Current & Upcoming Regulations for Metal Finishing

Department of Defense – SERDP/ESTCP
Washington, DC
May 22, 2006

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Backdrop on Metal Finishing
Regulatory Trends

- New Framework is International & Dynamic
- Europe leader in Environmental Policy 1995-now
Regulatory Trends: Metals Under Scrutiny
1970’s – 2010’s

- Lead
- Cadmium
- Hex Chromium
- Nickel
- Zinc
- Cobalt
- Other Metals
- Nanotechnology
- Other Metals
What’s Happening?

- Tightening Controls on Conventional Processes
- Restrictions on Materials & Products
- New Hazard & Risk Classification Activity

Drivers:
- Maturation of Statutes
- Legal Action
- Emergence of Precautionary Approach
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
New OSHA Chromium Exposure Limit

Final Rulemaking – published February 28, 2006

- New PEL 5 µg/m3
- 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 µg/m3
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
    - Chromium
    - 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 / ATCM 1469)
    - Assesses proximity to sensitive receptors
    - Add-on controls required over low threshold level
    - Potential excess cancer risk of 1 ng/m$^3$ 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 That May be Affected by Nickel 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 contract 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
Where Will Current Trends Lead?

- Lead
- Cadmium
- Chromium
- Nickel
- Cobalt
- Zinc
- Other Metals
- Nanotechnology