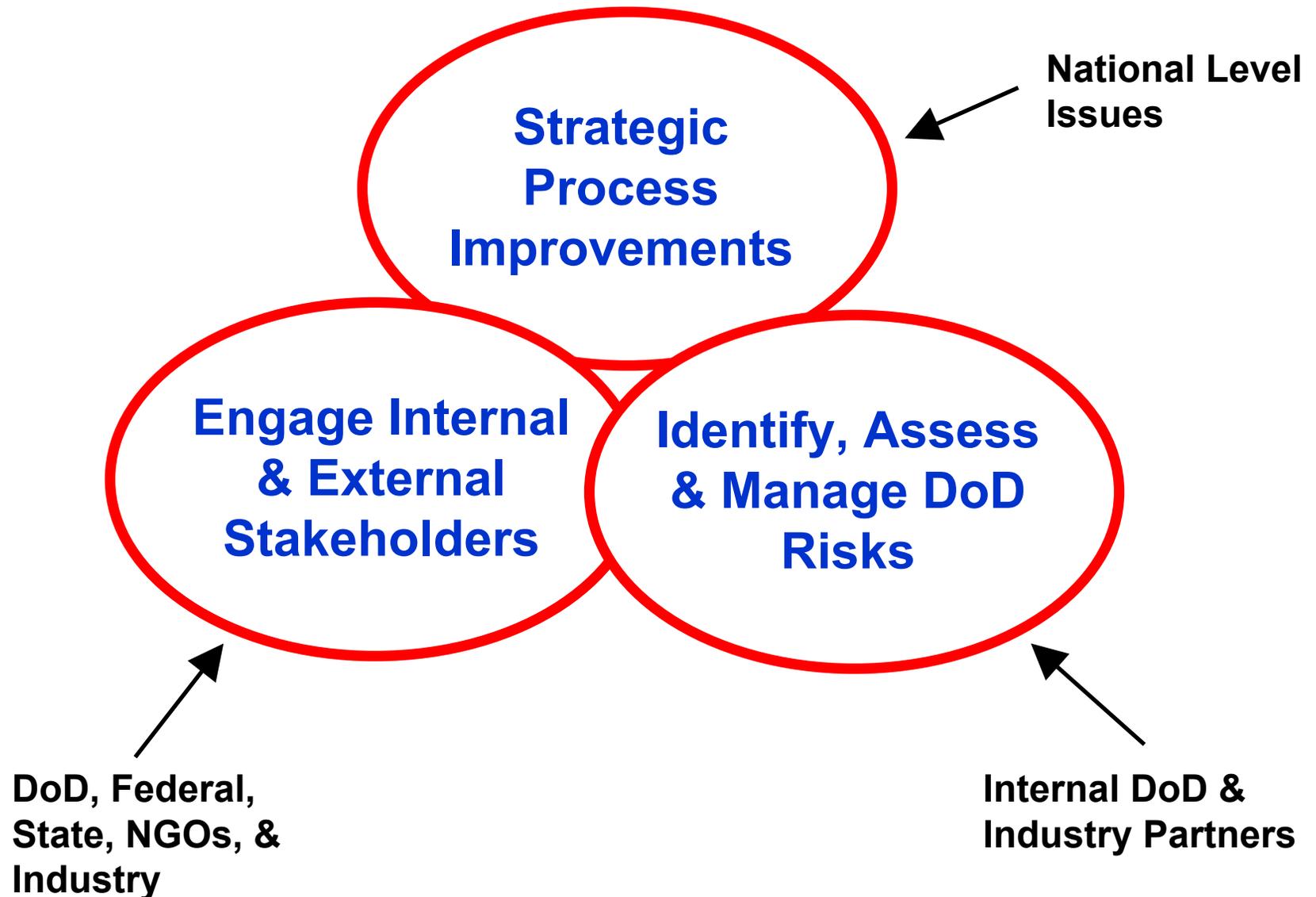
RDX Risk Management Actions

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- **Completed Army-CHPPM toxicity studies likely to remove cancer factor for RDX**
 - Toxicity thus defined by non-cancer factors
- **Planned non-cancer toxicity studies could result in 3-300 X reduction in uncertainty factors**
 - Current EPA advisory level is 2 ppb
 - MMR cleanup level is 0.6 ppb
- **Non-cancer study suite costs \$800K**
- **Conservative cost avoidance estimate > \$100M**
- **However....MA-DEP may be moving ahead to set an MCL w/o using Army studies**

Strategic Priorities to Achieve Vision

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EC Risk Communication Paper

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- **Issue: How should we communicate EC issues & risks consistently to the public?**
- DoD and regulators need to engage early and develop a common message
- We need to be transparent on what is known and not known (e.g., uncertainties)
- The paper contains a template for developing EC information for the public

EC Provisional Values Issue Paper

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- **Issue: How should we determine toxicity for ECs not in IRIS?**
- EPA Hierarchy provides starting point
 - IRIS
 - Provisional Peer Reviewed Toxicity Values (PPRTVs)
 - Other Federal/state values (ATSDR-MRLs, CA-EPA)
- Agencies free to use best available, *peer reviewed* data...avoid use of non-peer reviewed
- Toxicity assessments should be transparent, publicly available, & consistent with duration of exposure being assessed

EC Action Triggers Issue Paper

Acquisition, Technology and Logistics

- **Issue: What conditions, authorities, considerations help determine whether to take response actions for ECs w/o risk levels or regulatory standards?**
- Existing laws provide authorities & flexibilities to both DoD and regulators to act...but
 - Considerable professional judgment required
- Four typical scenarios identified
 - Covers human health risk only

Typical EC Scenarios

	ECs Present at Levels Requiring Action¹	ECs Present But Necessity for Action Uncertain
Other contaminants present at levels requiring action	Scenario 1	Scenario 2
Other contaminants not present or at levels not requiring action	Scenario 3	Scenario 4

¹ Requiring action means that EC levels are such that the parties agree

EC Action Triggers Issue Paper

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- Based on site history, determine if real or suspected release
- Determine toxicity – use Provisional Values Issue Paper
 - Identify science gaps, if any, to regulators
- Determine if pathway & receptor exist
 - If yes, assess risk using best data and take appropriate response actions
 - If no...it depends
 - Possible delay in action if toxicity unclear
 - Possible interim response & risk management actions
- Where agreement can't be reached, parties reserve rights under existing laws

