



Emerging Contaminants (EC) Directorate

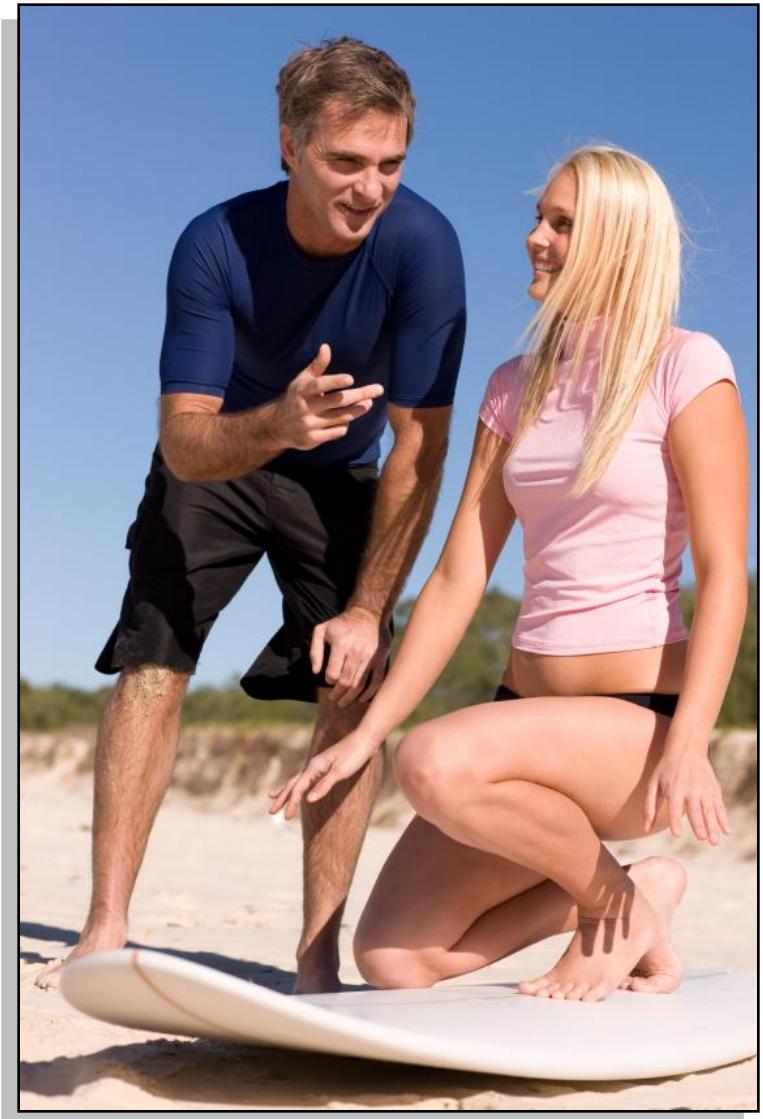
www.denix.osd.mil/MERIT

Maintaining Strategic Advantage by Learning to Surf in San Diego

Your Surfing Instructor is
Shannon E. Cunniff
Director, Emerging Contaminants
ODUSD (I&E)

Today's Surfing Lesson

- Understand the Ocean
- Read Today's Conditions
- Proactively Paddle or
 Miss the Wave
- Sustain your Ride!



Lesson One

Understand the Ocean



Trends

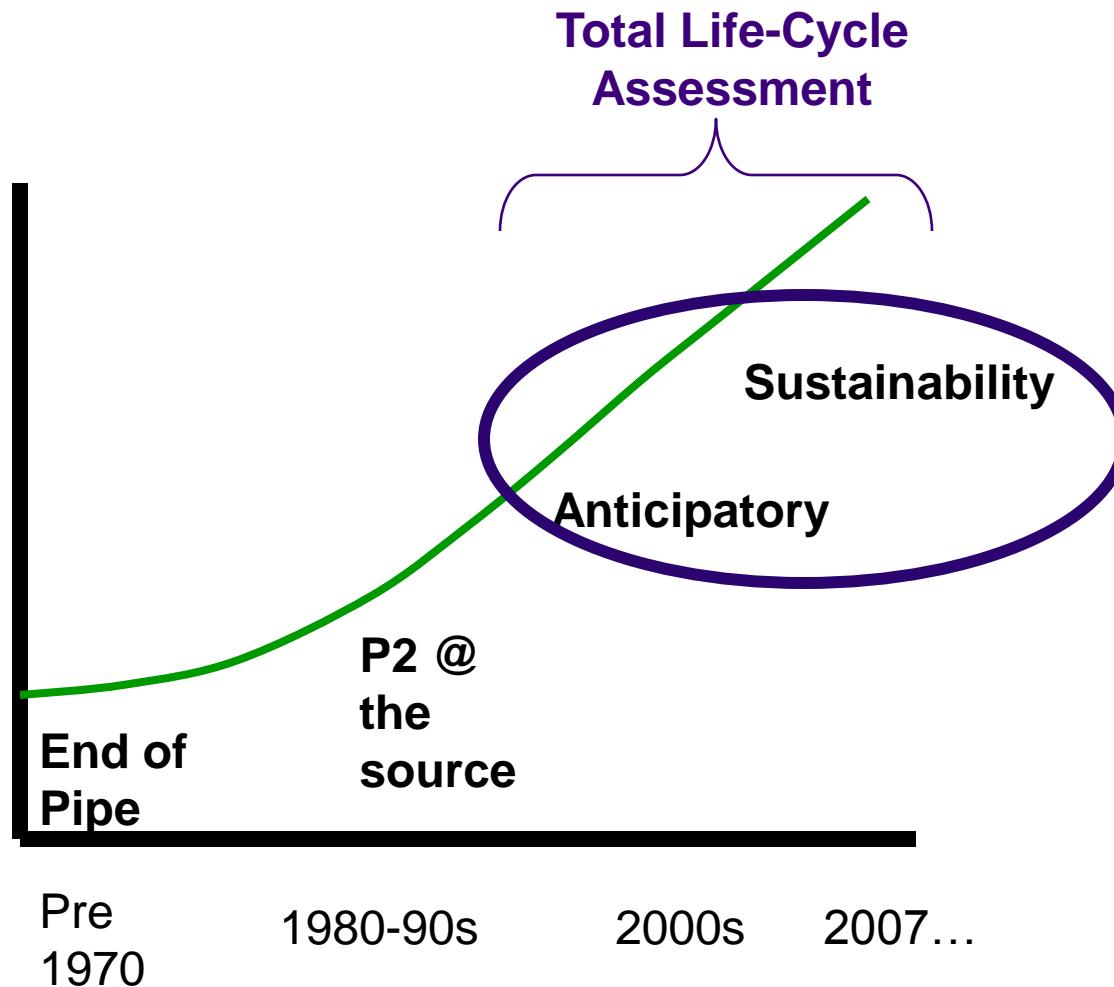
- ◆ **Economic strength / growth**
 - » Energy costs increasing
 - » Environmental liabilities
 - » Discretionary spending shrinking
 - » Frustration with ATL spending & timeliness



- ◆ **Legal**
 - » Regulations, Treaties
 - » EO 13423
 - » Regional Agreements

Evolve to remain relevant and ready to meet these challenges.

