The MONITOR

Aeronautical Systems Center (ASC/ENVV) • Bldg. 8 • 1801 Tenth Street • Suite 2 • Wright-Patterson AFB, OH 45433-7626
Commercial: (937) 255-3054 ext. 328 • DSN: 785-3054 ext. 328 • FAX: (937) 255-4155

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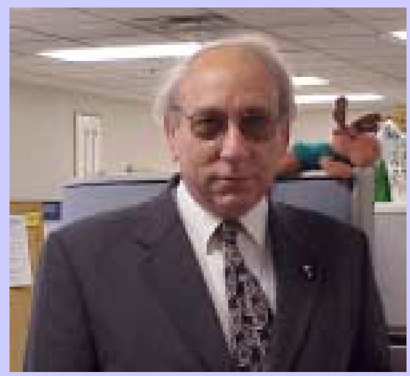
The MONITOR is a quarterly publication of the Headquarters Air Force Materiel Command (AFMC) Pollution Prevention Integrated Product Team (P2IPT) dedicated to integrating environment, safety, and health related issues across the entire life cycle of Air Force Weapon Systems. AFMC does not endorse the products featured in this magazine. The views and opinions expressed in this publication are not necessarily those of AFMC. All inquiries or submissions to the MONITOR may be addressed to the Program Manager, Mr. Frank Brown.



Aeronautical Systems Center (ASC/ENVV)
Bldg. 8 • 1801 Tenth Street • Suite 2 •
Wright-Patterson AFB, OH 45433-7626
Commercial: (937) 255-3059 ext. 331
DSN: 785-3059 ext. 331
FAX: (937) 255-4155

The Joint Group on Pollution Prevention (JG-PP) Non-Ozone Depleting Compound (ODC) Oxygen Line Cleaning Project Hosts 85% Critical Design Review Meeting with Stakeholders

In November 2000, the 85% design review meeting for the Joint Group on Pollution Prevention (JG-PP) Non-Ozone Depleting Compound (ODC) Oxygen Line Cleaning Project was held in Oklahoma City, OK. The primary objective of the meeting was to obtain feedback from the stakeholders on how the current cleaning system being demonstrated met their needs and solicit any further feedback for improvement to the design.

Mr. John Herrington, HQ AFMC/LGP-EV presented the role of the JG-PP in the project. He explained that the anticipated outcome of this project is to transition one or more validated technologies to the Department Of Defense (DoD) and industry. Mr. Herrington also discussed why oxygen line cleaning without the use of ODCs is of such importance. Presently, aircraft oxygen lines are cleaned before being installed in the aircraft or when contamination in the lines causes a problem for the pilot. When the contaminated problem is discovered, the pilot must switch to the use of auxiliary oxygen supplies. The aircraft is flown to an air base where the oxygen plumbing is dismantled, removed from the aircraft, cleaned using chloroflourocarbons (usually CFC-113 and HCFC-141b), and then reinstalled back into the idle aircraft. Because of this procedure, ODCs are emitted during cleaning, mission readiness is reduced while the aircraft sits idle, and the procedure is extremely costly.

Mr. Jerry Gore, OC-ALC/LIIRC and the head of the Tinker AFB Oxygen Group provided an overview of the Air Force project to develop a portable Oxygen Line Cleaning System (OLCS). The OLCS is being tested on a mock-up of the B-1 oxygen system that resides at Versar's Oklahoma City office. The B-1 mock-up uses test cells (pieces of oxygen lines that can be removed and observed) that allow for nondestructive verification of cleaning effectiveness. Currently, in place oxygen system cleaning occurs only after catastrophic failures. Mr. Gore recommended that with this new technology, aircraft oxygen systems should be cleaned at Programmed Depot Maintenance (usually between 4 and 6 years) and when the aircraft is new. Although the B-1 aircraft was identified early on to validate the OLCS, the same technology may to used to clean oxygen systems on the F-15, F-16, and the space shuttle. A cost analysis conducted by Versar showed that the use of the OLCS would save the F-15 and F-16 programs over $1M by preventing oxygen regulator failures. The existing process takes about six months at a cost of $1 million to clean the system as compared to the OLCS that takes about four hours and costs $2500 or less.

Mr. Greg Fillipi, Versar provided a summary status of the OLCS. The 85% design review of the technology was completed with the conclusion of the meeting. The major components of the system have been installed. The initial design is nearly complete and the transport unit has been designed and built. The B-1 oxygen line mock-up has been built and tested and test cells are installed and in use. Mr. Fillipi completed his presentation with a tour and demonstration of the OLCS and B-1 mock up.

For additional information about this project and technology, please contact Mr. John Herrington at DSN 787-8090 or visit the JG-PP web site at http://www.jgpp.com.

Source: JG-PP Meeting Minutes.◆

The Propulsion Environmental Working Group (PEWG) Web Site

The Propulsion Environmental Working Group (PEWG) is an established forum for DoD and propulsion industry original equipment manufactures (OEMs) collaboration to identify and resolve common environmental issues and promote the introduction and use of environmentally advantaged industrial materials and processes. The PEWG meets twice yearly during February and July to promote new technologies and receive updates on regulatory issues affecting DoD weapon system acquisition and sustainment. Current PEWG projects, of which there are 15, focus on engineered solvent substitution, chromium (Cr) and cadmium (Cd) reduction, surface engineering, as well as end item reclamation. Please visit the PEWG website at www.pewg.com for more detailed information.◆

Overview of the Strategic Environment Research and Development Program (SERDP)

The Strategic Environmental Research and Development Program (SERDP) is the Department of Defense's (DoD's) corporate environmental research and development (R&D) program. SERDP is planned and executed in full partnership with the Department of Energy (DOE) and the Environmental Protection Agency (EPA), with participation by numerous other Federal and non-Federal organizations. SERDP accelerates technology development through proof-of-principle, and promotes partnering by leveraging resources and reducing duplication of effort.

SERDP funds only basic research and technology development through "bench scale" proof of principle (6.1-6.3). SERDP does not fund demonstration and validation of existing technologies or engineering development of proven technologies. The annual Federal Call for proposals is released in mid-November and distributed through the members of the SERDP Executive Working Group (EWG). For the Air Force, Col Randy Gross, AFRL/MLQ, Tyndall AFB serves as the AF SERDP Program Manager on the EWG.

Once the call for proposals is distributed, AFRL/MLQ issues an Instruction Letter to Air Force organizations to submit proposals against the SERDP Statements of Need (SONs) requirements. The SONs outline high-priority, mission relevant, DoD environmental requirements. Information about each need (objective, expected payoff, background, user requirements, cost/schedule targets, and evaluation factors) is also located at web page http://www.serdp.org/sp-ewg-federal/.

Proposals must be prepared in accordance with the information found on the SERDP web page http://www.serdp.org/sp-ewg-federal/. Full proposals submitted to AFRL/MLQ will be reviewed and ranked by the AF SERDP Program Manager. Two candidate proposals for each SON will be submitted to the SERDP Program Office.

Once the proposals are received at the SERDP Program Office, the proposals are subject to Peer Review, Technical Thrust Area Working Group (TTWAG) Review, Source Selection Evaluation Board (SSEB) Review and the Scientific Advisory Board (SAB) Review. Details related to these reviews are found on the SERDP web page at: http://www.serdp.org/funding/Annual_Process.htm.

For further information regarding the AF SERDP proposal submission process, please contact Paul Kerch, AFRL MLQ at DSN 523-6299.◆

Name/ Organization	Phone	E-mail
Pollution Prevention		
Tom Naguy AFRL/MLQ	937-656-5709	thomas.naguy@wpafb.af.mil
Tom Lorman HQ AFMC/LGP-EV	937-257-7352	thomas.lorman@wpafb.af.mil
Compliance		
Dr. Joseph Wander AFRL/MLQ	850-283-6240	joe.wander@tyndall.af.mil

SERDP AF Points of Contact

Overview of the Environmental Security Technology Certification Program (ESTCP)

Environmental Security Technology Certification Program's (ESTCP's) mission is to demonstrate and validate promising, innovative technologies that target the Department of Defense's (DoD's) most urgent environmental needs through implementation and commercialization. ESTCP's strategy is to select lab proven technologies with broad DoD and market application. The goal is to transition mature environmental Science and Technology (S&T) projects through the demonstration/validation phase, enabling promising technologies to receive regulatory and end-user acceptance, and to be fielded and commercialized more rapidly.

Name/ Organization	Phone	E-mail
Pollution Prevention		
Tom Naguy AFRL/MLQ	937-656-5709	thomas.naguy@wpafb.af.mil
Tom Lorman HQ AFMC/LGP-EV	937-257-7352	thomas.lorman@wpafb.af.mil
Lt Col Eric Banks HQ AFCEE-EQP	210-536-3074	eric.banks@hqafcee.brooks.af.mil
Compliance		
Tom Lorman HQ AFMC/LGP-EV	937-257-7352	thomas.lorman@wpafb.af.mil
Dr. Joseph Wander AFRL/MLQ	850-283-6240	joe.wander@tyndall.af.mil
Tom Stauffer AFRL/MLQ	850-283-6059	tom.stauffer@mlq.tyndall.af.mil

ESTCP AF Points of Contact

The ESTCP Process ensures that approved technologies meet DoD environmental challenges through the following process:

- DoD environmental requirements are specified.
- ESTCP requests proposals.
- Rigorous and expert scientific review are made.
- ESCTP projects are selected in the thrust areas (i.e., Cleanup, Compliance, Pollution Prevention, UXO).
- Technologies are demonstrated and evaluated at DoD sites, in an operational setting.
- Cost, cost avoidance, and performance data are verified and validated.
- Effective and affordable technologies are transferred across DoD.
- Regulatory approval and end-user acceptances are facilitated.