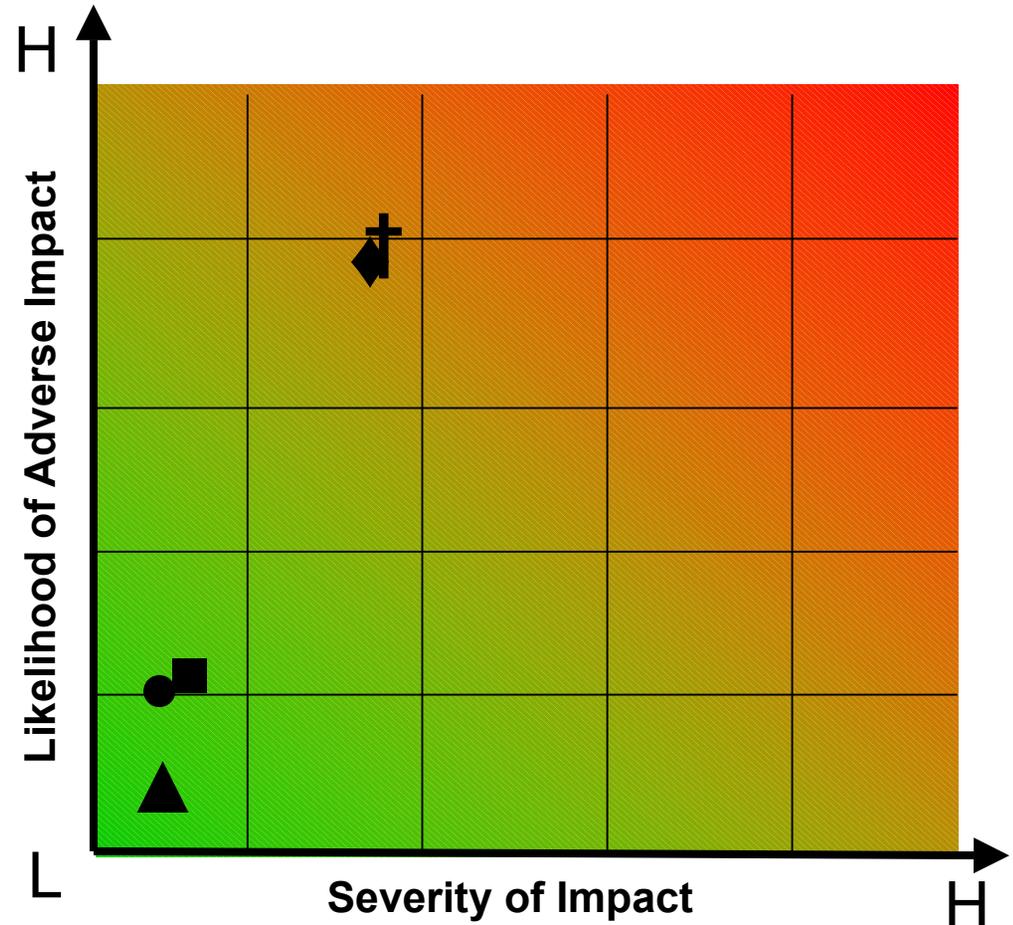
Phase I Impact Assessment Results

1,2,3-TCP Phase 1 Impact Assessment

Completed November 2006

Acquisition, Technology and Logistics

- ◆ ES&H
- Readiness & Training
- ▲ Acquisition/RDT&E
- O&M of Assets
- † Cleanup

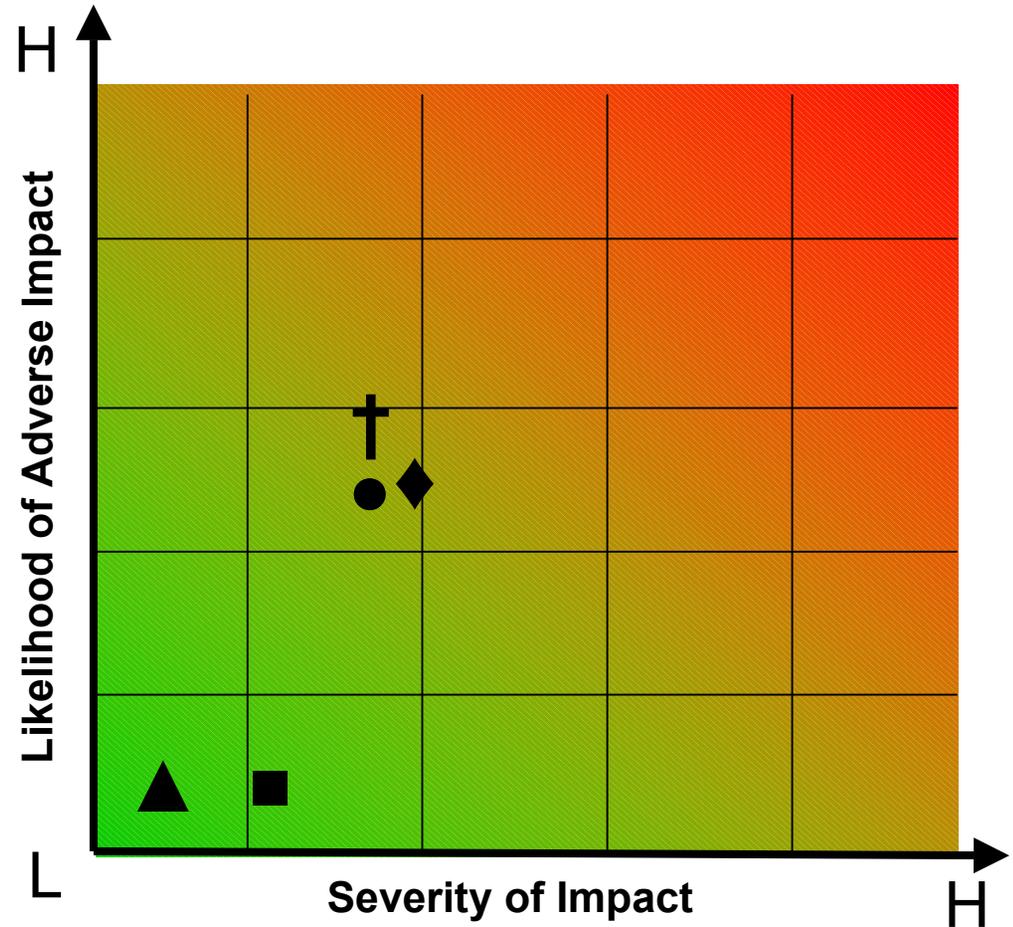


NDMA Phase 1 Impact Assessment

Completed November 2006

Acquisition, Technology and Logistics

- ◆ ES&H
- Readiness & Training
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- O&M of Assets
- † Cleanup

