JG-PP Fax/Email

Joint Group on Pollution Prevention

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Joint Cadmium Alternatives Team

Kick-Off Meeting Minutes

January 26-27, 2000

Comments:

Attached please find the minutes from the January 26-27, 2000, Joint Cadmium Alternatives Team Kick-Off Meeting. Please further distribute as necessary. The presentations that were given at this meeting are available on the JG-PP World Wide Web site, http://www.jgpp.com/drafts/presentations/index.htm. The **username** and **password** required to access this area of the JG-PP Web site are **jgppdrafts** and **drafts** (lower case) respectively.

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MEMORANDUM FOR RECORD **February 16, 2000**

Subject: Kick-Off Meeting Summary and Minutes –January 26-27, 2000

Original Equipment Manufacturer: Boeing, Lockheed Martin, Electric Boat Corporation, Bell Helicopter TEXTRON, Pratt & Whitney United Technologies

Potential Programs/Owners: TBD

Material(s) Targeted for Reduction/Elimination: Cadmium

Methodology Phase: I - Identification and II - Technical

Summary:

On 26 & 27 January 2000, representatives from the Army, Navy, Air Force, National Aeronautics & Space Administration (NASA) and Original Equipment Manufacturers (OEMs) met with representatives from the Joint Acquisition Sustainment Pollution Prevention Activity (JASPPA). The purpose of the meeting was to kick-off the Environmental Security Technology Certification Program (ESTCP)/Joint Group for Pollution Prevention (JG-PP) Joint Cadmium Alternatives Team (JCAT) project, and to begin identifying potential alternative technologies and performance requirements for qualifying alternatives.

A summary of all site activity/efforts to date can be obtained through the JG-PP World Wide Web site, http://www.jgpp.com.

Prior Decisions: Five application categories were identified, which include the following:

1. Electrical connectors
2. Structural components
3. Fasteners
4. Springs
5. Non-aerospace applications (addendum to BISDS JTP)

Next Teleconference/Meeting: Tentatively scheduled for summer 2000 at Aberdeen Proving Ground

Minutes

1. The meeting was called to order at approximately 13:00 on 26 January 2000.

2. Dr. Michael Kane, Naval Air Warfare Center Aircraft Division (NAWCAD), the project lead, opened the meeting by welcoming the participants to KSC. Dr. Kane then provided the participants with an overview of the purpose and objectives of the JCAT Project. Dr. Kane's overview emphasized two major points.
   - Total ownership costs of cadmium coated parts and components are becoming prohibitively expensive and unaffordable due to the **in-service** costs associated with the use of cadmium. Coating deposition costs alone do not merit the replacement of cadmium, i.e., alternatives methods for depositing cadmium are not adequate since in-service costs associated with the use of cadmium would still be present. Most cadmium alternatives will cost more to deposit than cadmium but would be justified when total ownership costs are considered.
   - Coating deposition costs for bulk quantity processing of fasteners and electrical connectors is critical. Small increases in coating deposition costs would dramatically increase when multiplied by the number of fasteners and electrical connectors that are purchased. A DOD, NASA, and industry cooperative effort will be needed to successfully transition cadmium alternatives for widespread use on fasteners and electrical connectors.

3. Dr. Kane asked for volunteers to participate in working groups to develop JTPs for the five application categories (electrical connectors, fasteners, springs, structural components, and non-aerospace applications). Mr. Carl Handsy, TACOM, and Mr. Pete Ault, Ocean City Research Corporation agreed to participate in developing the non-aerospace applications JTP (addendum to BISDS JTP). Mr. Jerry Brown, Lockheed Martin Corporation, and Mr. Joe Kolek, Air Force Research Laboratory (AFRL), agreed to participate in developing the electrical connectors JTP.

4. Dr. Kane reviewed Environmentally Assisted Cracking (EAC) of High Strength Steels. The group agreed that Environmentally Assisted Cracking (EAC) of High Strength Steels is a critical factor necessary for transitioning of cadmium alternatives. A test methodology for determining EAC of HSS must be developed and validated. The test method must yield reproducible, statistically significant data that discriminates between combinations of coatings, substrates, strength levels, chemical exposure and operational environments. The test method must be capable of generating data suitable for engineering certification of weapon critical components. Research studies of: hydrogen, hydrogen mobility, and hydrogen concentration in steels are not adequate for generating engineering certification data. Once the test method is developed and validated it will be incorporated into the Structural, Fasteners and Springs JTPs.