For more information about the ESTCP program, please visit http://www.estcp.org.◆

Overview of How to Submit a Proposal to the Environmental Security Technology Certification Program

Each year, ESTCP solicits proposals from DoD, non-Federal organizations, and Federal agencies other than DoD. A call for proposal is issued to DoD organizations in January. Only DoD organizations (services and defense agencies) are allowed to serve as lead organizations and submit proposals under this call. Participation by non-DoD organizations is encouraged through partnerships with the proposed team. A two-phase process first solicits proposals that then are reviewed and down selected by a Multi-Agency Review Committee. Successful partnerships are then asked to present an oral briefing to the review Committee in August.

AFMC strongly encourages using ESTCP as an additional source of funding for environmental projects in the demonstration/validation phase. AFMC recommends Environmental Management and Logistics functions work cooperatively to develop and prepare these submittals. The official FY02 DoD call, instructions and format for proposal submittals were posted on the ESTCP Home Page (http://www.estcp.org) in Jan 2001. The instructions, format, and cover page template provided at the website for FY01 projects are very similar to the requirements for FY02 submittals.

To increase the probability of project success, AFMC has sent out an Instruction Letter requesting all ESTP proposals to be submitted to the command by 9 February 2001. Over a four-week period, HQ AFMC reviewed the proposals and provided constructive feed back to the submitter. AFMC did not rank or eliminate any submitted proposal. All proposals are due back at AFMC by 21 March 2001. AFMC will then send a consolidated package of all ESTCP proposals to HQ USAF/ILEV. HQ USAF/ILEV, in concert with SAF/MIQ, will review and prepare the AF Package and submit all proposals to the ESTCP office by 10 April 2001.

ESTCP will complete the Phase I review of all submitted projects by 5-6 August 2001. Selected projects will be asked to prepare a briefing to the ESTCP Review Panel on the 20 August 2001. ESTCP will provide feedback on the final selected projects in September 2000.

For additional information regarding the AFMC ESTCP submittal process please contact Tom Lorman, HQ AFMC/LGP-EV, DSN 787-7352, Mr. Edward Finke, HQ AFMC/CEVV, DSN 787-2669, Mr. David Martin, HQ AFMC/CEVC, DSN 787-0106, and Mr. Thomas Naguy, AFRL/MLQL DSN 656-5709.◆

Overview of the AFMC Headquarters Pollution Prevention Integrated Product Team (P2IPT)

The HQ AFMC P2-IPT is a cross-functional team that has and continues to address pollution prevention issues through a team structure. The HQ AFMC P2-IPT includes core member representatives from Civil Engineering (CE), Logistics (LG), Air Force Research Laboratory (AFRL), Engineering (EN), Surgeon General (SG), Safety (SE), and the Directorate of Requirements (DR). HQ AFMC P2-IPT members coordinate resources and activities of the directorates and command staff offices to ensure the most effective and efficient implementation of pollution prevention priorities. The team works cooperatively and jointly to address command priorities. The primary role and responsibility of each team member are summarized below.

HQ AFMC/CEVV is the command focal point for the P2 Program and leads the P2-IPT to deliver integrated program guidance, strategies and solutions. CEVV conducts Programming, Planning, and Funds Management. CEVV is also the lead AFMC’s Compliance through Pollution Prevention (CTP2) Process and the Hazardous Materials Management Process (HMMP) team.

HQ AFMC/LGP-EV serves as AFMC's focal point for the Defense Reserve and AFMC's Pharmacy Program. HQ AFMC/LGP-EV is the focal point for AFMC logistics environmental activities, including maintenance activities. HQ AFMC/LGP-EV is the chair for the AFMC Weapon System Pollution Prevention Center Working Group (CWG) and an Air Force representative on the Joint Group on Pollution Prevention (JG-PP). LGP-EV also serves as an Air Force representative on the Environmental Security Technology Certification Program (ESTCP) and lead AFMC's weapon system P2 requirements development efforts.

AFRL/MLQL co-chairs the Strategic Environment Research and Develop Program (SERDP) and is an Air Force Representative to ESTCP. MLQL serves as the communication link to the AF laboratories and primarily focuses on implementing near term demonstrating/validation projects that impact Air Force weapon systems.

HQ AFMC/ENBA is the command focal point for Technical Order policy and ensures that P2 principles are incorporated into the Systems Engineering process.

HQ AFMC/SGBB collects, interprets, and communicates health risk assessments for both currently used hazardous materials and potential replacements in the Air Force systems and processes.

HQ AFMC/SES evaluates P2 proposed policies, plans, and projects to ensure process changes and product substitutions or replacements do not increase the safety level of risk to personnel or equipment.

HQ AFMC/DRAB develops pollution prevention plans and programs for weapon system P2 program management support to the Single Managers, Program Executive Officers (PEOs), and Designated Acquisition Commanders (DACs) in support of minimizing hazardous materials.

Support Organizations participating on the HQ AFMC P2-IPT include Aeronautical Systems Center, Acquisition Environmental, Safety, and Health Branch (ASC/ENVV), and AFMC Compliance Branch (HQ AFMC/CEVC) and Financial Management (HQ AFMC/FM).

Organization/Name	DSN	E-mail
HQ AFMC/CEVV Lt Col Michael Boucher *(Chairman)*	787-4670	michael.boucher@wpafb.af.mil
HQ AFMC/LGP-EV Debbie Meredith	787-7505	debora.meredith@wpafb.af.mil
AFRL/MLQL Tom Naguy	986-5709	thomas.naguy@wpafb.af.mil
HQ AFMC/ENBA Carroll Herring	787-6309	carroll.herring@wpafb.af.mil
HQ AFMC/SES Reed Holland	787-1616	reed.holland@wpafb.af.mil
HQ AFMC/SGBB Major Jim Harcarik	986-3635	james.harcarik@wpafb.af.mil
HQ AFMC/DRAW Sherry Ott	986-3931	sherry.ott@wpafb.af.mil
HQ AFMC/CEVC Dave Martin	787-0106	david.martin2@wpafb.af.mil
ASC/ENVV Lt Col James Byron	785-2905 ext. 308	james.byron@wpafb.af.mil

AFMC P2IPT Contacts

For more information regarding the P2IPT, please contact Lt. Col. Mike Boucher at DSN 787-7414.◆

Overview of AFMC's Pharmacy Program

The purpose of the Hazmat Pharmacy is to provide Air Force installations with a standard way to manage HAZMAT use and comply with Environment, Safety, and Occupational Health (ESOH) requirements. The Pharmacy provides for process-based authorizing, procuring, issuing, tracking, and disposing of HAZMATs and ODSs. It is the single point of accountability and control for HAZMATs and ODSs.

The installation HMMP team, a cross-functional team, ensures that all installation-level responsibilities for executing the Pharmacy Program are met. The primary members of the cross-functional team include Civil Engineering (CE), Logistics (LG), Surgeon General (SG), and Safety (SE). CE, SG, and SE review and authorize material usage, while LG provides manpower for issuing materials. Some of the additional responsibility of each member, as discussed in revised AFI 32-7086, include the following:

- CE leads the HMMP team and ensures that HAZMART facilities meet applicable ESOH requirements to support the Pharmacy Program. CE also consolidates and submits HMMP team validated environment-related funding requirements into the environmental programming/budgeting system.

- LG designates the appropriate personnel (representing supply, maintenance, transportation, and contracting) to participate in the HMMP team.
- SG provides bioenvironmental engineering (BE) participation in the HMMP team as required. SG prepares and submits appropriate BE-environment-related Pharmacy funding requirements through the HMMP team to CE for inclusion in the environmental programming/budgeting system.
- SE advises HAZMART facilities on compliance with all applicable OSHA, AFOSH, and local standards.

AFMC bases have adopted both a centralized and decentralized approach to Pharmacy Management. Some bases have co-located all functional areas in the HAZMAT Cell. At other bases, functional areas has remained in their respective areas but collaborated as necessary to issue materials and/or resolve ongoing problems. Both management methods have had merit and have been successfully implemented within AFMC.

Pharmacy Program Tracking System

AFMC uses the Hazardous Material Management System (HMMS) to track and manage the use of hazardous materials at the installations. HMMS is an automated tracking system providing cradle to grave tracking, management, and reporting capabilities for hazardous materials and waste. HMMS is a DoD standard joint service “purple” system that has helped save millions of dollars in Hazmat Acquisition through improved business practices. The HMMS includes the following functions:

- Tracks training, exposure, inventory, and personnel protective equipment
- Dispenses HAZMAT according to units of use
- Provides central issue point for Just-In-Time control and issue
- Provides on-line Material Safety Data Sheets (MSDS)
- Provides HAZMAT control by authorized users, zone, and task
- Provides hazwaste tracking and reporting

For further information about the HMMS, please contact Frank Berger (Frank.Berger@wpafb.af.mil) for HAZMAT issues or Dave Fort (David.Fort@wpafb.af.mil) for hazardous waste issues, or visit the HMMS web site at: http://www.hmms.com.

