

Current & Upcoming Regulations for Metal Finishing

Department of Defense – SERDP/ESTCP

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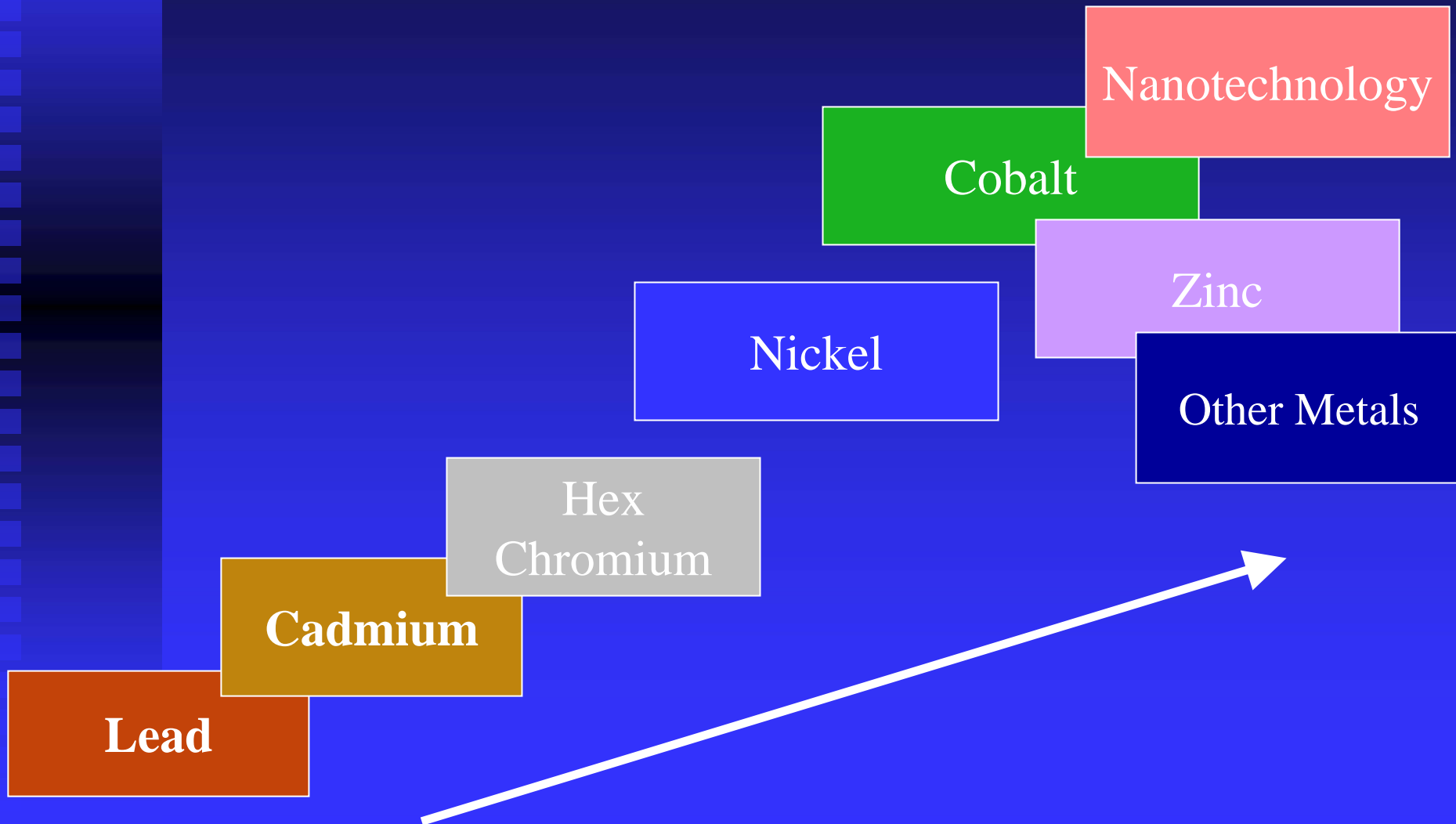
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Backdrop on Metal Finishing Regulatory Trends

- *New Framework is International & Dynamic*
- *US leader in Environmental Policy 1970-1995*
- *Europe leader in Environmental Policy 1995-now*

Regulatory Trends: Metals Under Scrutiny 1970's – 2010's



What's Happening?