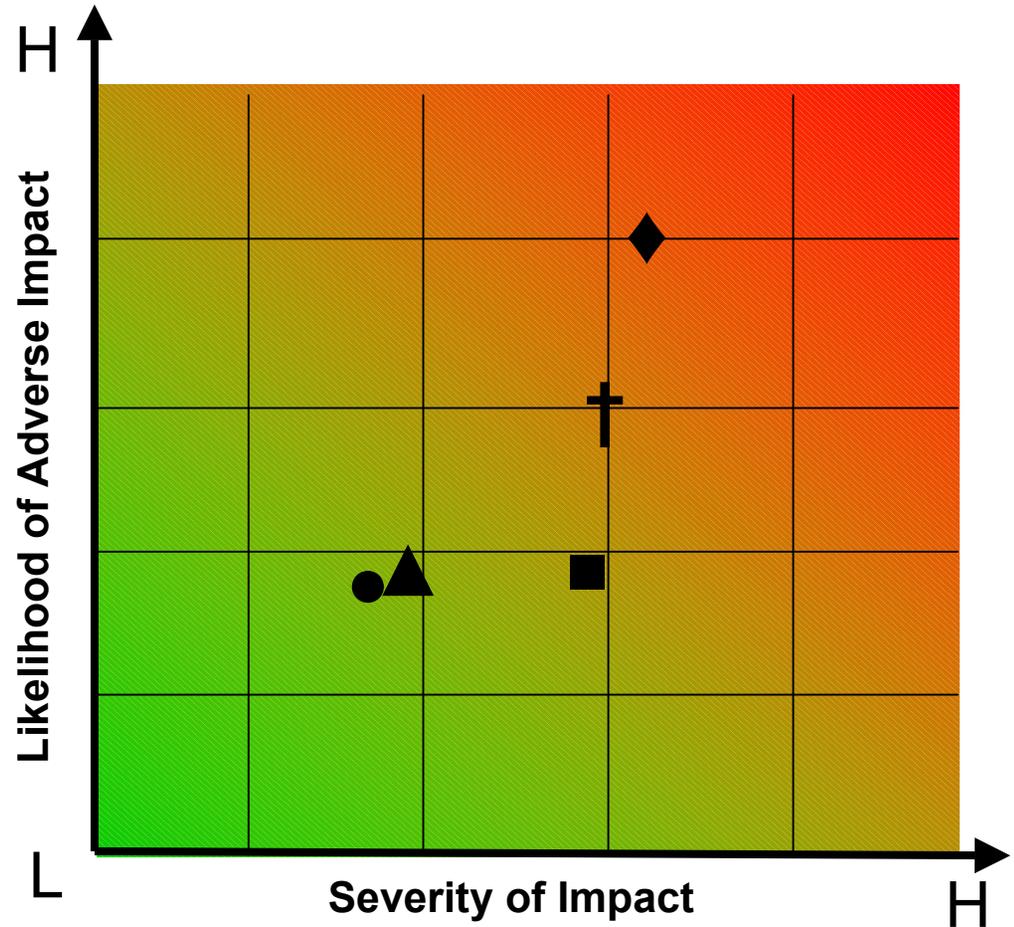


1,4-Dioxane Phase I Impact Assessment

Completed December 2006

Acquisition, Technology and Logistics

- ◆ ES&H
- Readiness & Training
- ▲ Acquisition/RDT&E
- O&M of Assets
- † Cleanup

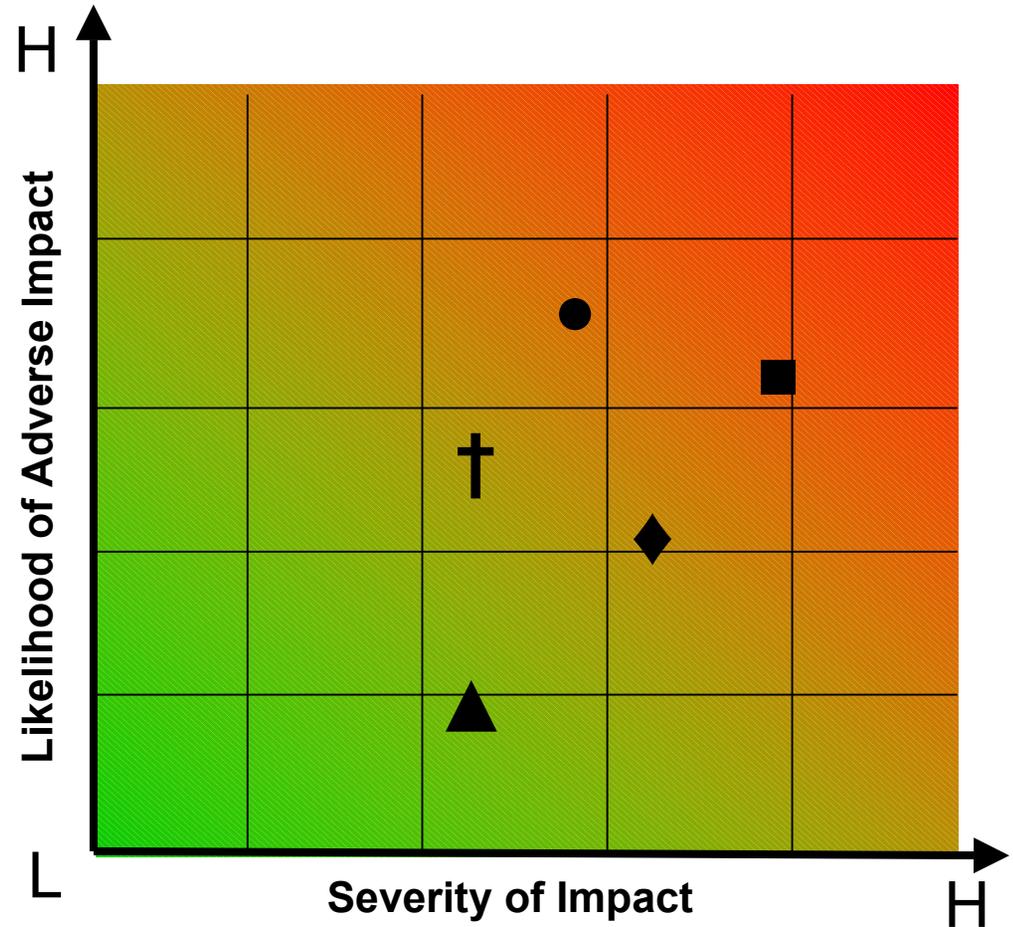


DNT Phase I Impact Assessment

Completed December 2006

Acquisition, Technology and Logistics

- ◆ ES&H
- Readiness & Training
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- † Cleanup