AFMC has a policy of tracking HAZMATs from cradle to grave to reduce cost, improve safety, and ensure better accountability for materials usage. To accomplish this goal, AFMC uses the Hazardous Material Management System (HMMS), a cradle-to-grave tracking system.

AFMC has also adopted a just-in-time philosophy of dispensing materials is the smallest unit required to minimize spills and material wastage. The HMMS employs the pharmaceutical concept and provides the quantity of material a user needs to accomplish the task.

To further streamline the acquisition process for HAZMATs, authorized users can make local purchase of hazardous materials, except weapon system Class I ODSs, using the government wide purchase cards. Weapon System ODS requisition must be approved by MAJCOM and HQ USAF HMMP teams prior to purchase. All AFMC installations provide training on the use of government wide purchase cards for hazardous materials.

For further information about the AFMC Pharmacy Program, please contact Ms Susan Misra at DSN 787-3498 or via email at Susan.Misra@wpafb.af.mil.◆

Air Force Materiel Command (AFMC) is Implementing a Compliance Through Pollution Prevention (CTP2) Process in Support of the Warfighter

Air Force Materiel Command (AFMC) Pollution Prevention and Compliance Branches are jointly implementing a compliance through pollution prevention (CTP2) Program that will ultimately reduce environmental compliance cost, total ownership cost (TOC), and environmental, safety and occupational health (ESOH) risks associated with Air Force weapon systems. CTP2 departs from previous civil engineering/environmental management programs in that it focuses on integrating the logistics community and other appropriate process owners at AFMC installations into the program's decision making and implementation process.

Logistics and test centers at AFMC strongly support the headquarters driven CTP2 process. According to Mr. Steve Coyle, Warner Robins Air Logistics Center (WR-ALC) Director of Environmental Management, "the CTP2 program has the endorsement of the Center Vice-commander and Environmental Protection Committee Chairman. The program takes a common sense approach by focusing on those installation processes for pollution reduction that reduces environmental burden and total ownership cost to the warfighter."

CTP2, as defined by AFMC, addresses the requirements of AFI 32-7080; Compliance Assurance and Pollution Prevention. The CTP2 process favors solving compliance requirements first through a pollution prevention (P2) solution rather than the traditional "end-of-pipe" control measure. However, implementing P2 solutions is not always easy. Since weapon systems drive most of AFMC's environmental costs, many cost-effective P2 solutions will involve changes to fielded weapon system design, operations, or maintenance. As a result, AFMC's CTP2 program makes it a priority to involve all the appropriate stakeholders, such as the logistics and weapon system communities, in the decision making and implementation process.

To date, HQ AFMC has completed a Compliance Site Inventory (CSI) for all its installations. CSIs were not conducted for McClellan AFB and Kelly AFB. Compliance sites are considered "vulnerabilities" that represent a potential opportunity for regulatory inspection. As a command, AFMC has approximately 18,000 compliance sites. Edwards AFB leads AFMC installations in potential "vulnerabilities" with 3,057 compliance sites. Rome AFB has the lowest vulnerability with 48 sites. Robins AFB, GA has assisted in three prototype process specific opportunity assessments (PSOA) to verify current AFMC guidance is doable and yields usable and costed pollution prevention solutions to eliminate or reduce compliance cost and risk. A fourth PSOA was completed by an independent contractor to further truth the guidance. The PSOA devel-

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Aerospace National Emission Standards for Hazardous Air Pollutants (NESHAPs) Update

Since the last Monitor there have been a minor change to the National Emission Standards for Aerospace Manufacturing and Rework Facilities (Aerospace NESHAP) and there may be more in the not too distant future.

The recent modification appeared in the Federal Register on December 8, 2000 (Volume 65, Number 237 page 76941-76945). The change establishes a relaxation of the organic Hazardous Air Pollutant (HAP) standard for primers used on large commercial aircraft. "Large commercial aircraft" is defined as "an aircraft of more than 110,000 pounds, maximum certified take-off weight manufactured for non-military use". Since the definition only requires that the aircraft using the relaxed primer status need only to be manufactured for non-military uses, it may also apply to military transport aircraft as long as the aircraft are identical to aircraft that are used for commercial transport. However, military organizations will probably not want to take advantage of the new, relaxed standard because of the increased record-keeping requirement. Figure 1 (see page 9) gives the old and new organic HAP and Volatile Organic Compound (VOC) limits according to the amendment.

The Navy is working on a modification that will relieve some of the record-keeping burden of smaller bases. EPA estimated the burden to be only 300 hours for a cost of $10,538 per facility annually, which appears low considering the scope of the regulation and the amount of record-keeping that is required. The burden for military bases is may be proportionally greater than for commercial facilities because the combination of aircraft maintenance and other operations at a given base may make the facility a Major Source, requiring the same record-keeping and reporting requirements as facilities that are Major strictly as a result of aerospace manufacturing and rework operations. The problem may be most pronounced at Navy and Army bases which tend to have a greater diversity of operations, similar situations may exist at Air Force bases, particularly at Air National Guard bases. The Navy is currently calculating the time burden for the Aerospace NESHAP compliance at NAS China Lake. For further information, or to coordinate activities with the

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CTP2 Continued

oped a solution to stop disposing of water picked up by flight line vacuum cleaners from being disposed of as F-Listed waste at a potential saving of $125,000 annually. The three prototype PSOAs are final and under review. The flightline vacuum cleaner PSOA is complete and the Base is moving on to the solution implementation phase.

HQ AFMC has established an action plan to implement the CTP2 process goals and objectives at the installations. In support of this effort, HQ AFMC is publishing a CTP2 implementation guide to ensure consistency in the program across all the command's installations. However, to address local concerns, HQ AFMC is providing funds to develop initial CTP2 Management Action Plans and conduct PSOAs. This dynamic relationship between HQ planning and base level implementation will ensure that AFMC's CTP2 process takes a consistent approach across the command, while addressing issues specific to each installation.

For more information about AFMC's CTP2 process, please contact Mr. Robert Colson at (937) 257-7414. Robins AFB's point of contact is Mr. Dave Bury at (478) 926-1197 ext. 184.◆

Aerospace NESHAPs Continued

Navy, contact Lisa Trembly (tremblyla@nfesc.navy.mil, 805-982-3567, DSN 551-3567). The Army too is considering this issue; in July, 2000 Paul Josephson (paul.josephson@aec.apgea.army.mil, 410-436-1205, DSN 584-1205) wrote an article that appeared in the Southern Region Alert calling for a small quantity exemption.

Category	Old HAP limit (g/L)[1]	Old VOC limit (g/L)[2]	New HAP limit (g/L)[1]	New VOC limit (g/L)[2]
Primers - Default Category	350	350	350	350
General Aviation Primers	540	540	540	540
Exterior Large Commercial Aircraft			650	650

Figure 1. Old and New Organic HAP and VOC Limits

Regardless of the success of the small quantity exemption the Navy and Army are pursuing, there may be changes in store for the Aerospace NESHAP if the calculated residual cancer risk is greater than one in a million. EPA is required to consider the residual risks associated with new Maximum Achievable Control Technology (MACT) standards, including NESHAP standards by Clean Air Act (CAA) §112(f). This section requires EPA to review MACT standards and set additional standards if risks do not provide an "ample margin of safety to protect public health". EPA has determined that for carcinogens an "ample margin of safety" is an incremental cancer risks of between 1 and 100 in a million depending on costs and technical feasibility. The first risk-based regulations are due later this year. It is possible that inorganic HAPs such as hexavalent chromium (Cr^{+6}) will receive increased scrutiny as a result of these activities since Cr^{+6} appears to be a strong carcinogen. How EPA treats Cr^{+6} and conducts this first round of residual risk assessments will provide some warning about how EPA will treat the Aerospace NESHAP. A review of the Aerospace NESHAP is due eight years after promulgation of the standard or in 2003.◆

Overview of the Clean Water Act (CWA) Services Steering Committee (SSC)

The Clean Water Act (CWA) Services Steering Committee (SSC) is established to lead the DoD in cost-effective implementation of the Clean Water Act (CWA) statutes and regulations to achieve sustained compliance at DoD installations.

The goals of the SSC include the following:

- Develop policy and processes that will ensure that all DoD installations are in compliance with CWA regulations and related DoD policy.
- Recommend policy and guidance for using conservation and pollution prevention measures as the first choice to avoid and reduce pollution.
- Anticipate and positively influence the development of new or revised legislation and regulations and other current or emerging initiatives.

The Deputy Assistant Secretary of the Navy (Environment and Safety) (DASN(ES)) who is designated as the DoD Executive Agent for the Clean Water Act by DoD Instruction 4715.6, Environmental Compliance, dated 24 April 1996.

The DASN(ES) designated the Chief of Naval Operations, Environment Safety and Occupational Health (CNO N45) to chair the SSC and execute the operations and functions of the SSC. Members of the CWA SSC are listed in Figure 2.