Progression of Environmental Practice



National Chemical Risk Mgmt Trends

- **Use of Precautionary Principle**

- » Must understand health & environmental effects before using chemicals

- **Chemical Management and Green Chemistry**

- » E.U. REACH, EO 13423, U.S. ChAMP, likely Toxic Substances Control Act reforms

- **Biomonitoring – What's showing up in humans?**

- » Center for Disease Control's national biomonitoring & Calif. voluntary program

- **Evolving Risk Assessment Process**

- » Increasing transparency...showing uncertainty range
 - » Identifying science gaps early and filling gaps via research
 - » Shift from animal dose/response → toxicogenomics with human cells
 - » Use of computational sciences
 - » Application of Age-Dependent Adjustment Factor (ADAF)

RoHS and Lead – A Cautionary Tale (continued)

- **One RoHS Goal: Eliminate Lead from Electronics**
- **Aeronautical/Aerospace Applications Constitute ~ 1% of Worldwide Electronics Usage**
 - ◆ DoD a fraction
- **Lead-free Circuit Boards Are In Our Supply Chain**
 - ◆ Where? What is the impact on mission-critical applications?
- **Initiatives Underway at DoD to Address These Unintended Consequences**
 - ◆ All are expensive (time-consuming)
 - ◆ All are *re*-active (vice *pro*-active)

Lesson Two

Read Today's Conditions



REACH – Basic Background

• **Main Objectives**

- ◆ Reduce risk from chemicals
- ◆ Share information on chemicals affects
- ◆ Encourage substitution to safer substances
- ◆ Authorize or restrict the use of high concern chemicals
- ◆ 2009-2018 Progressive implementation based on quantity & hazard

• **Directly Affects**

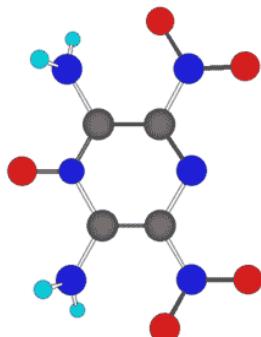
- ◆ Importers to EU & EU based manufacturers to be responsible for assessing the health and environmental effects of every substance
- ◆ Importers to EU & EU based manufacturers to transmit information to downstream users
- ◆ Downstream users to apply risk management measures

REACH – Basic Background (con't)

- **Requires Manufacturers and Importers to Register Listed Chemicals, which Raises Issues About:**
 - ◆ DoD's status and role are complex and unclear
 - ◆ Impact to DoD's suppliers (both in and into EU)
 - ◆ Proprietary, business confidential and national security info
- **First Impacts to DoD**
 - ◆ If by November 30, 2008, if some party has not registered those High Production Chemicals that DoD uses, its possible that then DoD may start feeling the effects of REACH.

REACH: Generating Emerging Contaminants for the Next 10 Years

What is an Emerging Contaminant?



- **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

Defense Exemptions are Possible, Not Guaranteed

- Specific cases...certain substances...necessary...Defense.
- Treaty of Lisbon 2007- EU greater say on Defense matters
- Not EU-wide -- Country by Country Exemption -- 30 Countries
- Labor intensive to get
- Likely to Require Some Proof of Military Uniqueness and Lack of Substitutes
- US not an EU Member State
 - ◆ DoD not obligated to comply with EU laws
 - ◆ Sovereignty issues
 - ◆ SoFA / Bi-Lateral agreements
- However, for EU Nations
 - ◆ Compliance is mandatory
 - ◆ May be subject to sanctions for non-enforcement within their borders

DoD & Defense Industries: Stormy Seas?

- **Potential for Release of Sensitive Information**
 - ◆ Required disclosures could reveal sensitive material formulations
- **Foreign Military Sales**
 - ◆ US may not have access to needed maintenance or logistic supports in EU
 - ◆ Competitive advantage to EU if US suppliers do not comply
- **NATO Interoperability/Unknown Performance Factors**
 - ◆ EU military may not be able to use US systems, maintenance procedures, or logistic supports
- **Overseas Maintenance and Base Operations**
 - ◆ Chemicals required by for maintenance may not be available
 - ◆ May not be able to import articles made with or containing some chemicals
- **Cost and Availability**
 - ◆ Diverging defense & commercial sectors: Possible problems with availability of parts and materials
- **Compatibility Issues & Pressure to Expand Qualified Products Lists**
 - ◆ RDT&E of substitutes -- alternatives that meet military specs
 - ◆ Unknowing acceptance of alternatives
- **Complicated and varying MOD requirements for Defense Exemptions**

REACH ... a Surfboard?

- **Knowledge Management Benefits Other DoD Interests and Activities**

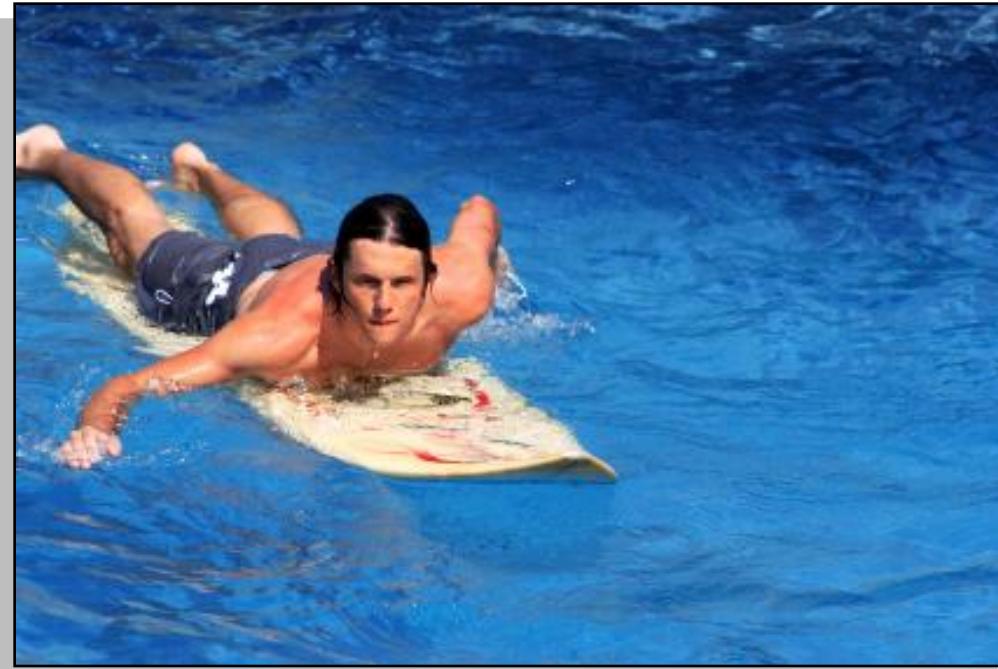
- ◆ Inform material selection to avoid late change orders
- ◆ Lifecycle cost reductions
- ◆ EO 13423's chemical risk management goals
- ◆ Strategic materials identification for National Defense Stockpile decision making