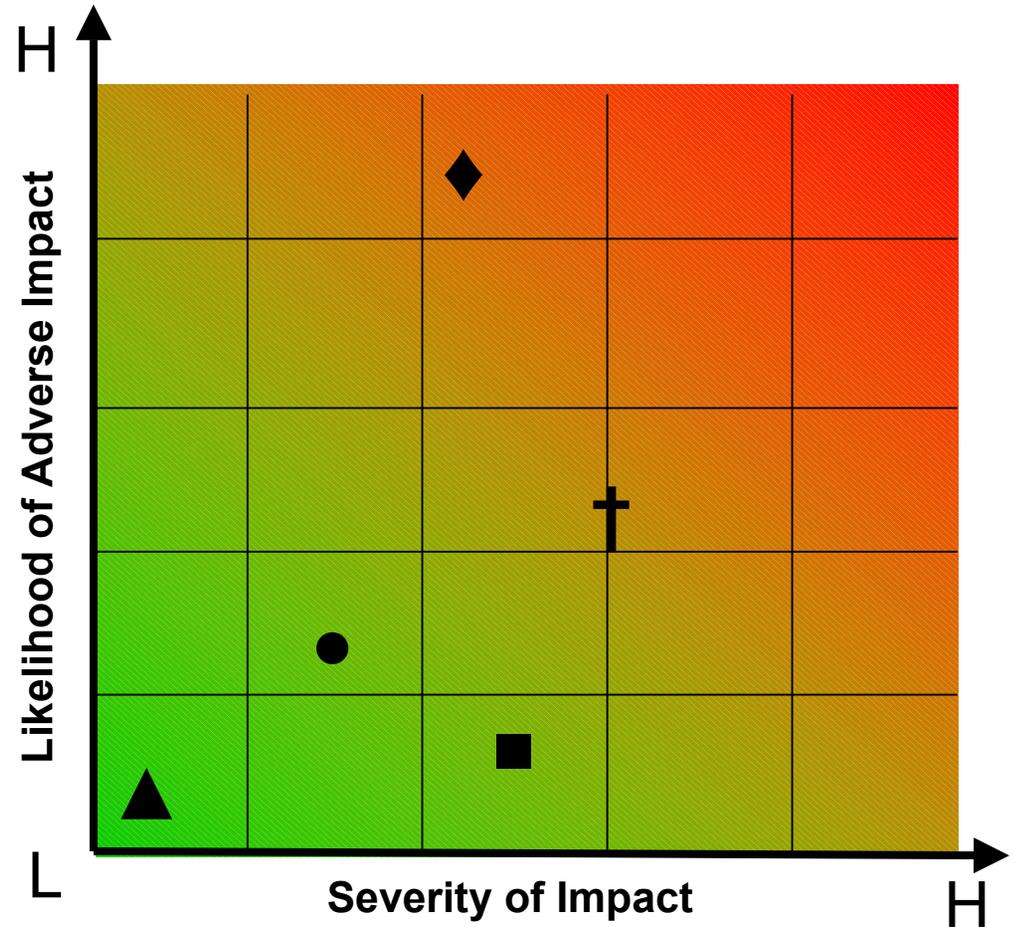


PFOS Phase I Impact Assessment

Completed January 2007

Acquisition, Technology and Logistics

- ◆ ES&H
- Readiness & Training
- ▲ Acquisition/RDT&E
- O&M of Assets
- † Cleanup

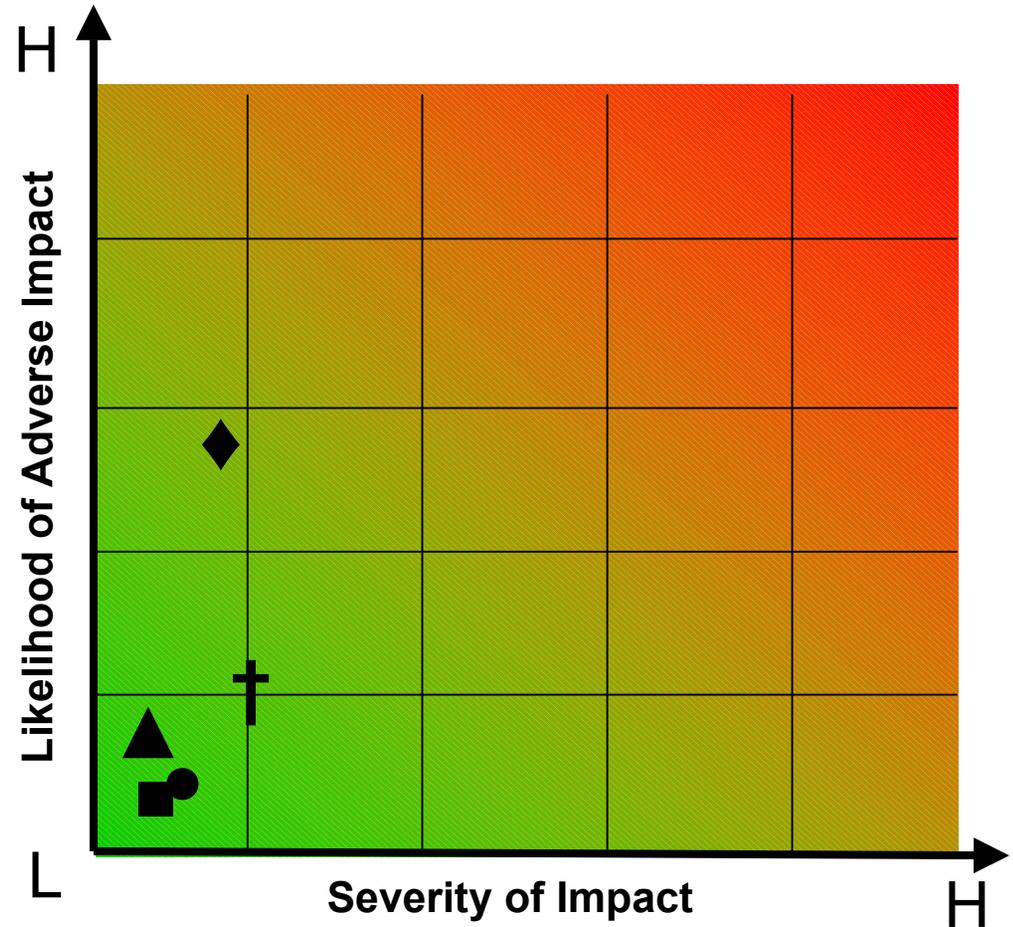


PBDE Phase I Impact Assessment

Completed January 2007

Acquisition, Technology and Logistics

- ◆ ES&H
- Readiness & Training
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- O&M of Assets
- † Cleanup