Name	Office	Phone	E-mail	Fax
DoD				
Ed Miller	ODUSD(ES)EQ-CM	703-604-1765	millered@acq.osd.mil	703-607-4237
Col Dan Benton	DoD/GC(E&I)	703-693-4894	bentond@osdgc.osd.mil	703-693-4507
DLA				
Bill Randall	DLA (CAAE)	703-767-6251	william_randall@hq.dla.mil	703-767-6248
Army				
LTC. Jacqulin Little	DAJA-EL	703-696-1593	jacqulin.little@hqda.army.mil	703-696-2940
Martin Elliot	DAIM-ED-C	703-693-0552	martin.elliot@hqda.army.mil	703-697-2808
Georgette Myers	USAEC	410-436-1203	georgette.myers@aec.apgea.army.mil	410-671-1675
Colleen Rathbun	USAEC	410-436-1554	colleen.rathbun@aec.apgea.army.mil	410-436-1670
Billy Ray Scott	USAEC	410-612-7073	billy.scott@aec.apgea.army.mil	410-671-1675
Navy				
Tanya Courtney	CNO N457D	703-602-1738	courtney.tanya@hq.navy.mil	703-602-5547
Kathy Ellis (Chair)	CNO N457C	703-602-2568	ellis.kathy@hq.navy.mil	703-602-5547
Pam Morris	Navy OAGC(I&E)	703-604-8223	morris.pamela@hq.navy.mil	703-614-1149
Lorri Schwartz	CNO N45D1	202-685-9332	schwartzla@navfac.navy.mil	202-685-1670
Air Force				
Maj. Joel Santa Teresa	AFLSA/JACE	703-696-9190	joel.santateresa@pentagon.af.mil	703-696-9184
Jay Shah	HQAF/ILEVQ	703-607-0120	jayant.shah@pentagon.af.mil	703-604-3740
Marine Corps				
Mike Doherty	HQ, USMC (LFL-6)	703-695-8541	dohertymc@hqmc.usmc.mil	703-695-8550
Coast Guard				
Tom Hayes	USMC/G-LEL	202-267-0056	thayes@comdl.escg.mil	202-267-4958

Figure 2. Listing of the Members of the CWA SSC

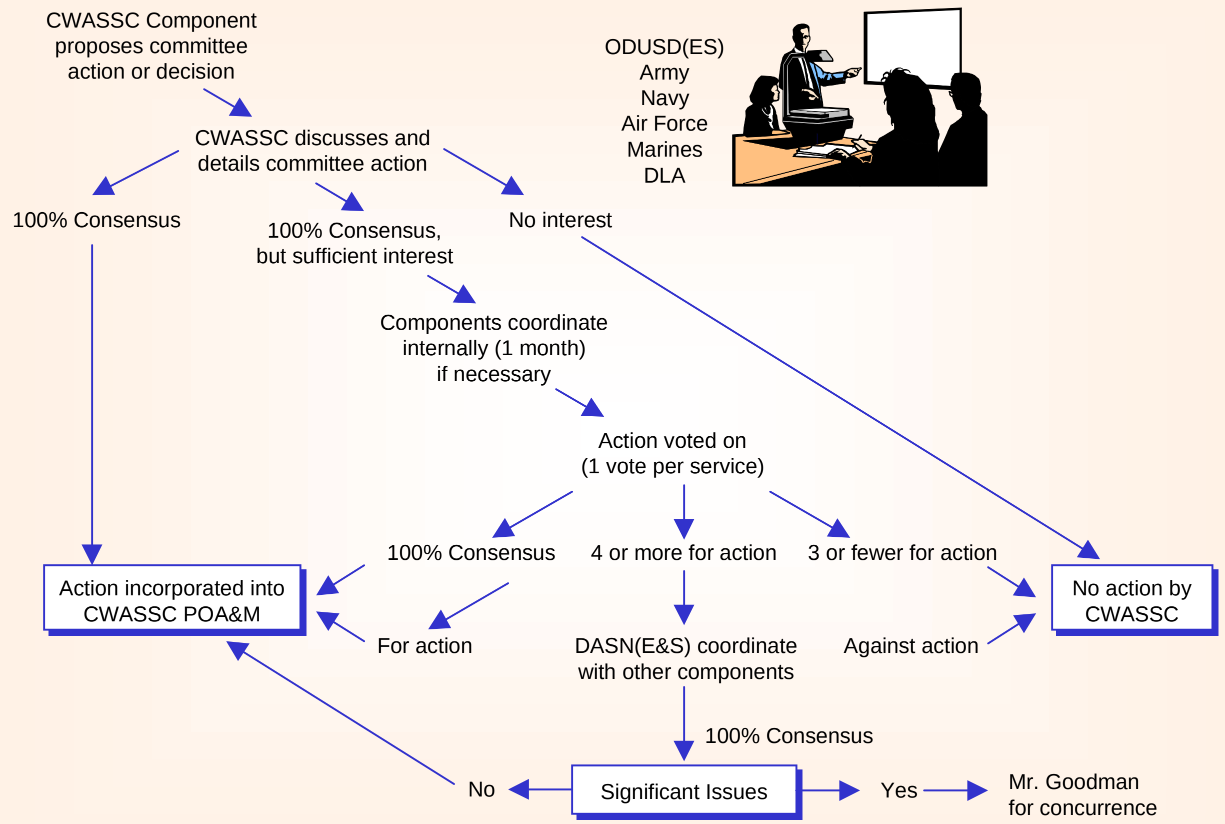
SSC members are senior military or civilian officials of the Army, Air Force, Marine Corps, Navy, and Defense Logistics Agency having responsibilities for the clean water act program management and the ability to recommend resources and policy affecting water quality issues to appropriate authorities within their Services or DoD Component and Congress. Representatives from non-DoD Federal agencies and departments also participate in the SSC meetings and serve as members of subcommittees and workgroups.

The CWA SSC directs five standing subcommittees that cover the following areas:

- Information Data Management (ODUSD(ES)(EQ-CM) serves as the lead)
- Clean Water Act Reauthorization (Navy serves as the lead)
- Point Source (Navy serves as the lead)
- Non-point source (Army serves as the lead)
- Resource requirements (Air Force serves as the lead).

For further information about the activities of the CWA SSC, please contact Jay Shah at HQ AF/ILEVQ at 703-607-0120

Source: www.denix.osd.mil/denix/DOD/working/CWASSC/about.html.◆



Source: http://www.denix.osd.mil/denix/DOD/working/CWASSC/admin/decision.html

Decision Making Chart for the Clean Water Act Services Steering Committee

First-Time Data Shows Many Localities Fail to Meet New Particle Standard

EPA has released its first full year of data from a new nationwide network for monitoring particulate matter 2.5 microns (PM-2.5) or smaller, indicating that approximately 100 localities across the country would be out of compliance with the agency's fine particle standard now being litigated in the U.S. Supreme Court. EPA says the tougher 2.5 PM standard is necessary to protect children and asthmatics from the harmful effects of particulate matter, often referred to as soot, but industry officials and some state regulators challenged EPA's rationale for a tougher standard after it was issued in 1997.

While the data shows that a large number of areas would fail to meet the standard, one EPA official warns that information is incomplete for some areas and is only based on one year of data collection. Data must be collected for three consecutive years to declare an area as being in "nonattainment" with the standard. In addition, the source notes that new measures to control acid rain could reduce the amount of PM-2.5 measured in some areas during the next two years.

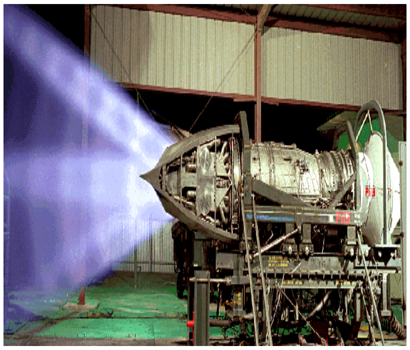
An industry source says the data underscores the need for "better data speciation," rather than an indication of widespread violations. Sources of PM-2.5 must be identified so that appropriate control measures can be designed and implemented for different parts of the nation if the rule survives its court challenge, this source says.

The monitoring data shows seasonal variations, one EPA official says. PM-2.5 readings were highest in the winter in the Northwest, where emissions are generally thought to come from residential fireplaces and stoves. In the East, peaks were in the summer; while in California's San Joaquin Valley there were peaks in both the summer and winter. The EPA official points out that the data did not show an expected drop from preliminary findings of particulate levels in the Southeast. It was expected that acid rain reduction measures would have produced a drop in PM-2.5 readings, the source says.

A local air-quality official notes that a separate EPA rule, which is also undergoing a court challenge, may have an impact on future particulate matters levels. EPA's regional haze rule is currently pending before the U.S. Court of Appeals for the District of Columbia, and if it survives its court challenge it would also call for reductions in particulate emissions.

Source: http://www.denix.osd.mil/denix/DOD/News/Pubs/CAR/04Jan01/22.doc.html.◆

Overview of the Propulsion Environmental Working Group (PEWG)



US Air Force Instruction (AFI) 21-104 requires the Propulsion Environmental Working Group to form and lead a government and industry collaboration to solve propulsion industrial base environmental problems. To meet the requirements of the AFI, the PEWG provides a forum for communication and an effective method for cooperation across the DoD and industry propulsion communities. The Group's mission is to reduce the use and release of hazardous materials in propulsion and power systems and support processes.

The Joint Propulsion Coordinating Committee (JPCC), a body comprised of the Air Force, Navy, and Army executive leads for propulsion and power systems, established the JPCC Hazmat Subcommittee to oversee joint environmental efforts. As a result, the PEWG was also chartered to functions as the working group tasked to carry out JPCC directives. The USAF member (OC-ALC/LR) is currently the senior member of the JPCC, and the Director, Propulsion Development Systems Office, is currently the PEWG Chair. However, the executive functions of the PEWG are managed by the environmental program manager collocated from the Acquisition Environmental, Safety, and Health Directorate, ASC/ENV, to the Propulsion Development Systems Office's Advanced Projects Division, ASC/LPJ.