- Tightening Controls on Processes
- Restrictions on Materials & Products
- New Hazard & Risk Classification Activity
- Drivers:
 - ◆ Maturation of Statutes
 - ◆ Legal Action
 - ◆ Emergence of Precautionary Approach

New OSHA Chromium Exposure Limit

- *Final Rulemaking – published February 28, 2006*
 - ◆ *New PEL 5 $\mu\text{g}/\text{m}^3$*
 - ◆ Local exhaust ventilation – 4 year compliance (2010)
 - ◆ Respirators
 - ◆ November 2006 for operations of 20 or more employees
 - ◆ May 2007 for ops < 20 employees
 - ◆ Medical monitoring & surveillance of employees
 - ◆ Housekeeping requirements
 - ◆ Maintain clean surfaces
 - ◆ Spills and releases to be cleaned up promptly
- *Outlook – Litigation may move PEL to 0.25 $\mu\text{g}/\text{m}^3$*

Pending USEPA Air Emissions Rule for Plating & Polishing Operations

- *Proposed Rulemaking – early 2007*
 - ◆ Potential restrictions on smaller (“area”) sources of “hazardous air pollutants” under CAAA Title III
 - ◆ Chromium
 - ◆ Nickel
 - ◆ Cobalt
 - ◆ Others
 - ◆ Technology-based controls (GACT) vs. MACT
 - ◆ Industry-EPA study on emission factors for nickel
- *Outlook – Chromium review / Nickel may get new scrutiny*

California – Selected Activity on Chromium

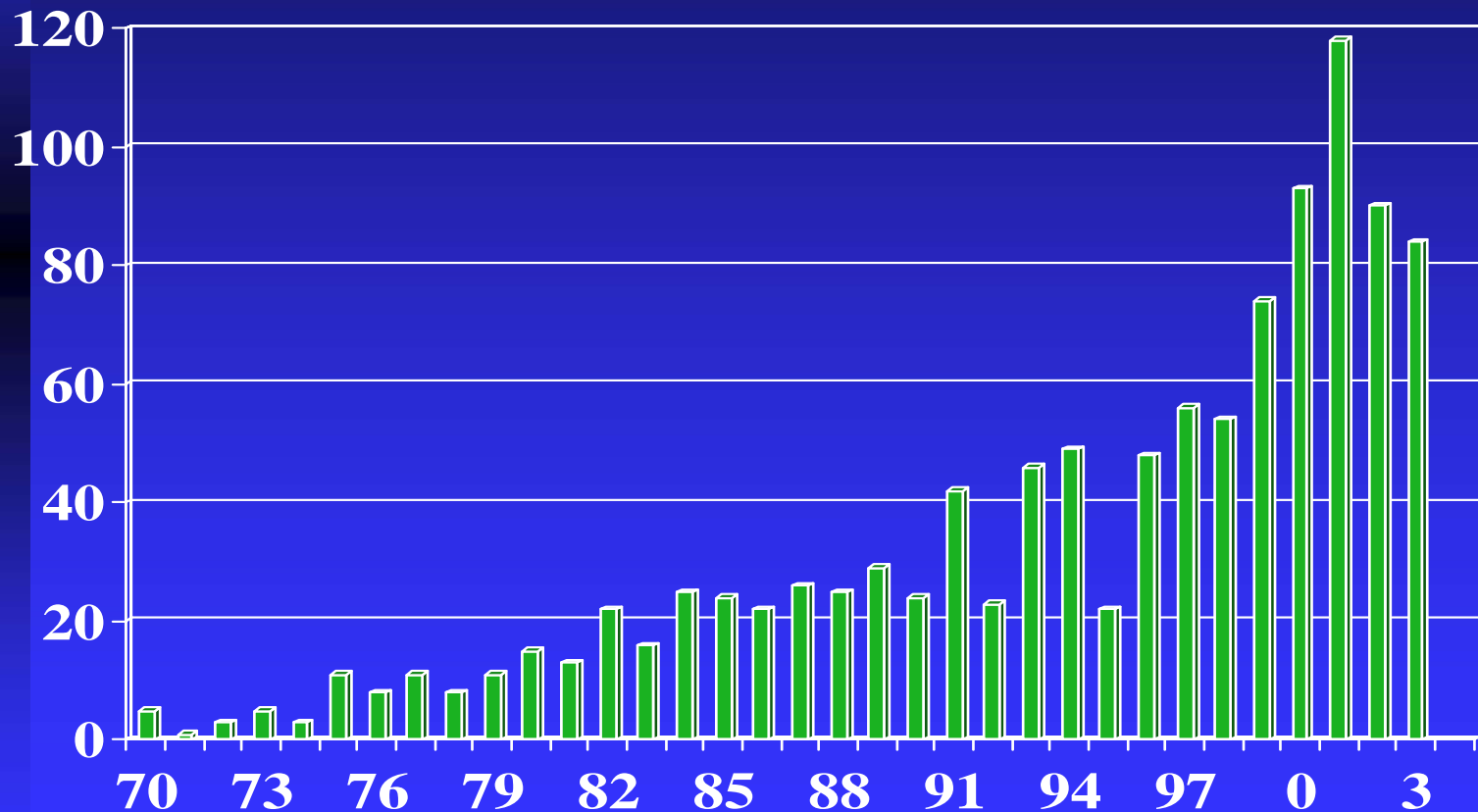
- *Air Emission Proposal Now Under Review – May 2006*
 - ◆ Tightens the most stringent air emissions requirements for chromium in the U.S. (CARB / Rule 1469)
 - ◆ Assesses proximity to sensitive receptors
 - ◆ Add-on controls required over low threshold level
 - ◆ Potential excess cancer risk of 1 ng/m³ is 1 in 146 million