5. Mr. Steve Gaydos, Boeing, provided the participants with a presentation on Boeing's cadmium replacement efforts. Boeing has evaluated several cadmium alternative technologies including IVD aluminum, sputtered aluminum and electrodeposited tin-zinc and zinc-nickel (acid and alkaline)

6. Mr. Gary Stevenson, AFRL, asked Mr. Gaydos about cadmium contamination associated with zinc alloy coatings. Mr. Gaydos indicated that Boeing has not evaluated these coatings for the presence of cadmium. However, this is an issue that needs to be addressed.

7. Mr. Joe Osborne, Boeing, provided the participants with the status of the validation testing that Boeing is conducting in accordance with the BISDS JTP. Boeing is in the process of procuring the test specimens. Once the test specimens are procured, the specimens will be coated with the three alternative coatings (IVD aluminum, tin-zinc, and alkaline zinc-nickel) and the baseline cadmium coating. After application of the coatings the specimens will be tested in accordance with the BISDS JTP. Mr. Osborne also informed the participants that Boeing's commercial aircraft division is funding the testing of an acid zinc-nickel alternative. The acid zinc-nickel alternative will be tested side-by-side with the other three alternatives and the cadmium baseline process. The test results for all four alternatives will be documented in the Joint Test Report (JTR), which will be published on the JG-PP Web site

8. Mr. Jerry Brown, Lockheed Martin Corporation, provided the participants with a presentation on Lockheed Martin's cadmium replacement efforts. Mr. Brown indicated that IVD aluminum coated with Chemfilm provided good corrosion resistance and lubricity. He also indicated that both Alumiplate and IVD aluminum coatings prevent the growth of electrical resistance. However, Alumiplate provides better corrosion protection than IVD aluminum. Aluminum substrate coated with Alumiplate and Chemfilm passed 500 hour scribed corrosion testing. Aluminum substrate coated with 0.3, 0.5 and 1.0 mils of Alumiplate with out Chemfilm passed 1000 hour unscribed salt fog testing. Mr. Brown recommended that manufactures of fasteners and electrical connectors be asked to participate in the JCAT project.

9. Mr. Paul Ret, AFRL, provided the participants with a presentation on AFRL's test plan for aluminum-manganese as an alternative to cadmium. AFRL's evaluation of aluminum-manganese will focus on threaded fasteners applications.

10. Dr. Kane provides the participants with brief overviews of other cadmium alternative technologies including Laser Induced Surface Improvements (LISI), Alumiplate and aluminum-manganese. The LISI process is considered thermal surface modification and not a coating process. The LISI process is also becoming portable, which makes it attractive for field applications such as touch-up and minor repairs. The Alumiplate process, toluene based non-aqueous plating of aluminum is inherently hazardous. Toluene provides for health and fire/explosion hazards. However, the aluminum coating is environmentally acceptable. Alumiplate is commercially available but production capacities are limited to small batches, i.e., 10-gallon capacity. Aluminum-manganese is deposited via a molten salt. The temperature of the molten salt bath is maintained at 374 degrees F, which precludes its use on temperature-sensitive substrates. The aluminum-manganese process is not commercially available.

11. Mr. Gaydos notified the participants that Boeing is conducting a demonstration in August 2000, in which it will use sputtered aluminum technology to coat the interior surface of a KC-135 truck beam and IVD aluminum technology to coat the exterior surface of the truck beam. Both technologies will be implemented in the same vacuum chamber.

12. Dr. Kane asked that all participants provide information on cadmium alternative technologies for incorporation into the project's potential alternatives report (PAR) (**action item JCAT.00.01. 01**).

13. The JCAT meeting adjourned for the day at 17:00

14. The JCAT meeting reconvened at 08:00 on 27 January

15. Mr. Roy Adamson, Electric Boat Corporation, provided the participants with information on Electric Boat's effort to eliminate cadmium used on electrical connectors that it uses to build Virginia Class Submarines for the Navy. The Navy required Electric Boat to comply with Executive Order 12856 and other acquisition pollution prevention requirements in the contract for building these submarines. Electric Boat worked with J-Tech and Sun Bank to find viable alternatives to cadmium for use on electrical connectors. IVD aluminum was identified as the best alternative for these applications. On threaded connectors, a dry film lubricant is applied over the IVD aluminum coating to provide lubricity, which prevents galling of the threads. Mr. Adamson will provide Electric Boat's report on this effort to Dr. Kane.