The JPCC has chartered the PEWG to "…establish a forum for DoD and propulsion industry collaboration to identify and resolve common environmental issues and promote introduction and use of environmentally advantaged industrial materials and processes…" (PEWG Charter, 16 Apr 98). To accomplish this mission, the PEWG meets twice a year to discuss emerging issues and opportunities as well as those already identified. When a problem or opportunity is brought to the PEWG, the Group first determines if it is common to more than one member, and if any work is already being done to arrive at a solution. If the problem has been solved and the solution is not proprietary, the solution is shared with the Group. Otherwise, the Group may decide to undertake a joint project to arrive at a solution. The interested parties form a technical working group (TWG) to plan and execute the joint project. Normally, one or more of the government activities will seek funding for the project. If the industry representatives are interested in the solution, they will contribute engineering or technical man-hours. The technical working group will meet independently of the PEWG general membership, on a schedule they determine. They will report back to the PEWG at the semi-annual meetings.

The current PEWG membership is listed in Figure 3. The PEWG also collaborates with the DoD Hard Chrome Alternatives Team (HCAT), Joint Group on Pollution Prevention (JG-PP), HQ AFMC P2IPT, Aerospace Industries Association (AIA), National Center for Manufacturing Sciences (NCMS), Department of Energy (DOE) National Laboratories, NATO Research Technology Organization, Applied Vehicle Technology Panel (NATO RTO AVT), and the Deputy Under Secretary of Defense for Environmental Security (DUSD-ES).

- Air Force (ASC, OC-ALC, OO-ALC, Air Force Research Laboratory, Using Commands)
- Navy (Naval Air Systems Command (NAVAIR), Naval Sea Systems Command (NAVSEA), Naval Aviation Depots at Cherry Point, Jacksonville, North Island)
- Army (Army Aviation Armament, and Missile Command (AMCOM))
- Defense Contract Management Agency
- Industry (GE Aircraft Engines, Pratt & Whitney, Pratt & Whitney Canada, Rolls-Royce Corporation, Williams International, The Boeing Company, Engelhard Industries, Advanced Surfaces and Processes, Inc., Dynamics Research Corporation (DRC)

Figure 3. PEWG Membership

Successful projects have included the elimination of Class I ozone-depleting chemicals, reduction in EPA-17 solvents, and finding an alternative for zinc chromate primers used in gas turbine engines. Current projects include finding a lead-free dry film lubricant for anti-galling/anti-fretting and anti-seizing applications, several projects seeking alternative processes to hard chrome plating, and engineered solutions to help DoD depots comply with the 1998 Aerospace National Emission Standards for Hazardous Air Pollutants (NESHAPs) rules.

For further information regarding the PEWG, please contact Mr. Frank Ivancic, ASC/LPJ at 937-255-0444 ext. 3185, or Mr. Bob Bondaruck, ASC/LPJ at 937-255-0444 ext. 3183. ◆

Alternatives for Chromium Electroplating: ElectroSpark Deposition

A typical chromium electroplating process utilizes the hexavalent form of chromium to produce a bonded surface coating. However, hexavalent chromium is a human carcinogen and both the EPA and OSHA have imposed stringent regulations on its use. To avoid potential health hazards and comply with government regulations, the plating industry has been searching for alternative coatings or processes.

Viable alternatives to chromium electroplating must impart similar mechanical, chemical, and physical properties. HVOF has been implemented as a hard chrome electroplating replacement. It is useful for applications with simple geometry, but currently it cannot accommodate components with angles, crevices, inside diameters, or blind holes.

ElectroSpark deposition (ESD) is an alternative technology being developed for NLOS through a SERDP sponsored project. Essentially, ESD is a micro-welding process that employs short duration, high current electrical pulses to deposit consumable electrode material. It produces a fused bond, while requiring a low heat input. It has the potential to replace hard chromium for NLOS applications, both manual and automated.

ESD imparts true metallurgical bonding to substrates and displays superior adhesion when compared to HVOF coatings in bend, tension, and torsion tests. Rapid solidification enables nanostructures and unique corrosion performance. Substrates with non-line-of-sight surfaces that are inaccessible with HVOF can be ESD coated using a spinning-disc electrode.

The economic and environmental benefits of the ESD technology are summarized in Figure 4.

- The plating unit is portable for shop or in-field coating service - this reduces downtime and labor requirements
- Robust coating may be produced for severe service requirements - longer service life leads to reduced maintenance costs
- The low heat-input process prevents thermal distortion problems and metallurgical changes in the substrates
- Functionally graded, multi-layer, and special surface compositions are achievable
- Special personal protection equipment (such as fume hoods, sound booths, etc.) are not required
- No hazardous waste streams are generated - which results in reduced liability and permitting costs

Figure 4. Benefits of ESD Technology

To date, ESD coatings have been successfully applied for wear resistance, corrosion resistance, for build-up, and special surface modifications. Commercial applications of ESD include coatings for hand tools such as scissors, pliers, screwdrivers, knives, and drill bits. ESD has been used in gas and steam turbines for hardsurfacing of blade tips, repair of diffusion coatings, repair of casting defects, and platinum preplacement prior to diffusion coating.

Although ESD has wide applicability, few limitations have been experienced. In order for ESD technology to be operative, both substrate and coating material must be electrically conductive. The maximum part size suitable for ESD is unlimited, but the effective coating rate is typically 2 to 20 cm^2/minute per applicator head used. Therefore, large components may require several applicator heads where accelerated production is an issue. In addition, the maximum practical coating thickness generally ranges from 25 to 100 µm (0.001 to 0.004 inch) depending on the material, but some materials have been deposited to 3 mm (0.12 inch) thick. Stress-relief cracking is inherent with some coating materials and certain applications may require extensive optimization of coating parameters (weld qualification) for uniform and effective coating.

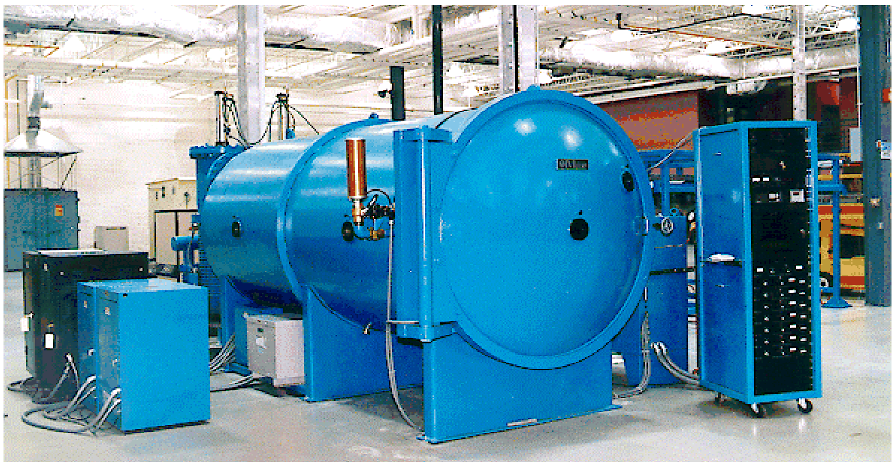
Based on the substrates treated and coatings applied to date, the ESD technology is a viable alternative for chromium electroplating. ESD capability in IDs is being evaluated and additional selected coatings will be tested for applicability. The ESD SERDP project has the support of Tri-Services.

For further information, please contact Roger N. Johnson, Pacific NW National Laboratory at (509) 375-6906 or Roger.Johnson@pnl.gov. ◆

Improving Aluminum Ion Vapor Deposition

Most DoD repair facilities use IVD aluminum as a replacement for cadmium electrodeposited coatings on metal components. As part of the process, glass bead peening is often used to increase the density of the IVD coating and to test its adhesion to the substrate material. Subsequently, a chromate conversion coating is added to impart greater corrosion resistance and to provide a surface suitable for painting. Because typical chromate solutions contain hexavalent chromium, which pose unacceptable health and environmental risks, non-chromate pretreatments are desirable. Although many non-chromate pretreatments have been investigated, most have had limited success.

One alternative to this process is to improve the actual coating structure of the IVD aluminum to provide a more corrosion resistant coating. In recent studies, the incorporation of a pulsed, high voltage power supply into conventional IVD equipment has shown the potential to improve coating structure and corrosion resistance. When the coating structure is improved, the glass bead peening step of the process may be eliminated and a less corrosion resistant non-chromate pretreatment may be applied and still offers improved corrosion resistance over the conventional coating. As part of an NDCEE project, Concurrent Technologies Corporation (CTC) is investigating the use of such equipment and developing a plan for validating its use and subsequent implementation into DoD repair depots.



Three technical objectives have been identified for the study. The primary objective is to eliminate the glass bead peening that is currently used to increase the density of IVD coatings. This will reduce the labor associated with processing and minimize waste generation. The second study objective is to replace hexavalent chromium conversion coatings with non-chromate pretreatments. Eliminating the use of this form of chromium will reduce environmental, health, and safety risks, as well as the associated costs. The final objective is to increase the component life cycle. This will result in extended service life between repairs, reduced labor costs, and improved readiness.

The project approach consists of four main steps: (1) a requirements analysis, (2) identification of alternatives, (3) technology demonstration, and (4) technology justification. At present, the first two steps in the process are complete. Components that are currently treated with IVD aluminum were selected by repair facilities for the improved IVD process. Requirements data were gathered on EH&S costs, life cycle costs, labor, and operational costs associated with the peening and chromate conversion coating. Baselines were established and the necessary specialty testing was identified.