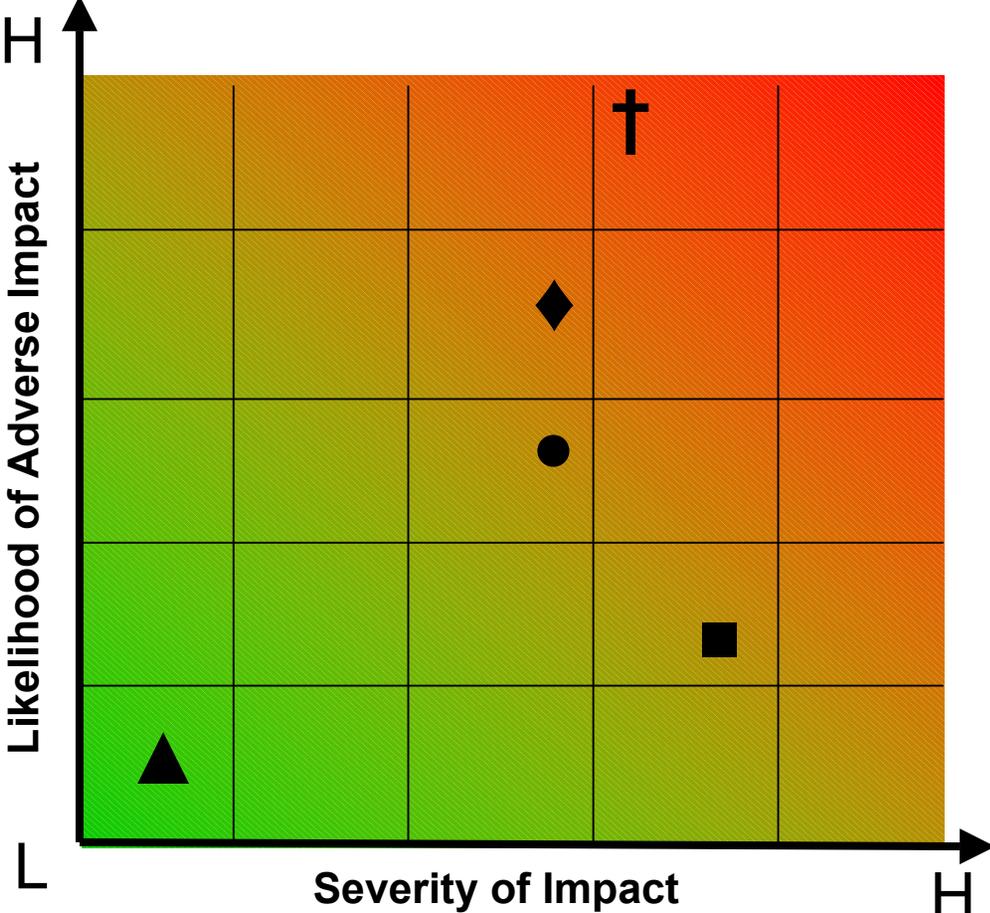


Dioxin Phase I Impact Assessment

Completed February 2007

Acquisition, Technology and Logistics

- ◆ ES&H
- Readiness & Training
- ▲ Acquisition/RDT&E
- O&M of Assets
- † Cleanup

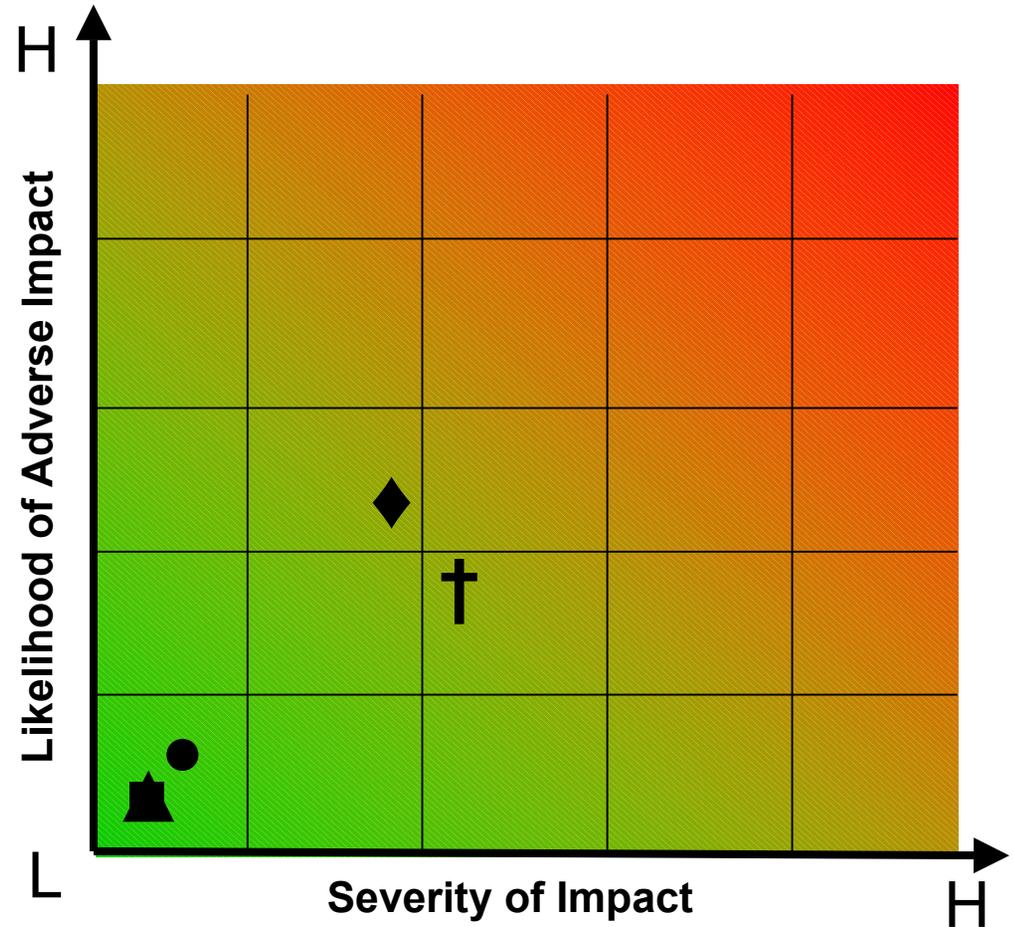


PCE Phase I Impact Assessment

Completed February 2007

Acquisition, Technology and Logistics

- ◆ ES&H
- Readiness & Training
- ▲ Acquisition/RDT&E
- O&M of Assets
- † Cleanup