Outlook – Currently being challenged

- *Thermal Spray Rule – 2004*
 - ◆ Chromium and nickel concerns / control technologies
- *Drinking Water – Public Health Goal for Hexavalent Chromium*

EU Environmental Legislation Has Exploded

Number of Items of Legislation Adopted, 1970-2003



European Regulatory Trends for Finishing

- Pressures on Products involving Metals and Chemicals
 - ◆ Europe driving global standard-setting under EPR
 - ◆ End of Life Vehicle Directive
 - ◆ WEEE / RoHS Directive
 - ◆ REACH Chemicals Directive
 - ◆ Lead, Mercury, Cadmium, Hexavalent Chromium
 - ◆ PFOS concerns
- Influence: Global supply chain & coatings customer base
- Critical Trend: Even with EU military exemptions, de facto materials de-selection policies will drive technology

Hazard & Risk Classification Trends: Chromium, Nickel and Cobalt

United States

- ◆ Chromium Risk Assessment for OSHA
 - ◆ Informed significant rulemaking decision
- ◆ Nickel Risk Assessment for USEPA – IRIS Publication
 - ◆ Pushed back to 2007
 - ◆ Industry 2-year animal cancer study
- ◆ Cobalt Sulfate listed as likely carcinogen
 - ◆ NTP February 2005

European Union

- ◆ “Global” Nickel Risk Assessment – Final 2005
 - ◆ Moving to regulatory action
- ◆ Nickel Air Emissions Monitoring – 4th Daughter Directive

Hazard & Risk Classification Trends

European Regulations May be Affected by Risk Assessment

- Directive 76/769/EEC Restrictions on marketing/use of dangerous substances
- Euro Coinage
- Consumer protection
- Directive 98/86/EC water quality standards
- Food contact materials, additives, and supplements
- Directive 90/385/EEC implantable medical devices
- Directive 88/378/EEC toy safety
- Directive 89/106/EEC construction products
- Emissions to water
- Directive 96/61/EC
- Directive 76/464/EEC
- Directive 2000/60/EC
- Directive 80/68/EEC
- Emissions to air
- Directive 98/24/EC protection of workers
- Directive 2000/76/EC incineration of waste
- Waste management
- Directive 91/689/EEC and Regulation EEC No. 259/93 haz waste