Viable non-chromate pretreatments were selected based on previous efforts. These alternatives included Alodine 2000, NCS Rainseal, Sanchem Full Process, and trivalent chromium. CTC's IVD system will be upgraded and retrofitted with a pulsed, high voltage power supply to propagate the improved process. Control systems will also be upgraded to enable easy transition to depot systems that have been assembled by various manufacturers.

Testing for adhesion and corrosion resistance will be conducted in the Technology Demonstration Phase. The most viable coating strategies will undergo additional stage two testing. The entire realm of the stage two specialty tests has not been fully developed, but may include primer and paint adhesion testing and re-embrittlement testing.

Implementation activities are not included in the current scope of work. However, follow-on funding will be pursued for technology transition to repair depots and for new applications.

For further information, please contact Lisa Cato, Concurrent Technologies Corporation at (803) 637-2516.◆

Non-Cadmium Repair Process for NAVAIR Field Repair Requirements

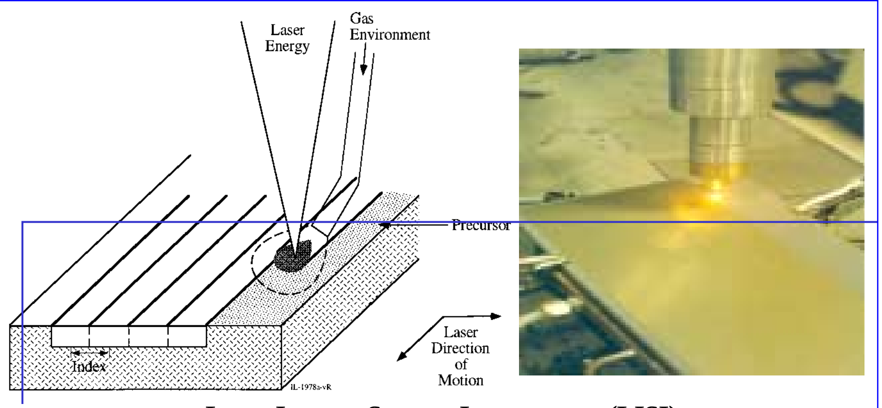
As cadmium coatings are removed from use as a corrosion preventative on Navy aircraft, new coating processes are being introduced as replacements. Current candidate materials for the replacement of cadmium include ion vapor deposition (IVD) aluminum, Al-Mn, Ni-Zn, and others. However, field and depot repair techniques for these new processes are currently undeveloped. If these new coatings are damaged in the field, the equivalent of a brush touch-up technique does not exist. SBIR has funded a study conducted by Surface Treatment Technologies, Inc. (ST2) to evaluate both the Laser Induced Surface Improvement (LISI) process and the Electro-Spark Alloying (ESA) process to develop such a field-portable repair process.

	LISI	ESA
Hardware Cost	$280K	$30K
Robotic Cost	$75K	$45K
Hand Processing Capable	no	yes
Processing Rate	20-40 sq. ft.	2-3 sq. ft.
Coatings	Al	Al, CD, etc.
HAZ	limited	none
Development Time	2 yr.	ready
Gouge Repair	no	yes

Comparison of LISI and ESA

Phase I of the study focused on evaluating the LISI process as a brush touch-up repair technique for non-cadmium sacrificial anode replacement materials (e.g., Al, Al-Mn, Ni-Zn). The Phase I results not only demonstrated LISI repair capabilities, but also a potential for field portability and for OEM coating applications. Phase II emphasized OEM applications, field repairability with respect to stripability/reapplication, and the portability of laser hardware. In addition, LISI was compared with current ESA technologies for feasibility as alternate surface alloying and coating processes.

The LISI process uses thermal energy induced through laser optics to produce a controlled surface modification on the substrate metal. Surface improvements made by the high-energy laser do not form a coating, but a re-alloying of the base metal. The initial step is to design an alloy powder blend that provides the desired improvement and apply it to the surface of the base alloy or substrate as a paint or thin film. Thermal energy is then applied via the laser to melt the master alloy addition into the top layer of the base material. This technique provides a full metallurgical bond with the substrate where the improved surface becomes integral to the base alloy and cannot delaminate. Alloying rates of 20 to 50 sq. ft./hr. per laser can be achieved. The fiber-optic laser beam delivery permits precise control of location, and the alloying can be performed remotely with robotics and fiber-optics. The LISI technique is environmentally acceptable.



Laser Induced Surface Improvement (LISI)

Current and developing applications for LISI include mold & die surfaces, automotive engines, cryogenic couplings, wear surfaces for construction, military aircraft engines and landing gear. Wide applicability of the LISI technology is being demonstrated in parallel for NAVAIR, as well as other military, and commercial customers. Extensive commercial R&D projects are ongoing.

In the ESA process, an electric arc is produced through a moving electrode energized by a series of capacitors. During generation of the arc, small particles of the electrode material are melted, accelerated through the arc, and impacted against the base metal substrate, where they are solidified rapidly and can be built-up incrementally. This micro arc-welding process forms a true fused metallurgical bond with the substrate. ESA produces consistent, thin layers while the substrate remains at or near room temperature. Current coating rates 1 to 2 ft. sq/hr per system. As with LISI, the ESA technique is environmentally acceptable.

ESA surfaces have been tested in a wide range of applications including wear resistance, corrosion resistance, and for build-up or special surface modifications. The coatings produced by ESA typically exhibit higher load tolerance, lower wear rate, and lower corrosion rate than similar materials applied by other processes. ESA can be easily automated, operators are easily trained, and the process and equipment are portable.

Initial fatigue data have been gathered in Phase II of the ST2 study. The ESA technique performs significantly better that LSI for 4340 steel, but both processes are similar for 13-8PH steel. Current field studies indicate that the LISI portable diode laser produces wide lateral heat damage adjacent to precursor and that optical redesign is necessary to optimize the diode systems for LISI. The accompanying chart provides further comparison of the LISI and ESA technologies.

Based upon data to date, ESA offers significant advantages over LISI for field repair. ST2 has recommended that NAVAIR focus on Electro-spark alloying and proposed additional tasks for the remainder of the study. These tasks include: 1) develop a written parameter processing document for specific alloys/hardware of interest, 2) perform laboratory processing on actual hardware samples, 3) perform a field demonstration of ESA processing, and 4) provide an ESA device as deliverable on contract.

For further information, please contact Michael A. Riley, Surface Treatment Technologies, Inc. at (410) 332-0633.◆

Aluminum Substitution for Cadmium/Chromium

Defense Supply Center Richmond has sponsored a project to investigate, document, and facilitate the potential replacement of cadmium and chromium plating of parts in military applications to reduce corrosion. The project has evolved in three phases. The first phase, completed in 1998, consisted of determining the feasibility of implementing a process that already had a commercial market. The second phase, which is ongoing, consists of identifying stakeholders with similar corrosion problems and partnering with them to provide plated coupons and parts for testing. The testing is designed to assure that the aluminum-plated parts meet all specification and performance requirements. This includes identifying and resolving common technical issues and parameters. The third phase involves identifying additional testing needs, developing scale-up requirements, life-cycle costing estimates, licensing agreements, and industrial specifications.

Aluminum (Al) metal is environmentally favorable, in comparison to cadmium and chromium. Until recently, the application of Al to various metal substrates has been limited to commercial mechanical and vapor deposition methods. A relatively new process of electroplating aluminum was introduced in Europe about 1988. The Al electroplating has shown improved corrosion resistance over conventional coatings. Corrosion resistance of the Al coating is determined by the purity and protective oxide surface.

In the first phase of this study, a process that is proprietary and patented to AlumiPlate, Inc. of Minneapolis, Minnesota was identified and determined to offer the greatest potential for cadmium/chromium replacement. The AlumiPlate process works by electrochemically depositing aluminum (Al) metal on a substrate that may consist of a wide array of base metals and configurations. The electrodeposited aluminum offers superior performance to conventional non-Al platings and structural aluminum alloys.

The opportunity for Al re-plating in military applications was recognized in 1995 by DLA. Military and commercial applications of the AlumiPlate process were identified and test components were prepared under DLA contract. Non-critical weapons systems components, which are routinely replated, were featured. A feasibility study involving sample testing for data confirmation was completed in 1998. The study showed that hazardous material minimization is consistent in the final product as well as in the plating operation. Further, the process was found to meet or exceed performance specifications for cadmium substitution and chromium replacement requirements in corrosion applications. The AlumiPlate process is a commercially available technology that can be directly implemented by the military without repeating years of research and development.

In Phase II, military and commercial organizations with similar corrosion problems and requirements were identified. Networking with these stakeholder organizations was established and specimens of plated parts/coupons were provided for field testing and evaluation. Active testing of the non-critical items is ongoing. A database center is being maintained for facilitation of stakeholder testing and evaluation results so that information can be communicated between partners as it becomes available.

Several ongoing tasks are being pursued in Phase III as well. Additional joint testing and evaluation efforts were identified for the various stakeholders and a system was established to track Al-plated parts. Performance evaluation and life cycle costing are in progress. Scale-up parameters are being developed as well. Increased stakeholder participation will be promoted to ensure the success of these efforts.