EU 1st Round SVHC & DoD Chemicals of Interest

FOR IMMEDIATE CONCERN			
OTHER CHEMICALS/USE OVERVIEW	CAS / EC Numbers	Reason	Recently Compiled DoD Information
Anthracene is used in the manufacture of pyrotechnics and as a component of black smoke	120-12-7 / 204-371-1	PBT	May be of concern since it is used in dyes (flares and markers) HMIRS – 37 products; MIDAS – 32 items
4,4'-Diaminodiphenylmethane is used as a hardener in epoxy resins and adhesives as well as in some construction coatings	101-77-9 / 202-974-4	CMR	Could become a big issue as DoD uses many adhesives (chemistry to be identified) HMIRS – 253 products, curing and hardening agents, adhesive film
Cobalt dichloride 's widespread uses include the production gas masks, self indicating silica gels, flux for magnesium refining (notably when recycling scrap material), as a solid lubricant, a metal drier in air-drying coatings and a drying agent in paints, lacquers, varnishes and printing inks; in the production of non-ferrous metals and electroplating processes	7646-79-9 / 231-589-4	CMR	HMIRS – 215 products; MIDAS – 113 items

Lesson Three

Proactively Paddle or Miss the Wave



Steps for Catching the REACH Wave: What DOD & its Suppliers Can Do

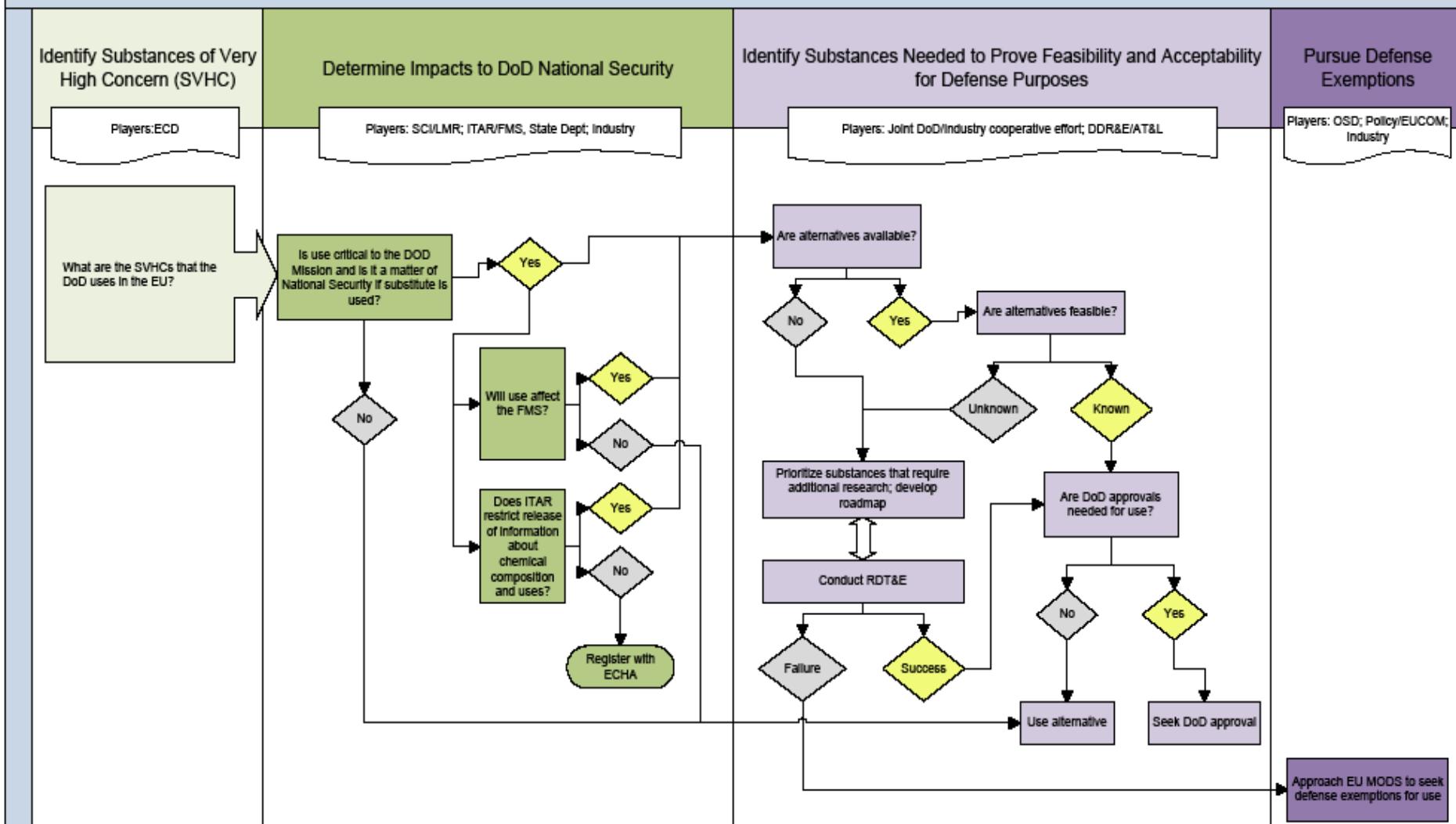
- Identify Strategic Materials/Chemicals and Identify Needs for Defense Exemptions Early
- Coordinate Research Plans to Look For and Evaluate Substitutes
- Accelerate & Expand Substitution Efforts
- Improve Visibility into Supply Chain
 - ◆ Materials used
 - ◆ Chemicals required for O&M
- Improve Knowledge Management and Information Sharing
 - ◆ E.g., Uses of proposed SVHCs to ensure those uses authorized