Regulatory Change & Technology

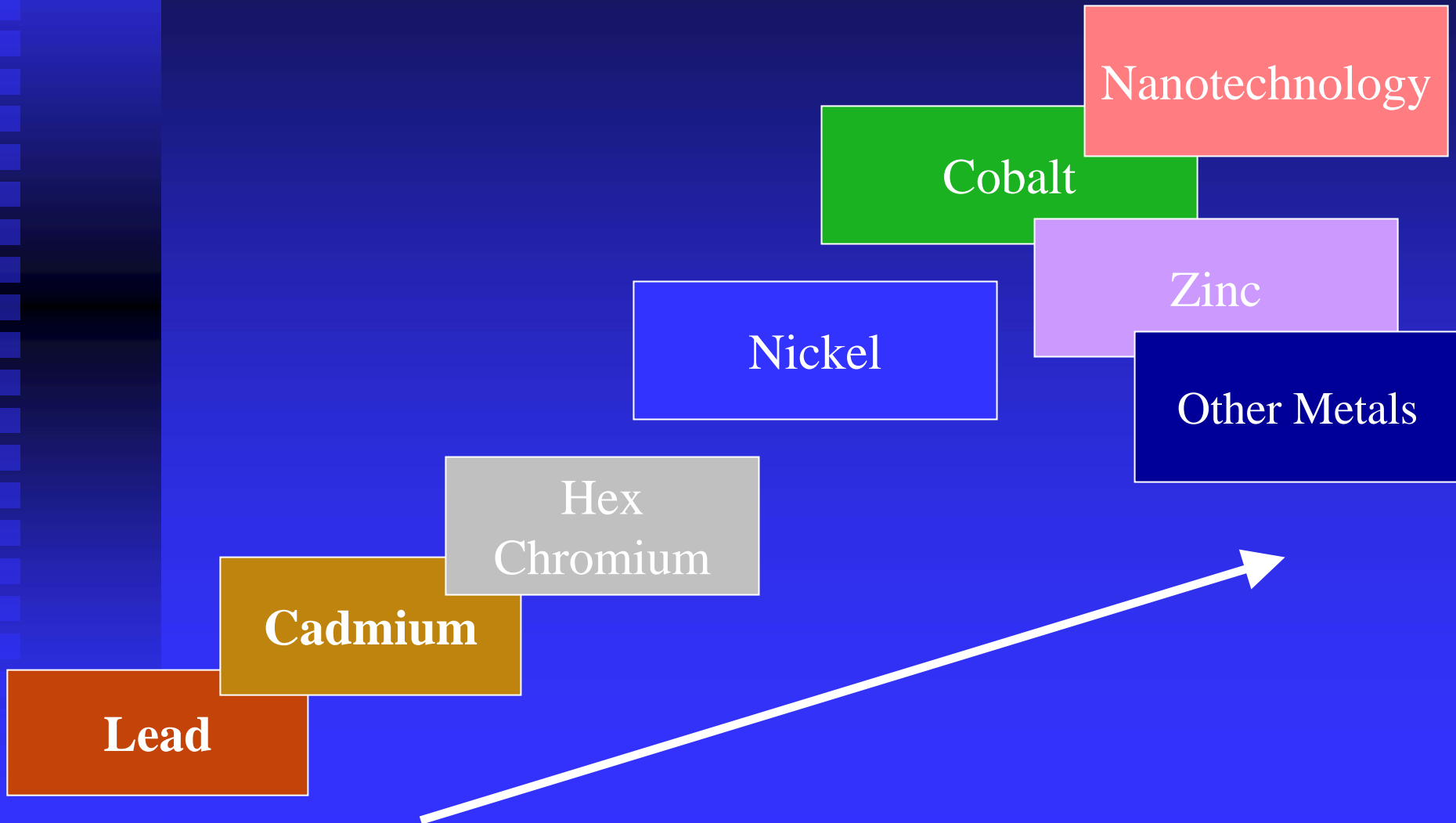
Emergence of Alternatives

- New “wet” / “wet” to “dry” processes
 - ◆ HVOF & Others
- Changing material from finished metals to non-metals
 - ◆ Composites
- New metal alloys
 - ◆ Base material replacements
- Nanotechnology development
 - ◆ Characteristics showing promise for future