For further information, please contact Mr. Linwood Gilman, DSCR-VBB, at (804) 279-3518 or Mr. Russell Vanallen at 804-279-5222.◆

Review of Cadmium Alternatives

Cadmium plating is a major problem in aircraft components, not just because of its environmental problems, but also as a source of hydrogen embrittlement in high strength steels. Most alternatives under evaluation at present are zinc-based electroplates (Sn-Zn and Zn-Ni) or Ion Vapor Deposition (IVD) aluminum coatings. There are additional emerging technologies at various states of development including Al electroplate, Al-Mn molten salt bath electroplate, thermal sprays, metalorganic chemical vapor disposition (MOCVD) aluminum coatings, Mn- and Sn-based aqueous electroplates, and new high strength stainless steels. The Rowan Technology Group has been funded by Joint Strike Fighter Program to evaluate the current state of development of these alternatives, and their potential for production use.

The primary concern is to avoid cadmium, chromium, and volatile organic compounds (VOCs) in formulating metal coatings on components designated for use on the Joint Strike Fighter. This is only possible if there are viable alternatives. The goal of the Rowan study is to make recommendations on the most viable alternatives based on existing data and current work.

Alternatives to cadmium plating were evaluated by performing a technology analysis. Primarily, work currently underway was reviewed. Alternatives were identified, including alternatives not currently being considered by JSF. The status of the alternatives was assessed by employing the Technology Assessment Matrix method. Using this method, the development status of the different technologies were ranked based on characteristics such as the availability of raw materials, the availability and capacity of production equipment, production methods, definition and properties of materials, production system design, and market penetration. Finally, the suitability and fit for original equipment (OEM) and overhaul and repair (O&R) were evaluated based on data and requirements.

The technologies examined include electroplating methods, dry coating methods such as IVD aluminum, MOCVD aluminum, and thermal spray aluminum, as well as new stainless steels. Electroplate technologies have a large body of available data and are currently undergoing some of the most serious evaluation. They are the closest to drop-in methods and are usually less expensive than dry methods. However, they produce larger waste volumes than dry methods, and the non-aqueous techniques are highly reactive with water. Furthermore, alloy plating can be tricky since it is dependent on solution chemistry and current density.

IVD aluminum coating is a fully commercial process with a long history of successful use. Cost is a primary issue with IVD. Currently, IVD requires shot blasting and chromate conversion to improve coating density and corrosion resistance. The chromate solutions are not desirable from a health and environmental perspective. CVD aluminum can be performed with simple fixtures, and has very good throwing power for deep holes. Alloys can be coated with CVD and precursors can be recycled. The method requires relatively high temperatures (500^{o}F) and produces metalorganic compounds that are typically hazardous. To date, much of the MOCVD aluminum technology is in the research and development stages and very little data are available on performance. Techniques involving thermal sprayed aluminum and alloys are commercially available. Arc and plasma sprayed aluminum and Al-Zn have already been used on some landing gear. The coating, though, is quite thick and relatively porous. Additionally, the method is not suitable for fasteners and is questionable for electrical connectors.

New stainless steels are being developed with essentially the same mechanical properties as 300M. These are more efficient steels with lower alloying and carbon percentages. They have design properties incorporated for better performance. Hydrogen embrittlement and stress corrosion cracking are significantly reduced or eliminated. Designer alloys of the new steels can be made quickly and efficiently. Currently, new stainless landing gear steel is being developed under SERDP and ALGLE funding. On the other hand, the cost of qualification for these new steels may be higher than for coating. Furthermore, previous stainless steel formulations suffered pitting and corrosion, and it is not yet known whether these will do the same. Initial data suggest that they will not.

The development status of these alternative technologies to cadmium replacement is quite variable and no single solution is apparent at this time. Aqueous electroplates and IVD are furthest along in development, but new IVD ID methods are emerging quickly and look promising. Non-aqueous electroplates have attractive properties, although they can be highly reactive and require enclosed baths for production. Currently, thermal spray methods are in limited production, but may be viable for a wider range of applications. MOCVD is attractive for IDs, however, much of this technology is in the R&D stage and there are some concerns over OSH and temperatures. High strength stainless steel is likely to be the best long-term approach. The new steels offer drop in, out-of-the-box replacement to eliminate cadmium and organic compounds.

For further information, please contact Keith Legg, Rowan Technology Group at (847) 680-9420.◆

Overview of the Environmentally Advanced RAM Coatings (EARC) Program

The Problem

DoD rework facilities and military bases have been mandated to reduce hazardous chemical emissions. Iron filled elastomers (IFE) are applied to aircraft to impart Low Observability (LO) features to elude radar signatures. LO coatings present a major environmental problem because of their high solvent content and thickness. One of the greatest sources of toxic air emissions results from the spraying of elastomeric coatings. Typical IFE coatings contain large quantities of Methyl Isobutyl Ketone (MIBK) and Methyl Ethyl Ketone (MEK). IFE coatings are not only high in solvent content, but they are applied in very thick layers. MEK and MIBK are listed as volatile organic compounds (VOCs), as well as hazardous air pollutants (HAPs) and are targeted for reduction/elimination on the Air Force Materiel Command list of 24 most hazardous materials. Additionally, there are logistic concerns with applying the coatings for field and battle damage repairs. The coatings are currently sprayed with high volume, low pressure spray guns, which require up to 16 hours to apply, and three to four days to fully cure before flying. A three to four day turnaround time for repairing IFE coatings is a major impact to repair labor hours, sortie rates, and maintenance man-hours to flight-hour ratios.

The Objective

Identify and evaluate commercially available, castable polyurethane resin systems and iron filler materials for application to large surface areas on AF aircraft/missiles. Demonstrate equipment and procedures for applying selected LO coatings at a user location with the near term goal of obtaining combined VOC/HAP emissions of 230 g/l, or less, thus reducing combined VOC/HAPs by up to 75%. Reduce the time for a full coating application and curing by 75% from the current 3-4 days. Also, to improve worker safety and eliminate the need for NESHAP and CAA waivers.

The Approach

In 1999 an SAIC/Boeing team was awarded a contract to leverage previous Boeing plural component spray application systems and to evaluate/test commercial resins and fillers in candidate materials. The spray equipment was optimized for non-robotic, manual control. Nine candidate materials were screened and tested to ultimately select two for demonstration at an ALC or original equipment supplier. Transition to an LO user is also a major follow-on effort and this project will be managed by ASC/ENVV.

Accomplishment

Of nine potential formulations that SAIC/Boeing screened, sprayed, and tested, four were found to have the necessary materials and performance characteristics required of the project. The materials were sprayed to validate supplier claims, and the four underwent mechanical and electrical properties testing. All these materials exhibited properties that contained less than 230 g/l VOC, and their "build" rates were less than four hours. Additionally. their "dry-to-sand" times will result in significantly expedited material handling times over currently employed materials and methods. Two were then down-selected and are now undergoing detailed performance testing.

For further information, please contact Mr. Thomas A. Naguy, AFRL/MLQE, at: (937) 656-5709

Source: AFRL/MLQE Fact Sheet. ◆

TRANSITION OF NONDESTRUCTIVE VALUATION POINT INSPECTION TOOL FOR LOW OBSERVABLE MAINTAINABILITY

Payoff

The MM-704A prototype point inspection tool is designed to provide better inspection capability and reduce Low Observable (LO) maintenance costs on the F-117 Stealth Fighter. It is user friendly (red light/green light), lightweight, portable, battery operated, multi-functional, and, with some software changes, it can also be multi-platform (B-2 and F-22). The MM-704A is designed to assist maintenance personnel in evaluating canopy glass, light lenses, radar absorbing material (RAM), and metallized composites in real-time. The information provided by the MM-704A will assure LO engineers and maintenance personnel that repairs have been performed correctly. Additionally, the Air Force will save valuable time and money while increasing reliability and confidence in the LO maintenance process, decreasing turn-around time, and increasing aircraft mission availability.

Accomplishment

The Air Force Research Laboratory (AFRL) Materials and Manufacturing Directorate (ML), Nondestructive Evaluation Branch ‘ in a cooperative venture with the F-117 System Program Office, researched and delivered the MM-704A prototype point inspection tool to the 491 Fighter Wing at Holloman AFB, New Mexico. For several months, LO maintainers evaluated the tool, developed under the Multi-Spectral Low Observable Nondestructive Evaluation (MS LONDE) contract with Lockheed Martin Skunk Works. The F-117 System Program Office at Wright-Patterson AFB is transitioning the AFRL-developed technology by producing and purchasing several units of the next-generation low observable nondestructive evaluation tool for flightline use.

Background

LO weapon systems such as the F-117 Stealth Fighter and the B-2 Stealth Bomber depend on stealthiness for protection against increasingly lethal integrated air defense systems, Maintaining LO signature integrity is critical for success of these weapon systems in carrying out extremely hazardous missions. Unfortunately, maintaining the LO aircraft's radar cross section is a time-consuming and expensive endeavor. Consequently, LO maintainability continues to be one of Air Combat Command's (ACC's) highest concerns. In 1997, ML began research and development activities in the nondestructive evaluation of LO materials and technology under the MS LONDE program, Of the four original MS LONDE technology concepts, the Lockheed Martin Skunk Works MM-704A was quickly singled out as a possible replacement for ACC's F-117 current inspection tool, the JOST gun. Personnel from the 49th Fighter Wing conducted a five-month functional evaluation and determined the MM-704A tool performed all tests "as advertised." It delivers better and more consistent measurements and therefore provides increased reliability and confidence in the LO maintenance process. The operational utility evaluation of the MM-704A tool found its overall utility to be quite good. The 49th Fighter Wing completed a quick readiness evaluation (spot check) of 15 aircraft in a period of 1.5 days (with only one tool) in preparation for a recent deployment. Multifunctional capability, quick warm up, easy calibration, and the ability to mount the sensor on an extension pole to reach any location on the F-117 from the ground, all contribute to the improvement in LO maintainability.