DoD's Emerging Contaminants Directorate Can Help You

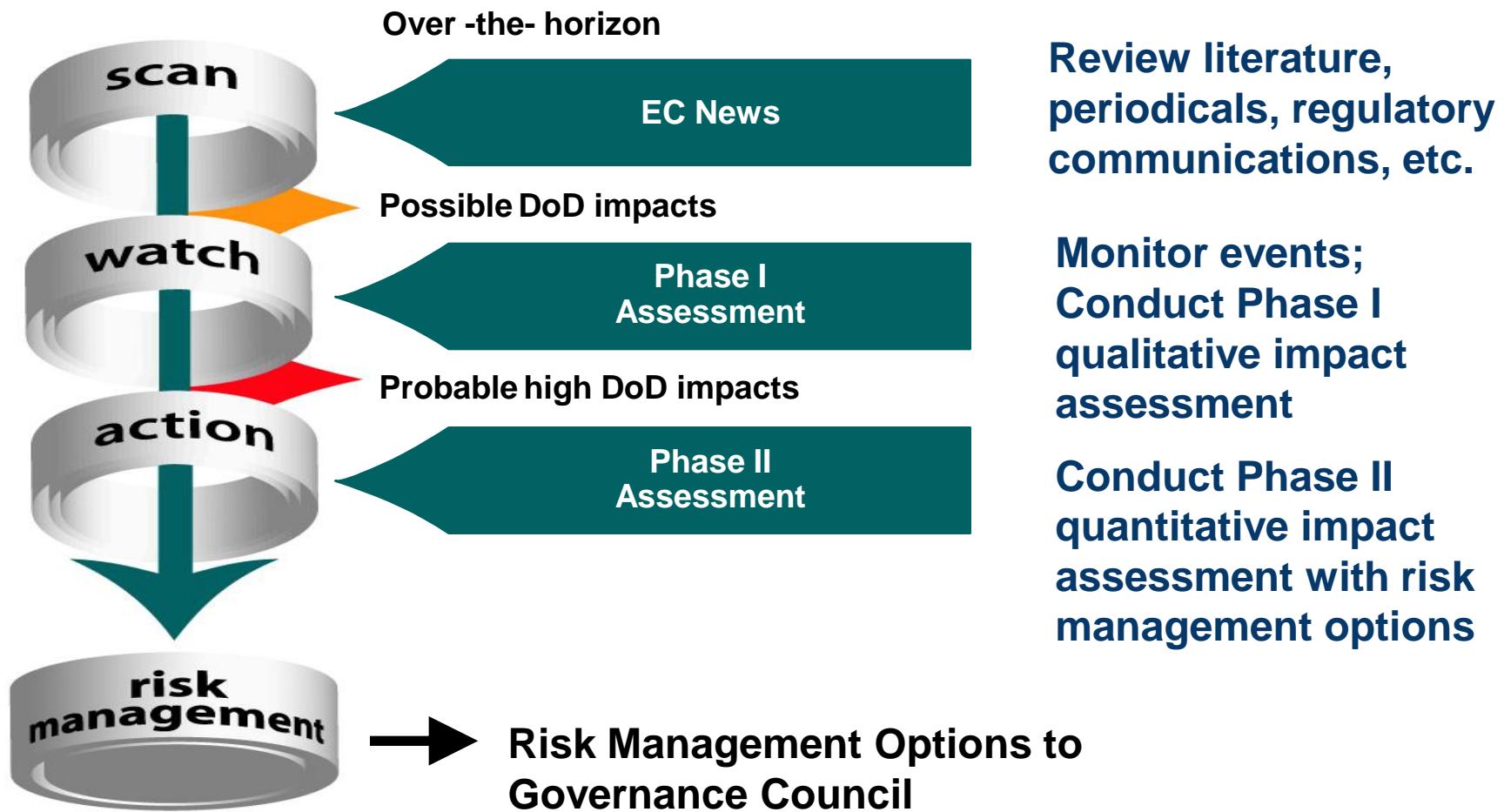
REACH and EC

Part I: REACH Decision Diagram (26 Sep 08)

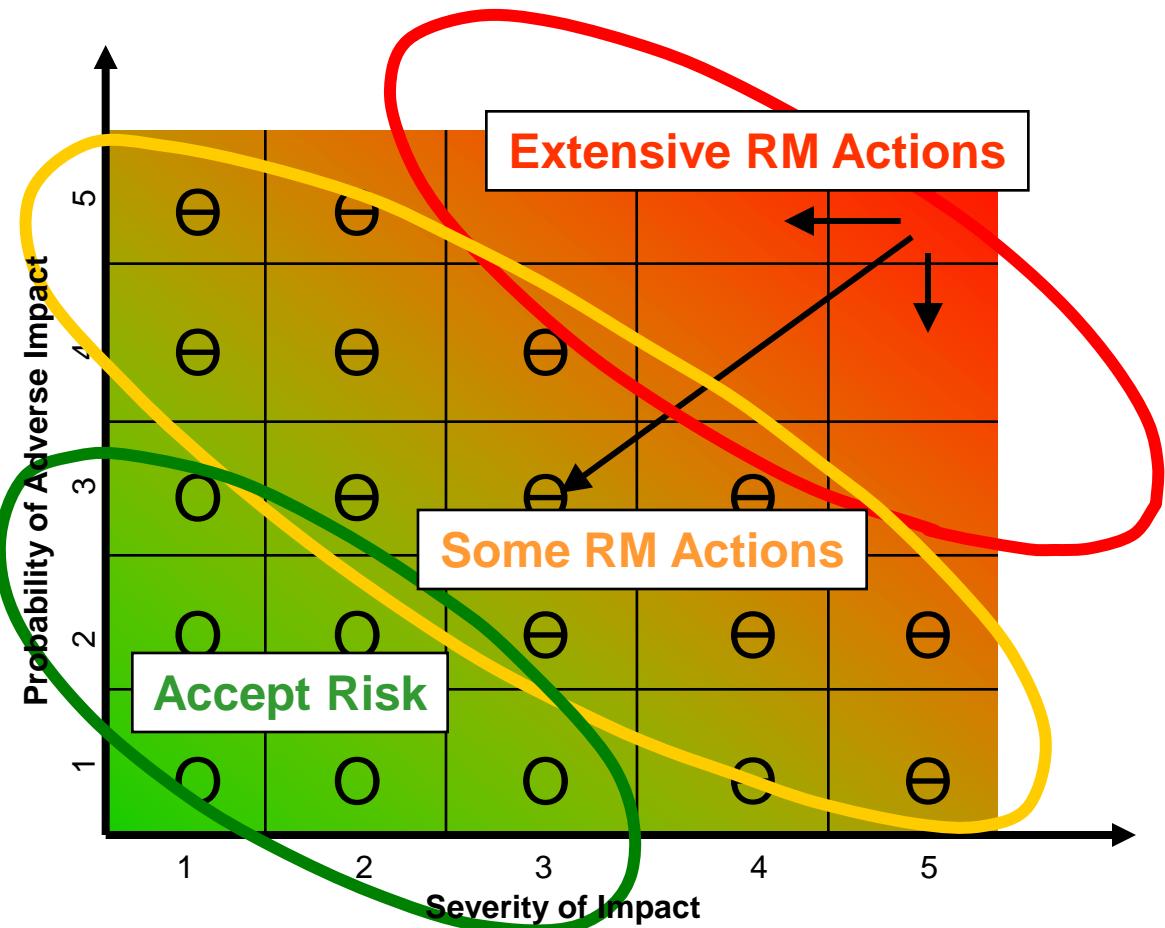
Goal: Assure no adverse impact to national security with attention on operations in EU



EC “Scan-Watch-Action” Process



Integrated Risk Management



- Define the negative influences on the enterprise in question.
- Identify strategic risk management options to lower severe risks.
- Measure progress by quantifying risk reduction of actions taken.