Perchlorate Update

DoD Perchlorate Policy

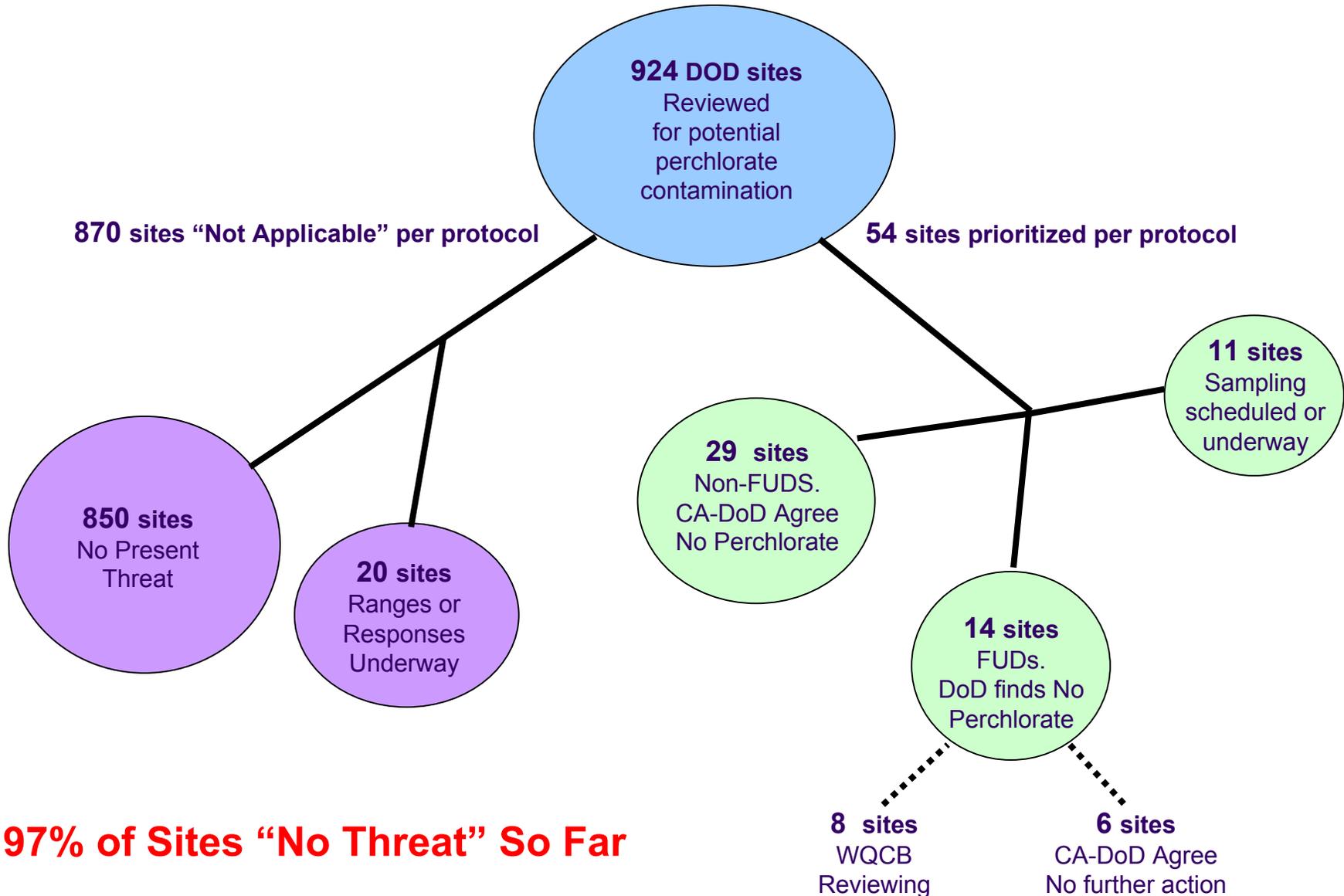
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- Based on latest EPA reference dose
- Sets 24 ppb perchlorate in water as level of concern (departure point) for management and cleanup decisions in absence of any state/federal standard
- Provides specific sampling guidelines for DoD-owned drinking water systems
- Requires semi-annual wastewater effluent sampling at permitted DoD point sources where perchlorate has been used or released through dismantling of munitions
- Applies to all real property belonging to DoD and to Formerly-Used Defense Sites (FUDS)
- Directs assessment for off-range migration from operational ranges consistent with DoDD 4715.11 and 4715.12

California Prioritization Protocol Results

(as of 13 February 2007)

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Tungsten Work Group

Tungsten Work Group Studies

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- **Embedded fragments studies of tungsten-metal composites**
 - W/Ni/Co...causes aggressive tumors in rats...100% mortality
 - Other composites w/tin, iron do not appear problematic
 - Similar tests with DU...no fatalities
 - Embedded fragments from soldiers will be cataloged and sent for analysis
 - No W/Ni/Co found in humans yet
 - CHPPM conducting verification studies

Tungsten Work Group Studies

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- **Tungstate Toxicity studies**
 - CHPPM conducting tungsten studies on rats
 - Doses of sodium tungstate being administered
 - Tungsten from sampling not speciated...total tungsten measured
 - Based on NOAEL of 20 mg/kg >>> 140 ppb possible MCL
 - New two-year study beginning