Transition of Nondestructive Evaluation Point Inspection Tool for Low Observable Maintainability

Source: Air Force Research Laboratory, Success Stories A Review of 1999, Compact Disk.◆

Aircraft Coatings Test Facility Trims Painting Costs and Hazardous Waste

Payoff

Improved aircraft coatings will result in less frequent stripping and repainting of aircraft, which will significantly reduce air pollution, hazardous waste generation and worker exposure to hazardous materials. The improved performance of these new, integrated coating systems will provide better aircraft corrosion protection, extending the life of the Air Force's aging aircraft fleet.

Accomplishment

The Air Force Research Laboratory's (AFRL's) Materials and Manufacturing Directorate (ML) constructed a one-of-a-kind test facility at Wright-Patterson AFB, Ohio, to improve overall coatings performance, directly benefiting aircraft mission preparedness. The new facility, operated by the Air Force Coating Technology Integration Office (CTIO), provides Air Logistic Centers (ALCs), System Program Office (SPO) directors and users with advanced integrated systems using emerging coating systems technologies and troubleshoots problems with existing aircraft field-level coating systems.

Background

Aircraft Coatings Test Facility Trims Painting Costs and Hazardous Waste

Planning for the one-of-a-kind test facility started in 1995 under the management of the ML's Systems Support Division, CTIO, with construction completed in 1998. The CTIO believes this test facility will help save millions in aircraft stripping and painting costs during the next decade and significantly reduce associated hazardous waste caused by aircraft paint activities. The CTIO is an integral part of the Air Force's Coating System Strategy and is the technical arm of the Air Force's Aircraft Coatings Single Manager. The CTIO's integration efforts focus on the transition of new coating materials, processes, and equipment technologies based on priorities established by the Coatings Technology Screening Committee. The Air Force's increased emphasis on aircraft paint and depaint technology can be traced to three key events. First, there was a need to meet 1998 National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations and Occupational Safety and Health Administration (OSHA) initiatives affecting depot and field-level aircraft coating procedures. Second, there was increased dissatisfaction by field commanders with the appearance and performance of existing aircraft coating systems. Third, there was growing concern over what appeared to be an over diversified and dispersed development effort for critical elements of the coating system. The cornerstone of the CTIO's capability is an environmentally controlled paint booth that can vary temperature from 40-110 degrees Fahrenheit with 10 to 90 percent relative humidity. This paint booth simulates most environmental conditions encountered by ALCs and field units where preparation and painting of aircraft occurs. Simulating real-world conditions allows assessment and resolution of field paint and coating problems. The controlled, variable environment paint booth allows for painting of samples varying from small three-by-five-inch test coupons up to six-by-six-foot panels and off-aircraft parts. The Materials and Manufacturing Directorate has partnered with Warner-Robins ALC to accomplish the CTIO's depaint activities with contractor staff members augmenting government operations at both locations.

Source: Air Force Research Laboratory, Success Stories A Review of 1999, Compact Disk.◆

Federal Agency Usage of DSCR Provided Re-refined Oil Continues to Grow

In 1995 Defense Supply Center Richmond (DSCR) began offering re-refined motor oil to its customers via the Basic Re-refined Motor Oil Program. This program offers re-refined motor oil to federal civilian and military agencies worldwide. Since that time DSCR has added the Closed Loop Re-refined Motor Oil Program (Closed Loop) that offers re-refined motor oil in the Continental US and includes free pick-up of the customers waste oil, up to 120% of what is purchased. Both programs have packaged products that are readily available to the customer and are competitively priced when compared to virgin oils. The Closed Loop Program even offers bulk deliveries if you meet the 200-gallon minimum order requirement.

Since the inception of DSCR’s re-refined oil programs, customer demands have continued to grow. At the direction of Mr. Dave Oliver, the Principal Undersecretary of Defense for Acquisition and Technology, DSCR implemented an Automatic Substitution Policy where all DoD commercial virgin oil requisitions that have a re-refined oil counterpart are automatically substituted with the re-refined oil equivalent. This has helped customers comply with Executive Order 13101/13149 and increase their re-refined oil usage. Likewise, automatic substitution policies are in place for the Department of Justice, Department of Interior and the Department of Transportation. Additionally, DSCR has diligently worked with the US Post Office Fleet Managers and many of them are now participating in the DSCR Closed Loop Program. It is DSCR’s goal to work with the US Postal Service as much as possible.

One example of the increase in re-refined oil usage lies within the Department of Defense. As a percentage of DSCR total comparable virgin/re-refined oil usage, the DOD has moved from 8.6% re-refined oil usage in FY97, to 18.8% in FY98, to 27.5 % in FY99, and 38.4% in FY00. Factoring in the automatic substitution policies, DSCR’s total re-refined oil usage was up approximately 50.4% in FY00 compared to FY99. DSCR feels that there is still much room for growth in this area both within the Department of Defense and Civilian Federal Agencies.

In conclusion, federal military and civilian consumers of virgin oil products may purchase the environmentally preferred, re-refined motor oil from Defense Supply Center Richmond. This will help in complying with Executive Orders 13101/13149 and due to the rising costs of crude oil, may reduce overall costs associated with the purchasing of motor oil. To place an order you can call the DSCR Call Center at 804-279-4865 and press 0. Or use your government credit card by accessing website www.emall.dla.mil. For questions concerning DSCR’s Re-refined Oil Programs you may contact Mr. Jim Fazzio at commercial 804-279-4908 or DSN 695-4908. ◆

DLA Updates Guidance for Reporting Hazardous Waste Disposal Data

The Defense Logistics Agency (DLA) has issued new guidance on reporting hazardous waste disposal costs and quantities, responding to a recent Pentagon inspector general’s report that found policy in this area lacking.

The inspector general in a Dec. 22 report found it impossible to determine why the military’s hazardous waste disposal budgets had increased in recent years while the reported unit cost to dispose of the waste and the reported amount of waste had decreased. This was because DLA, Army and Air Force data were not well supported (Defense Environment Alert, Jan. 16, p9). For instance, DLA components were unable to provide historical cost data to support their budget estimates, and they could not provide adequate supporting documentation for waste disposal volumes, according to the report.

The new guidance, issued Dec. 26, calls on DLA commanders “to designate a hazardous waste coordinator at each installation to be responsible for ensuring that required information is correctly maintained and accurately reported,” according to a memorandum accompanying the updated policy.

The guidance also “establishes DLA policy for the collection, maintenance and reporting of hazardous waste cost and quantity information,” addressing several issues that have complicated the adoption of standardized procedures for DLA-managed facilities, according to the guidance. These issues are central accountability, automation, required data, and the key date for recording disposal.

The policy notes that disposal actions are managed both by DLA installations and Defense Reutilization and Marketing Service (DRMS) staffs. “Clearly, the potential exists for the hazardous waste data to be incomplete or inaccurate unless care is exercised to ensure a central repository of data at each site with close coordination among the involved offices, with firm, fixed responsibilities for the data,” the guidance says.

Thus, DLA installation commanders should designate a hazardous waste coordinator at each site, who “will be responsible for maintaining all hazardous waste records (including manifests) at their installation, and for collecting and reporting [measures of merit] data” to the appropriate DLA environmental coordinator, the guidance explains.
The policy explains that different types of DLA-managed installations have differing automation needs, but says that the “hazardous waste coordinator must track all hazardous waste being disposed of from the installation using appropriate automated tools.” The guidance outlines the different types of automated reporting and tracking systems used by the military services and DLA.

But although automation requirements may differ among installations, “there is a common set of hazardous waste data that provides regulatory compliance and assurance of accurate reports,” the guidance says. The policy lists the minimum required data, such as quantities, costs and dates. The data should be broken out in quarterly segments so that the information can be considered in both calendar and fiscal year reporting, the guidance says.
Finally, the guidance says that past measures of merit guidance does not specify how to determine the disposal date for waste. “The date to consider waste ‘disposed of’ has been subject to interpretation, since hazardous waste could move from installation to DRMS control, but remain in installation storage for some time before shipment to the Treatment, Storage, and Disposal Facility (TSDF),” the policy says.

Therefore, the new guidance says the disposal date will be the date of shipment as recorded on the pickup manifest. Before that date, the waste is considered to be in storage, but on that date, the waste is “disposed of” from the installation’s standpoint, the guidance says, although it explains that some time may pass from the TSDF receipt date or certification of disposal.

Source: Defense Environmental Alert, 13 February 2001.◆

Internet Sources

Agency	Web Site
Environmental Protection Agency	http://www.epa.gov
Environmental Appeals Board	http://www.epa.gov/boarddec/
Department of Agriculture	http://www.usda.gov
Department of Energy	http://www.doe.gov/
Department of the interior	http://www.doi.gov
Department of Justice	http://www.usdoj.gov/
Minerals Management Service	http://www.mms.gov/
National Park Service	http://www.nps.gov/
Office of Surface Mining	http://www.osmre.gov/osm.htm
U.S. Fish and Wildlife Service	http://www.fws.gov
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