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# Cadmium Alternatives for Fasteners

## Status and Way Forward

James Jennings

Naval Surface Warfare Center Philadelphia

[james.c.jennings@navy.mil](mailto:james.c.jennings@navy.mil)

215-897-7869, DSN 443-7869

FAX 215-897-8450, DSN 443-8450

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- Where We Have Been
- Where We Are
- A Way Forward

- Cadmium is a Hazardous Material
  - US OSH Regulated
  - US EPA Regulated
  - Not a Prohibited Material In US
  - Not a Prohibited Material In DoD

- ESTCP/SERDP/JG-PP Sponsored Work
  - JG-PP: Alternatives to Electrodeposited Cadmium for Corrosion Protection and Threaded Part Lubricity Applications (Project Number: J-95-MF-006)
  - JG-PP: Cadmium Replacements for Department of Defense (DoD) and National Aeronautics and Space Administration (NASA) Applications (Project Number: J-00-MF-024)
    - Structural Cadmium
    - Fastener Cadmium Coating Alternatives
    - Connector Cadmium Alternatives

- Other DoD Sponsored Work
  - Army
    - Independently Evaluated Alternatives
    - Implemented Alternatives
    - No Cadmium in FCS
  - Air Force
    - Independently Evaluated Alternatives
    - Implemented Alternatives
    - No Cadmium in JSF
  - Navy
    - No Independent Alternative Evaluation
    - No Implementation

- Cadmium Not The Only Problem
  - Hexavalent Chromium in Chromate Coatings
    - US OSHA reduced PEL in 2006
    - US OSHA may further lower PEL
- US National Regulations Not Only Source
  - Europe
    - End-of-Life Directive
    - Restriction of use of Hazardous Substances (RoHS)
  - US States
    - May adopt European style restrictions

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- Industry Moved Faster than DoD
  - Auto and Ground Vehicle Industry
    - No Cadmium
    - No Hexavalent Chromium
  - Electronics Industry
    - No Cadmium
    - No Hexavalent Chromium
  - Commercial Aviation Industry
    - No Cadmium
    - No Hexavalent Chromium

- Industry Moved Faster than DoD (Cont.)
  - Diminishing supply sources
    - Cadmium plating more expensive
    - Hexavalent Chromium more expensive
  - Are we getting what we expect?



- ESTCP/SERDP/JG-PP
  - Aware of Need
    - 2006 Metal Finishing Workshop
    - 2006 Partners In Environmental Technology Technical Symposium and Workshop
  - SERDP
    - 2008 Solicitation
    - WPSON-08-01"ENVIRONMENTALLY BENIGN, HIGH-STRENGTH FASTENERS FOR WEAPONS SYSTEMS"
  - ESTCP
    - 2008 Solicitation
    - Topic 4 "WEAPONS SYSTEMS & PLATFORMS (WP)"
  - JG-PP
    - Joint Cadmium Alternatives Team (JCAT)

## Where Do We Go From Here?

- Needs
  - Cadmium and Hexavalent Chromium Free Alternatives
    - Identify
    - Evaluate
  - Test Protocol
  - Design Guidance
  - Implement Alternatives

- New High Strength Steel Fastener Cadmium (and Hexavalent Chromium) Alternatives
  - Coordinated Efforts
  - Diverse Team
    - Industry
    - DoD
  - Information Sharing
  - Submit Proposals To ESTCP/SERDP As Appropriate

- Proposed ESTCP/JG-PP Program
  - Year 1
    - Joint Test Protocol
    - Potential Alternatives Report
    - Correlate Existing Data
    - Test Program
  - Years 2 & 3
    - Testing
    - Identify Additional Work
    - Communicate

- Proposed ESTCP Program (Cont.)
  - Year 4
    - Test Report
    - Design Guidance
    - Implementation
  - Follow-On
    - Implementation
      - Specifications
      - Design Documentation
      - Stock System



# A Way Forward

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I Need Your Help!

- I Need Your Help!
  - Stakeholders and Interested Parties
  - Test Data
  - Participation in Work
  - Ideas

Interested?

Please Contact Me

James Jennings

[james.c.jennings@navy.mil](mailto:james.c.jennings@navy.mil)

215-897-7869