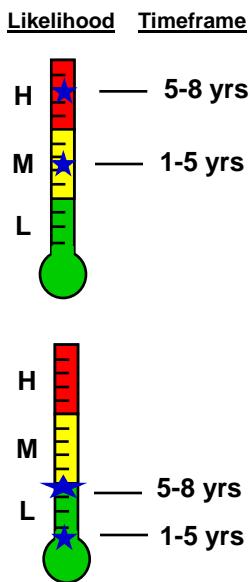
Hex Chromium Phase I Impact Assessment

Completed July 2007

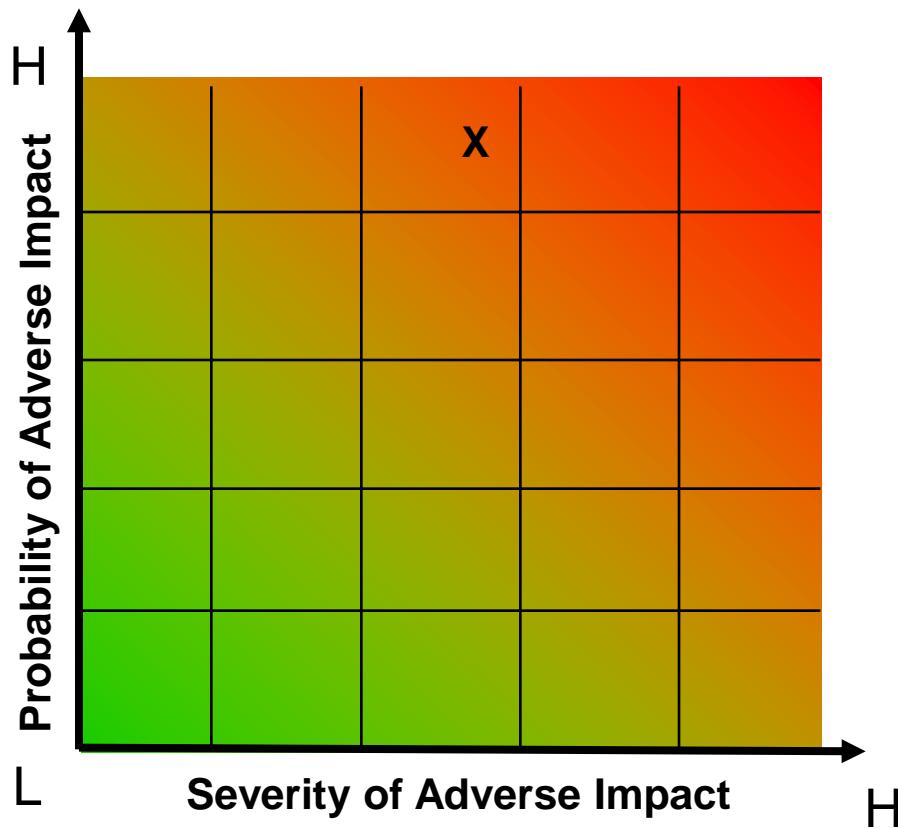
Hexavalent chromium is used in DoD weapons systems due to its useful metal finishing properties. Chromium compounds enhance hardness, increase adhesion as paint primers, and provide corrosion protection. Undergoing IRIS reassessment and CAL/EPA is developing drinking water public health goal.

Likelihood of Toxicity Value/ Regulatory Change

1. Likelihood that the USEPA will revise the IRIS toxicity benchmarks for Hex Chrome
2. Likelihood that OSHA will revise the occupational exposure standards for Hex Chrome



Note: California may establish a Public Health Goal before USEPA finalizes its IRIS value or reassesses the federal MCL.



ES&H

Readiness & Training
Acquisition/RDT&E

POMD of Assets

X Cleanup

DoD Action List

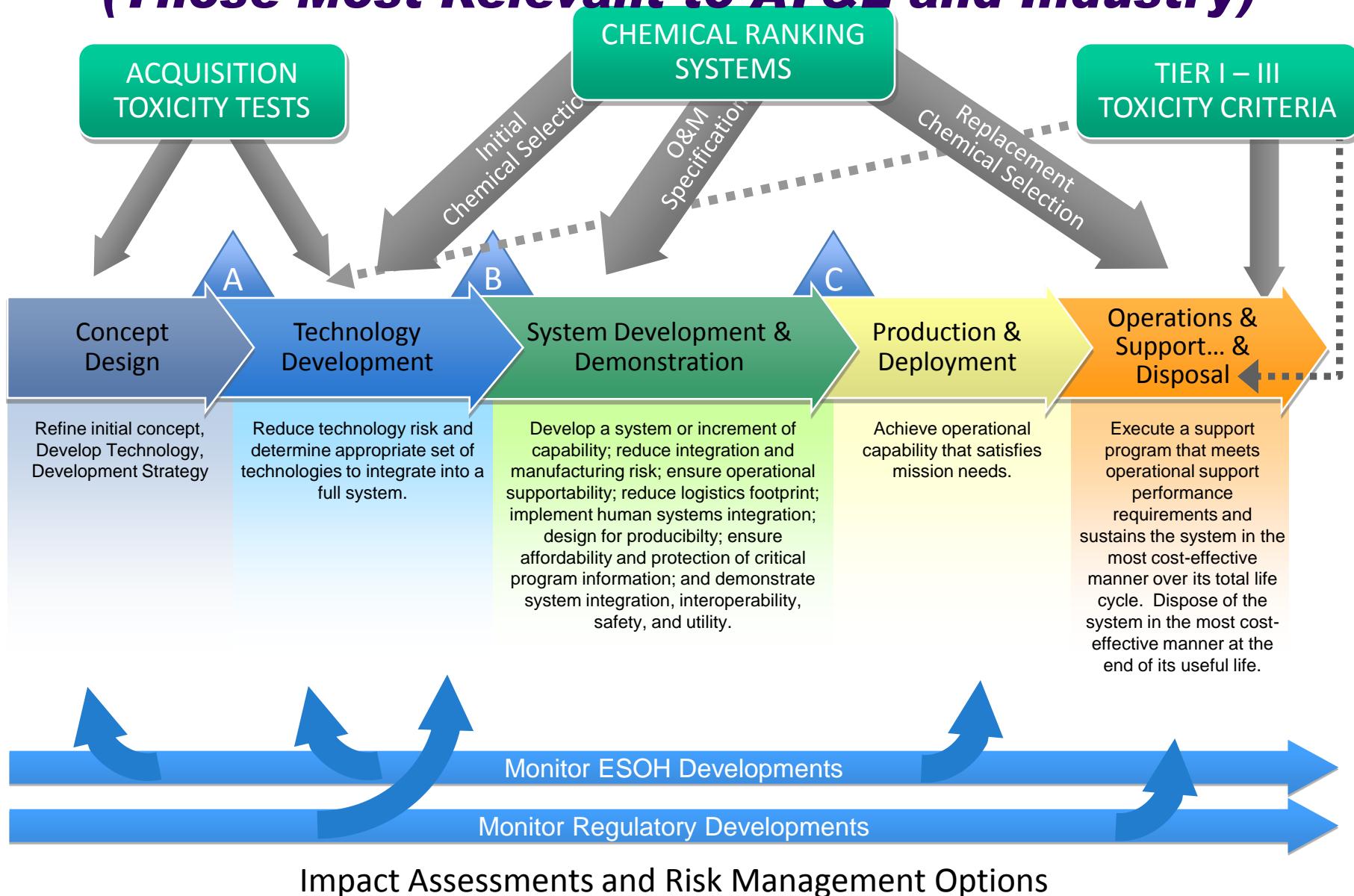
- Perchlorate
- Royal Demolition eXplosive (RDX)
- Trichloroethylene (TCE)
- Hexavalent Chromium
- Naphthalene
- Beryllium
- Sulfur Hexafluoride (SF6)

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

DoD Watch List

- ✓ Tungsten
 - ✓ Tetrachloroethylene (PCE)
 - ✓ Dioxins
 - ✓ 1,4-Dioxane
 - Nanomaterials
 - ✓ Perfluoroctyl sulfonate (PFOS)
 - ✓ Di-nitrotoluenes (DNT)
 - ✓ Lead (Added 3-07)
 - ✓ Nickel (Added 3-07)
 - Cerium (Added 7-07)
 - Cobalt (Added 7-07)
 - Cadmium (Added 12-07)
 - Manganese (Added 12-07)
 - ✓ Perfluoroctanoic acid (PFOA)
(Downgraded from Action List 9/08)
- ✓ = Phase I Impact assessments completed

The Products (Those Most Relevant to AT&L and Industry)