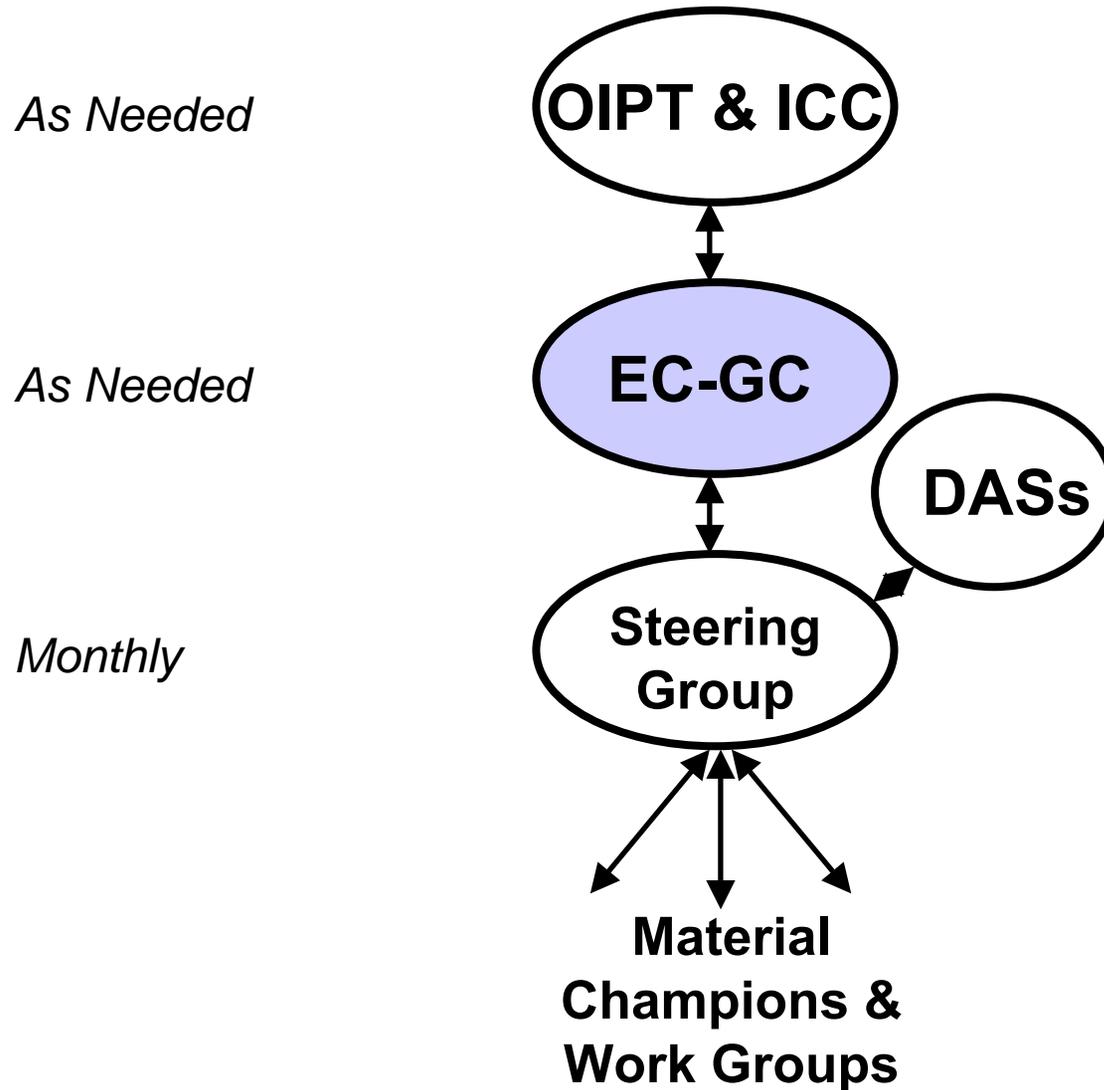
Tungsten Work Group Studies

Acquisition, Technology and Logistics

- **Tungstate Fate & Transport studies**
 - Army-ERDC conducting fate & Transport studies
 - 88M tungsten rounds produced...27M remaining
 - Tungsten is mobile...rate depends on site conditions
 - Mobility increased in alkaline soils
 - Tungsten more soluble & mobile than lead
 - Lot's of data gaps in human health and environmental data
 - Studies on-going at three installations including MMR