Regulation of Nanotechnology: Long Term Outlook

- Early Stage of Review - coatings are in the discussion
 - ◆ Nanotechnology's potential effects on human health and the environment – over 200 nanotech products for consumers now
 - ◆ Issues include voluntary reporting from industry on nanotech products
 - ◆ Question: Is there a regulatory paradigm for nanotechnology?
 - ◆ Status – insufficient scientific / regulatory vocabulary to describe nanotechnologies, much less regulate
- Experts calling for life cycle approach to address potential harm

Regulatory Trends: Metals Under Scrutiny 1970's – ?



Breakout Sessions: Locations & Co-Chairs (Monday Afternoon)

HYDRAULICS AND PNEUMATIC ACTUATORS – GREEN

Location: Monet 3

Co-Chairs: Brad Beardsley & Pamela Kobryn

TURBINE ENGINES FOR VEHICLES, SHIPS, AIRCRAFT – BLUE

Location: Monet 4

Co-Chairs: Mark Rechsteiner & Bob Bondaruk

STRUCTURAL (LOAD-BEARING) COMPONENTS – RED

Location: Ballroom C&D

Co-Chairs: Paul Chalmer & Ron Montgomery

GUN BARRELS & SMALL COMPONENTS – YELLOW

Location: Monet 2

Co-Chairs: Mike Audino & James Jennings

Breakout Sessions: Locations & Co-Chairs (Tues. Morning)

CHROME PLATING (LINE-OF-SIGHT + NLOS) – GREEN + BLUE

Location: Monet 2

Co-Chairs: Bruce Sartwell & Peter Gallerani

CD PLATING – RED

Location: Monet 3

Co-Chairs: Erin Beck & Debra Naguy

HEX CR PRE & POST TREATMENTS – YELLOW

Location: Monet 4

Co-Chairs: Bill Nickerson & Brian Lowry

**Breakout Sessions:
Locations & Co-Chairs (Monday Afternoon)**

Key Issues and Observations

- Robust international legal regimes governing chemicals are now in place.
- International agreements will drive national standards world-wide (e.g., production bans, restrictions, management)
- Europe will seek to globalize REACH
- U.S. participation is essential to ensuring balanced, science-based decisions
- Watch for TSCA and FIFRA Amendments

1970-1995

- US is a worldwide leader in environmental policy
 - ◆ Clean Air Act
 - ◆ Superfund
 - ◆ Title IV Acid Rain Program 1990
- Command and control regulatory and enforcement approach focused on process (and not products) and fines for past (mis)behavior

1995-Present

- Europe is now at the forefront of environmental policy-making
- Polluter-pays and precautionary principles
- Focus on product regulation
 - ◆ Packaging Waste Directive
 - ◆ End-of-Life Vehicle Directive
 - ◆ Cadmium regulation
 - ◆ EUP
- Market access
- Spill-over effects: California and China

RoHS Directive Overview



- Restriction of Hazardous Substances
- Electrical and Electronic Equipment (EEE)
- Pb, Hg, Cd, Cr6+, PBBs and PBDEs
 - ◆ MCVs in “homogenous materials”
 - ◆ Adopted, published and effective
- Industry must comply by July 1, 2006

Four Product Exemptions Under WEEE

1. EEE intended for military purposes
2. Large-scale stationary industrial tools
3. Implanted and infected medical devices
4. EEE “part of another type of equipment that does not fall within the scope” of the WEEE Directive

Recent Regulatory Activity

■ Focus on Processes

- ◆ Hexavalent Chromium (OSHA, EPA, California)
- ◆ Nickel Compounds (NTP, EPA)
- ◆ Alternative Technologies – thermal sprays (California)

■ Focus on Products

- ◆ Metals – States looking to integrate European approaches for metals (California, Massachusetts)
- ◆ PFOS – key chemical ingredient in fume suppressants

■ Complexity of the Regulatory Framework will Increase