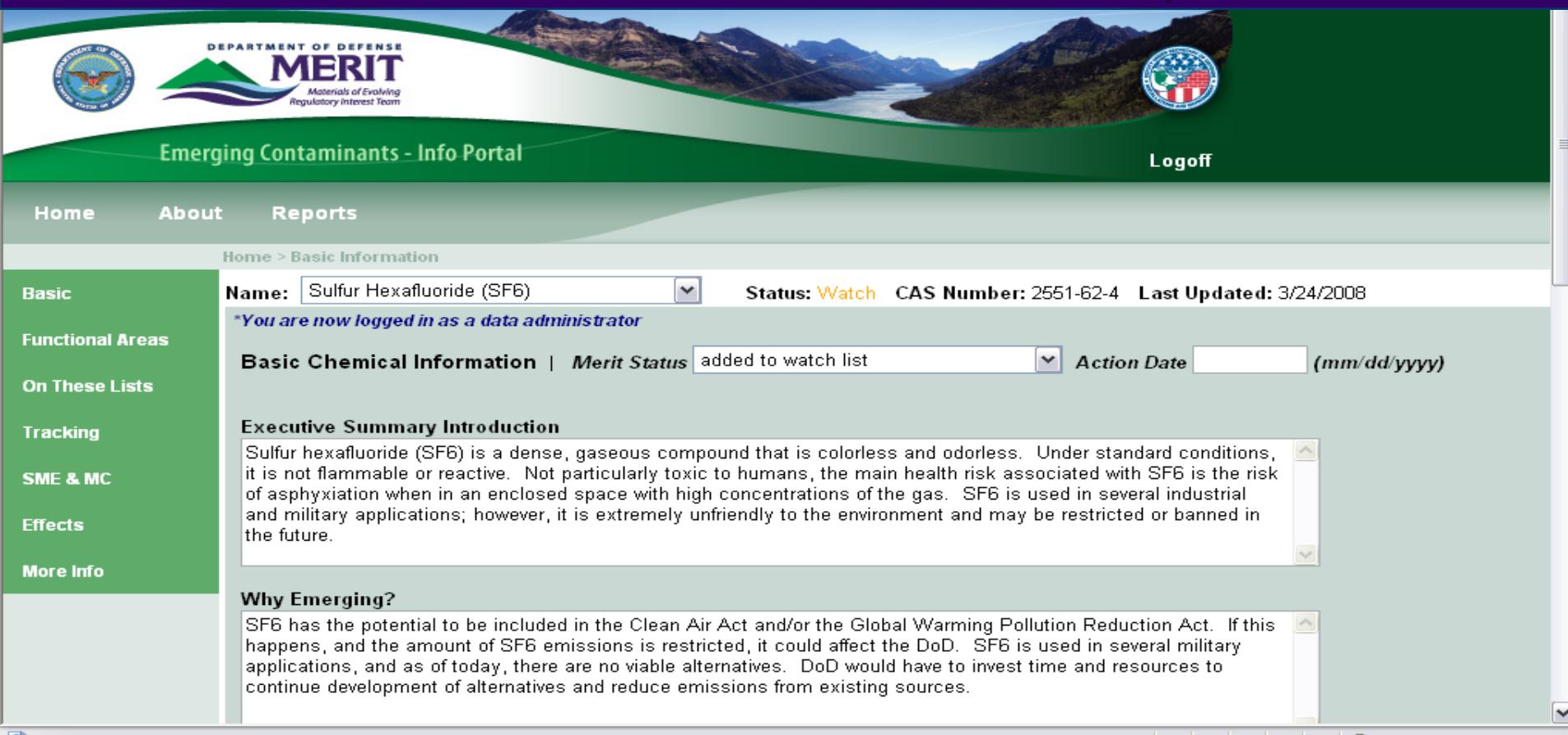


Emerging Contaminants Public Web Site:

<https://www.denix.osd.mil/MERIT>

EC PORTAL: www.ecportalinfo.org

Working on More Powerful Ways to
Collect, Disseminate, and Share Information & Experiences



The screenshot shows a web page from the Department of Defense MERIT (Materials of Evolving Regulatory Interest Team) website. The top navigation bar includes links for Home, About, Reports, and Logoff. A sidebar on the left lists Functional Areas: Basic, On These Lists, Tracking, SME & MC, Effects, and More Info. The main content area displays basic information for Sulfur Hexafluoride (SF6), including its name, status (Watch), CAS number (2551-62-4), and last update date (3/24/2008). It also shows a message indicating the user is logged in as a data administrator. Below this, there's an Executive Summary Introduction and a section titled Why Emerging? Both sections contain detailed text about SF6's properties and potential regulation under the Clean Air Act or Global Warming Pollution Reduction Act.

DEPARTMENT OF DEFENSE
MERIT
Materials of Evolving
Regulatory Interest Team

Emerging Contaminants - Info Portal

Logoff

Home About Reports

Home > Basic Information

Basic

Name: Sulfur Hexafluoride (SF6) Status: Watch CAS Number: 2551-62-4 Last Updated: 3/24/2008

*You are now logged in as a data administrator

Functional Areas

On These Lists

Tracking

SME & MC

Effects

More Info

Basic Chemical Information | Merit Status added to watch list Action Date (mm/dd/yyyy)

Executive Summary Introduction

Sulfur hexafluoride (SF6) is a dense, gaseous compound that is colorless and odorless. Under standard conditions, it is not flammable or reactive. Not particularly toxic to humans, the main health risk associated with SF6 is the risk of asphyxiation when in an enclosed space with high concentrations of the gas. SF6 is used in several industrial and military applications; however, it is extremely unfriendly to the environment and may be restricted or banned in the future.

Why Emerging?

SF6 has the potential to be included in the Clean Air Act and/or the Global Warming Pollution Reduction Act. If this happens, and the amount of SF6 emissions is restricted, it could affect the DoD. SF6 is used in several military applications, and as of today, there are no viable alternatives. DoD would have to invest time and resources to continue development of alternatives and reduce emissions from existing sources.