16. Dr. Kane reviewed the project plan with the participants and asked them if they concurred. All of the participants concurred with the plan.

17. Dr. Kane asked that the participants identify the users, producers and approval authorities within their organizations affected by this project and to provide this information to NDCEE/*CTC* (Dave James) (**action item JCAT.00.01.02**).

18. Dr. Kane asked the participants to identify appropriate manufactures/vendors of electrical connectors, fasteners and other items affected by this project and to provide this information to NDCEE/*CTC* (Dave James) (**action item JCAT.00.01.03**).

19. Mr. Joe Osborne recommended that gears be included as a subcategory in the Structures JTP. The participants agreed with this recommendation.

20. Mr. Kolek agreed to provide information on cadmium alternatives for use on electrical connectors to Dr. Kane (**action item JCAT.00.01.04**).

21. Dr. Kane asked the participants to identify specific applications for those systems currently in the acquisition process that are affected by this project (**action item JCAT.00.01.05**).

22. Dr. Kane asked the participants to identify the Military Specifications that their organizations require for cadmium coatings and to provide this information to NDCEE/*CTC* (Dave James) (**action item JCAT.00.01. 06**).

23. Mr. Ault agreed to provide a NAVSEA report on cadmium alternatives to Dr. Kane

24. Mr. Gaydos agreed to provide information on IVD aluminum to Dr. Kane

25. Dr. Kane initiated a discussion on the need to develop a test methodology to evaluate EAC. ASTM F-519, 2000 hour sustained tensile test, could be used to evaluate a "worst case scenario." Mr. Paul Buckley, ARL, suggested using the 10,000 hour cantilever bend test to evaluate EAC. Mr. Buckely, Mr. Nate Hughes, Hill AFB, and Mr. Gaydos agreed to participate in developing an appropriate EAC test methodology.

26. Dr. Kane tentatively scheduled the next JCAT meeting for this summer. Dr. Ralph Adler, ARL, recommended holding the meeting at Aberdeen Proving Ground.

SIGNED (Approved by Michael Kane, 2/9/00)

Approved by David Asiello {2/15/00}
JASPPA, CNO

Attachments:
1. Action Items

Action Items
Joint Cadmium Alternatives Team
January 26-27, 2000

New Action Items

JCAT.00.01.01

Date Due:	**25 Feb 2000**
Responsibility:	All
Required Action:	Provide information on cadmium alternative technologies for incorporation into the project's potential alternatives report (PAR) to NDCEE/*CTC* (Dave James)
Comments:	

JCAT.00.01. 02

Date Due:	**25 Feb 2000**
Responsibility:	All
Required Action:	Identify the users, producers and approval authorities within their organizations affected by this project and provide this information to NDCEE/*CTC* (Dave James)
Comments:	

JCAT.00.01.03

Date Due:	**25 Feb 2000**
Responsibility:	All
Required Action:	Identify appropriate manufactures/vendors of electrical connectors, fasteners and other items affected by this project and provide this information to NDCEE/*CTC* (Dave James)
Comments:	

JCAT.00.01.04

Date Due:	**25 Feb 2000**
Responsibility:	Mr. Joe Kolek, AFRL
Required Action:	Provide information on cadmium alternatives for use on electrical connectors to Dr. Kane
Comments:	

JCAT.00.01.05

Date Due:	**25 Feb 2000**
Responsibility:	All
Required Action:	Identify specific applications for those systems currently in the acquisition process affected by this project and provide this information to NDCEE/*CTC* (Dave James)
Comments:	

Action Items
Joint Cadmium Alternatives Team
January 26-27, 2000

JCAT.00.01.06

Date Due:	**25 Feb 2000**
Responsibility:	All
Required Action:	Identify the Military Specifications that their organizations require for cadmium coatings and provide this information to NDCEE/*CTC* (Dave James)
Comments:	

Open Action Items from Previous Meetings and Teleconferences

None