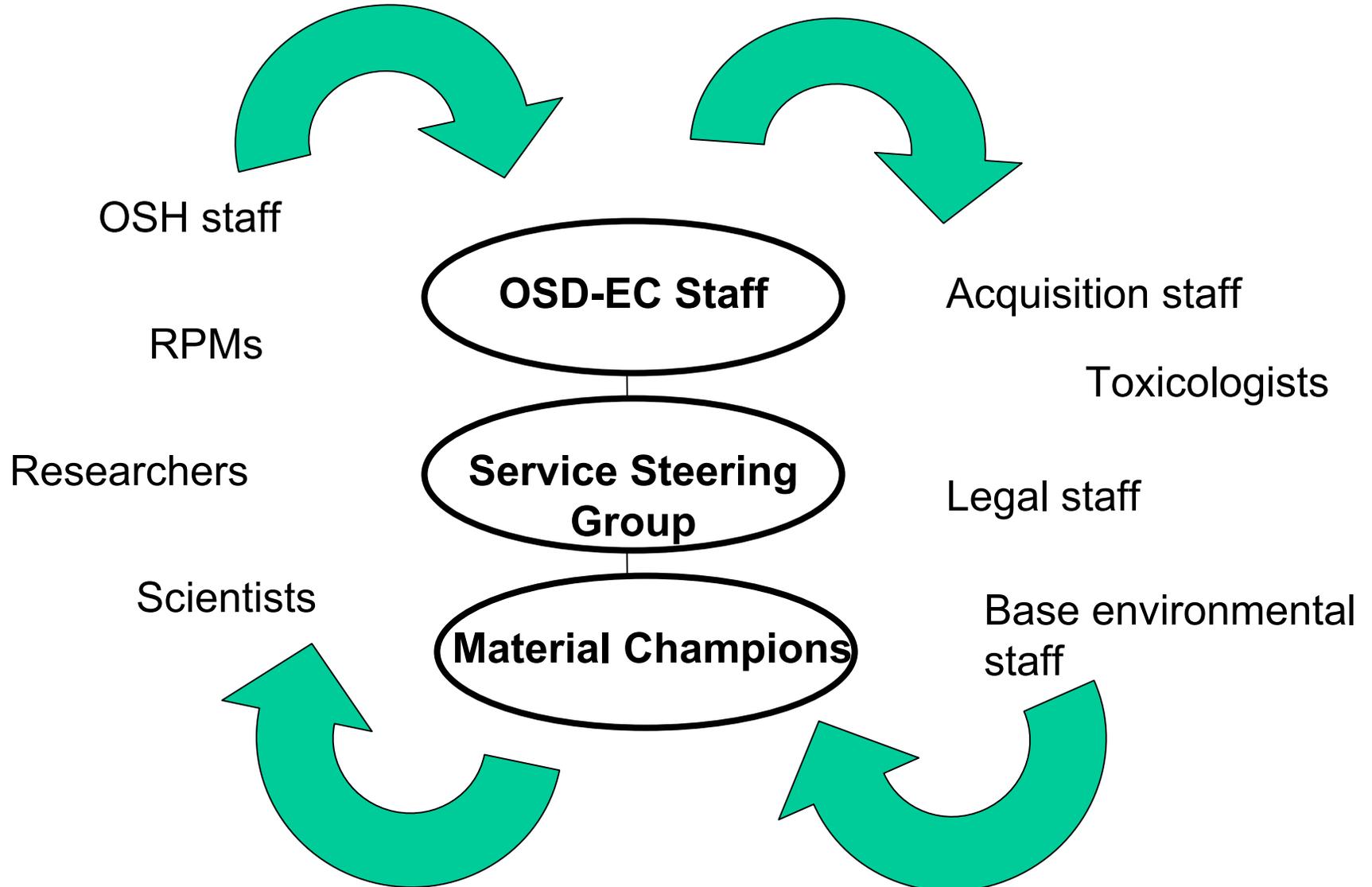
Misc Slides

EC Governance

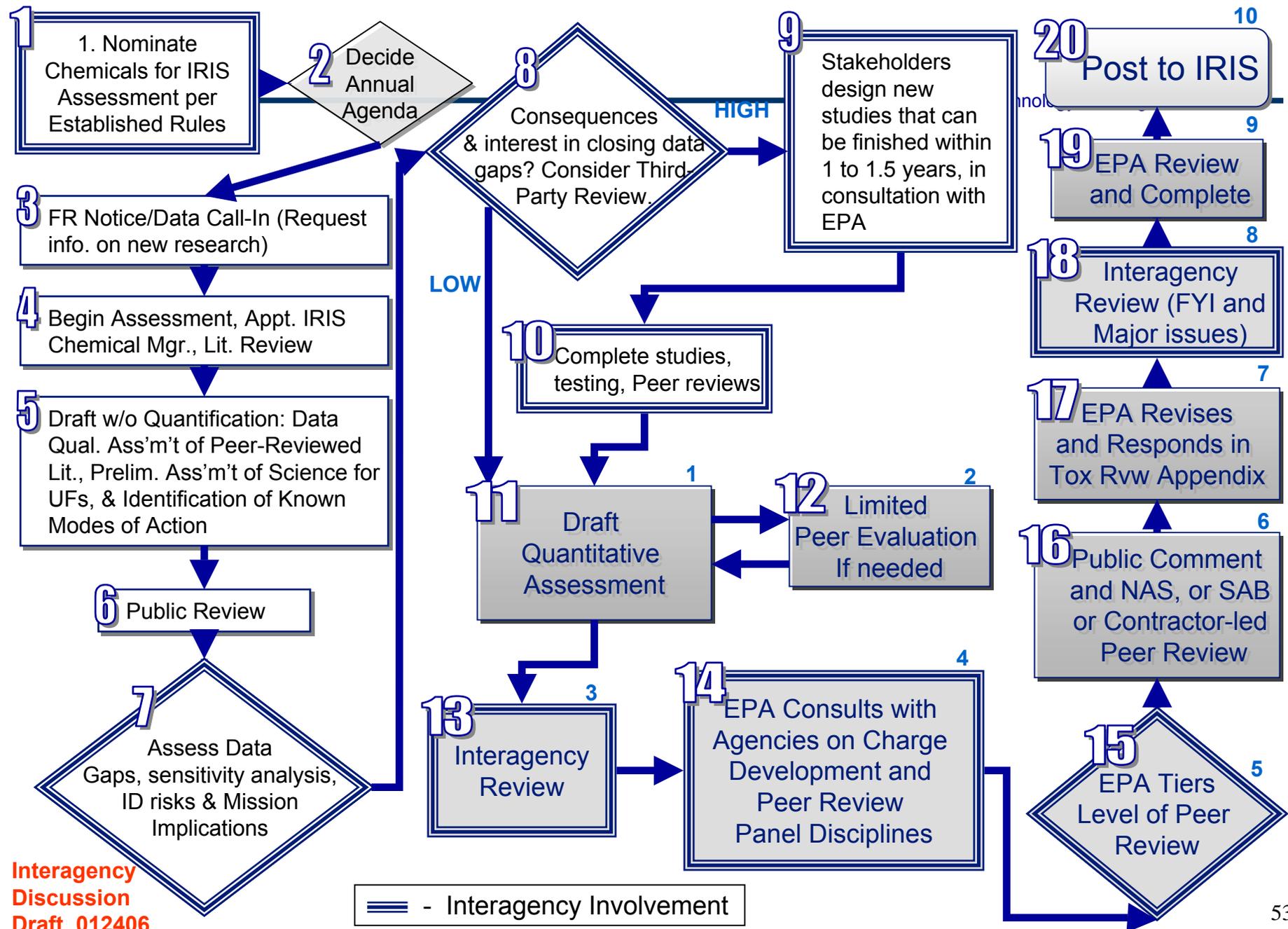


MERIT- A Virtual Team

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Proposed IRIS Process



Examples – Past & Present

- **Ozone Depleting Substances** – Refrigerants, fire suppressants, solvents...phased out of production!
- **Perchlorate** - Munitions/propellant oxidizer...very low toxicity levels being set by states (2 ppb in MA)
- **Hexavalent Chromium** - Heavy metal used in DoD systems/platforms...recent, revised 10-fold reduction in Permissible Exposure Level (PEL)
- **PBDEs** - Fire retardants...EU banned in July 06....states following with legislation
- **Naphthalene** - Component of JP-8/fuels used throughout DoD...proposed as a carcinogen by EPA...low toxicity levels could have major impacts

EC-Integrated Product Team Decisions

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- **Tungsten**
 - Army and OSD-HA co-chair a work group
- **Hexavalent chromium**
 - Move to EC action list & identify RM options
- **Naphthalene**
 - Move to EC action list & identify RM
- **Nanomaterials**
 - DDR&E and ADUSD (ESOH) co-chair a work group