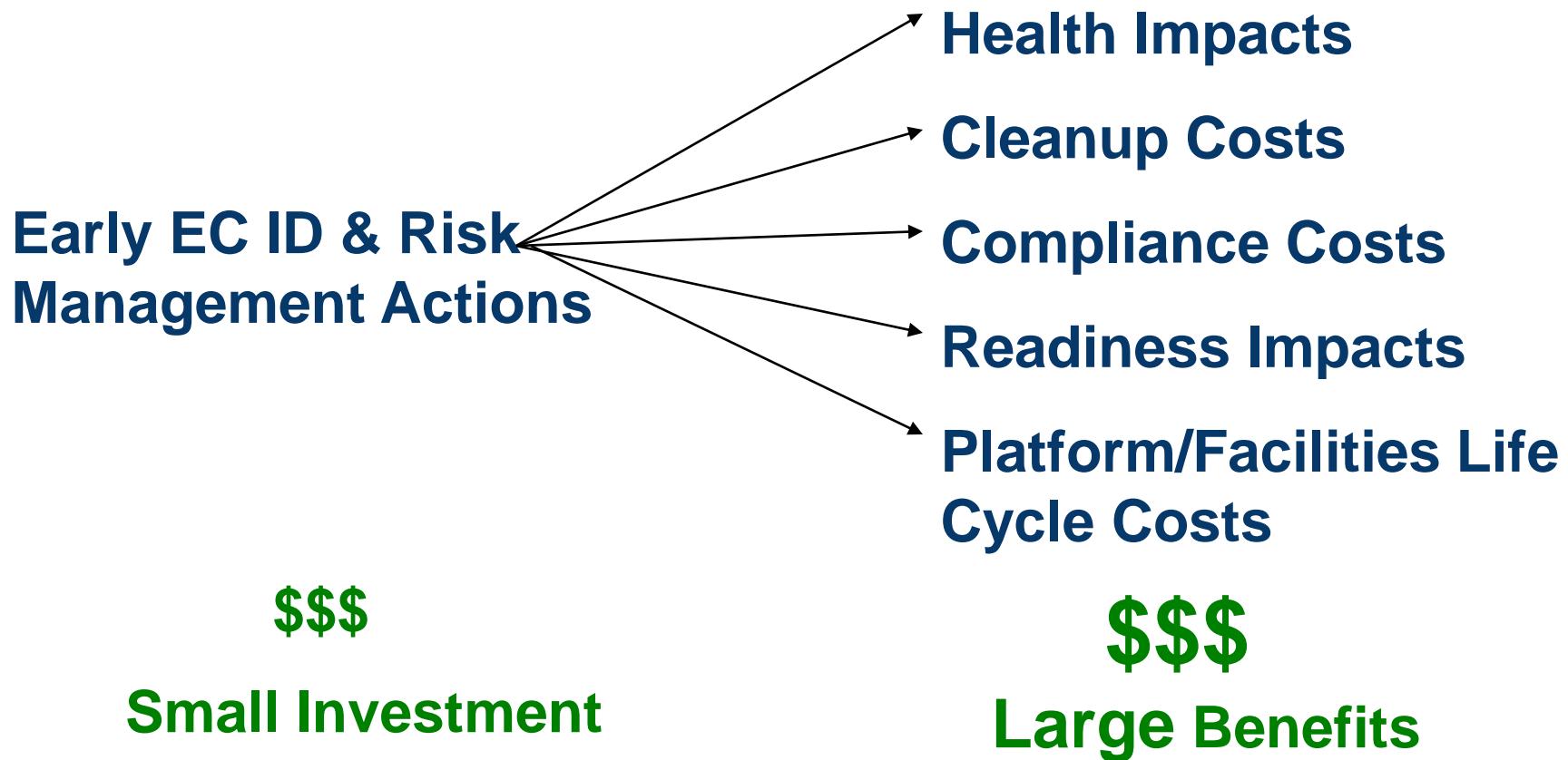
Lesson Four

Sustain Your Ride



Address Emerging Contaminants Early!

Proactive vs. Reactive Actions



Sustainability Fosters DoD's Mission

Sustainability Fosters DoD's Mission

- **Strengthens Operational Capacity**

- ◆ Meet current and future training, testing, and other mission requirements by sustaining land, air, and water resources

- **Lessens Costs**

- ◆ Minimize impacts and total ownership costs of systems, materiel, facilities, and operations

- **Enhances Well-Being**

- ◆ Of our Soldiers, civilians, families, neighbors and communities

- **Links the Future to the Present**

- ◆ Fosters identification of user needs and anticipation of future challenges

✓ **Disciplined People**

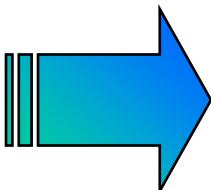
- ✓ Act with Understanding
- ✓ Broadened temporal & areal scales

✓ **Disciplined Thought**

- ✓ Broadened System Boundaries
- ✓ Risk-based Approaches
- ✓ Life-cycle, Ownership of the risk, Risk taker pays
- ✓ Moving beyond compliance

✓ **Disciplined Action**

- ✓ Greater Accountability



✓ **Distinctive Impact**

✓ **Superior Performance for the Mission**

✓ **Enhanced Endurance**

✓ **Strategic & Economic Advantage**

Sustainability is about Building Greatness to Last

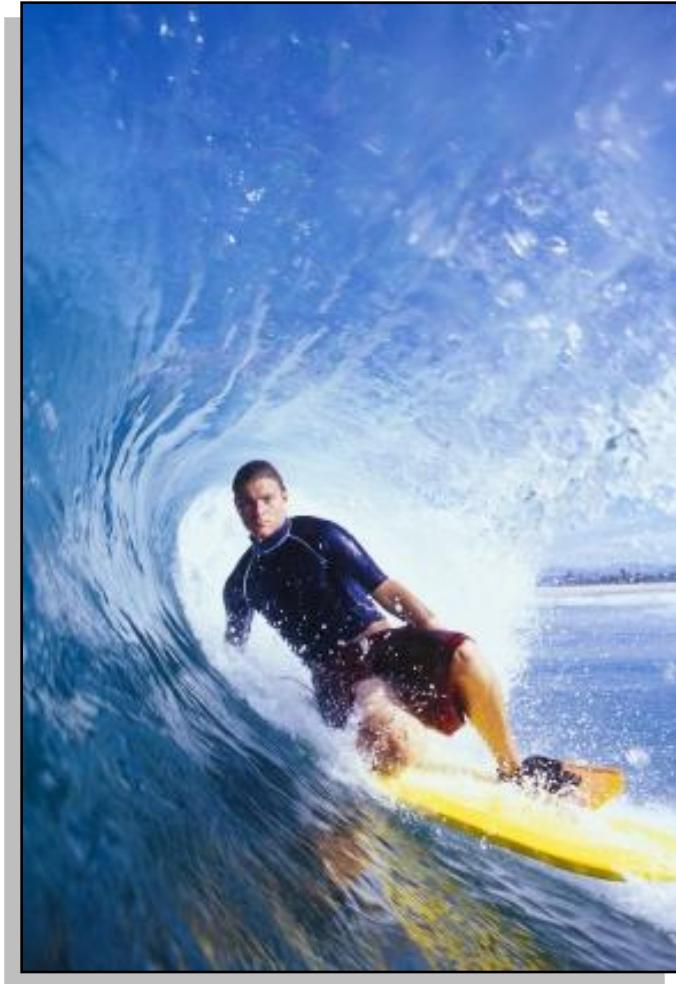
Surfing Lesson Main Points

- **Understand the Ocean: New Paradigms Forcing Change**
 - ◆ Budget
 - ◆ Agility needed to maintain strategic advantage
- **Read Today's Conditions**
 - ◆ REACH is just the beginning...its going to get more complicated in a world economy and supply network
- **Proactively Paddle or Miss the Wave**
 - ◆ Requires new thinking: Proactive targeted investments before regulatory action
 - ◆ EC providing advance warning and tools to help
- **Sustain your Ride!**
 - ◆ Potential large payback
 - ◆ Protects people, mission and assets



Take Home Message

Either stay ahead of the curve.....



Or wipe out.....





Emerging Contaminants (EC) Directorate

www.denix.osd.mil/MERIT

Questions & Discussion



Hexavalent Chromium

- Hexavalent chromium is a metal that is used for coatings in aircraft and other vehicles to provide a hard, wear-resistant surface, and in paints to prevent corrosion of the base metal



- The Permissible Exposure Limit (PEL) was recently lowered by the Occupational Safety and Health Administration (OSHA)
- European environmental regulations have effectively banned the use of hexavalent chromium on vehicles and electrical equipment. Many automobile, military parts and electronics manufacturers are adopting European or other stringent standards for all of their products

Hex Chromium Phase I Impact Assessment Findings

- ◆ Environment, Safety, and Health (ES&H)
 - ◆ High risk because it is a known inhalation carcinogen—CrVI is also a suspected oral carcinogen that poses noncancer risks. May be more stringently regulated due to new toxicity testing results. Significant cost and effort required to monitor and manage worker exposure if standards are lowered.
- Readiness and Training
 - ◆ Low risk due to the possibility of reduced availability of ranges/firing points as a result of new regulations is considered small.
- ▲ Acquisition/Research, Development, Testing, and Evaluation (RDT&E)
 - ◆ High risk because over 2,300 munitions items contain CrVI. Aircraft demolition and shipwrecking also releases CrVI. Emerging regulatory constraints may increase life-cycle costs and restrict testing/development of new technologies.
- Production, Operations, Maintenance & Disposal (POMD) of DoD Assets
 - ◆ High risk as new CrVI toxicity values would impact some routine anti-corrosion inspection and painting processes. Waste handling and disposal burdens would increase as would permitting and reporting for many DoD industrial operations.
- ✗ Cleanup Program
 - ◆ High risk as cleanups at 200-250 DoD sites may be affected. Very likely will have to re-examine closed sites for possible re-evaluation.
- Recommendation: Phase II Impact Assessment in process/RMOs under development.

Beryllium

- Beryllium is a steel-gray, naturally occurring metal found in rock, coal, soil and volcanic ash
- It is used to make specialty ceramics for electrical and high-technology applications such as x-ray machines, spaceships and aircraft, missile guidance systems, and computers
- OSHA's exposure limit is 2 micrograms/cubic meter of air. Under the Clean Air Act, EPA restricts the amount of beryllium that can be released into the air



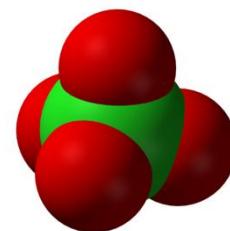
Naphthalene

- Naphthalene is a natural constituent of petroleum and jet fuel used by the military. It also appears as a white solid in pesticides (e.g., mothballs)
- Naphthalene is classified by the National Toxicology Program as *reasonably anticipated to be a human carcinogen*
- EPA is evaluating potential regulatory changes
- There are potentially significant impacts on health and DoD operations, especially fuel handling
- Further engineering controls, personal protective equipment, air monitoring, and medical tracking may follow
- DoD complies with current environmental and occupational health regulations
- DoD is testing jet fuel samples and evaluating potential impacts on DoD related to possible changes in regulatory status

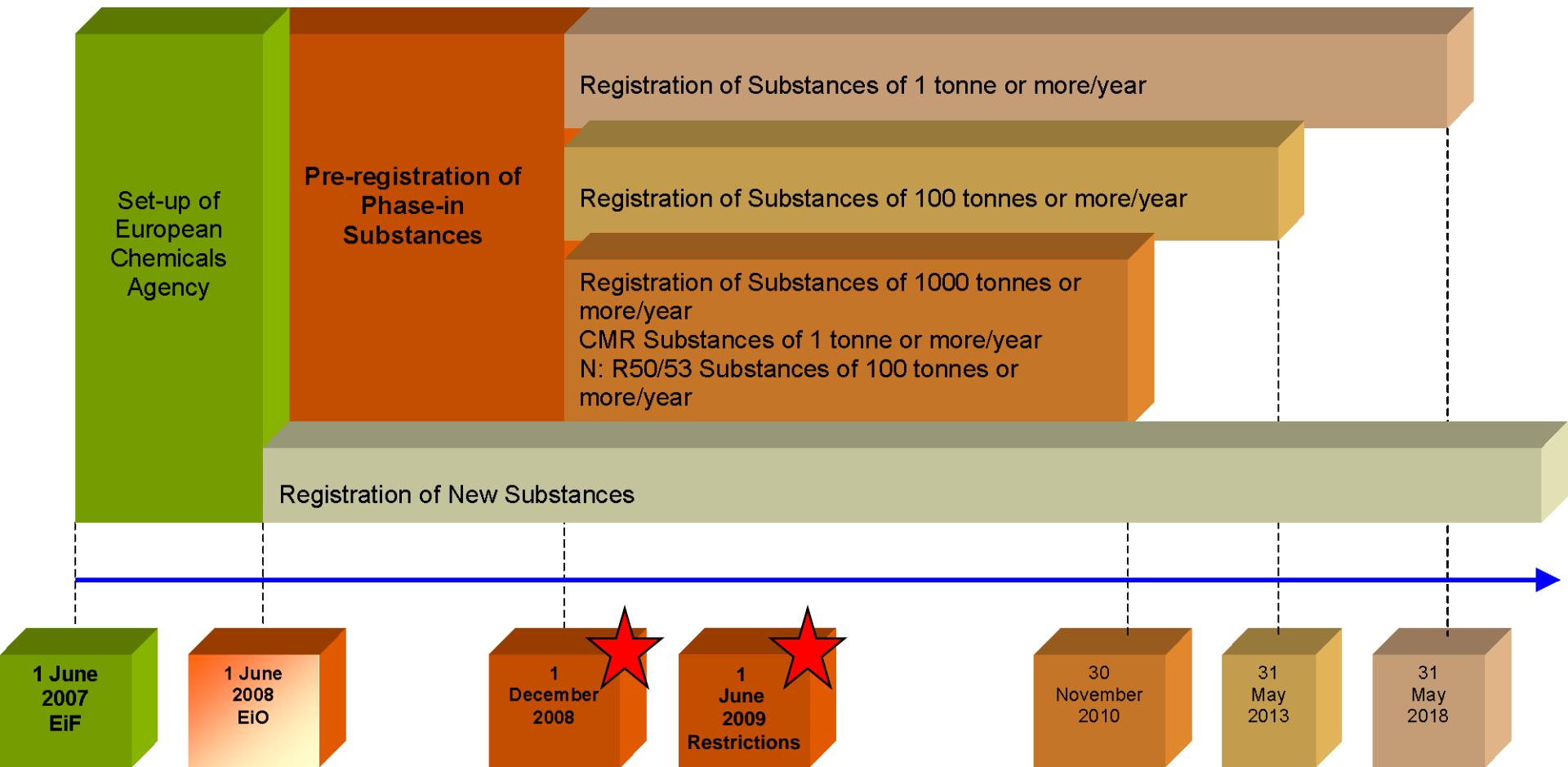


Perchlorate

- Perchlorate is a salt with properties that make it the safest, most efficient, stable and reliable propellant oxidizer available
- DoD relies on perchlorate for rocket and missile propellants, pyrotechnics and flares, but is relying on it less and less for munitions
- Perchlorate was detected — generally at levels below EPA's benchmark of 24 parts per billion — in drinking water sources in at least 34 states
- Several states such as California are considering or have recently developed public health goals or other regulatory requirements



REACH – Timeline and Phases



Focus First on substances with high volumes and those of greatest concern.