FY2003 CHIEF OF NAVAL OPERATIONS ENVIRONMENTAL SECURITY AWARDS

AWARD CATEGORY:
"ENVIRONMENTAL EXCELLENCE IN WEAPON SYSTEM ACQUISITION (TEAM)"

F/A-18E/F & EA-18G ACQUISITION PROGRAM

1.0 INTRODUCTION

PMA265 is a multi-platform program office that acquires, delivers, and sustains the F/A-18 weapon system. The F/A-18 has evolved through three variants: A/B, C/D, and E/F. The fourth variant, the EA-18G, is in the early stages of the acquisition process. Today, the F/A-18 Hornet is flying from the U.S. Navy's twelve aircraft carriers and from the air bases of seven allied nations. The F/A-18 Hornet is a multi-mission strike fighter, combining the capabilities of a fighter or interceptor with those of attack aircraft or bomber. The A, C, and E models are a single seat aircraft; while the B, D, and F models are two seat aircraft. The A/B and C/D variants are out of production and are currently in service with the US Navy and the Marine Corps. The multi-mission F/A-18E/F "Super Hornet" is an evolutionary upgrade of the combat-proven night strike F/A-18C/D. The Super Hornet provides the battle group commander with a platform that has significant growth potential, more than adequate carrier based landing weight, as well as range, endurance, and ordnance carriage capabilities. The F/A-18E/F is also considerably more survivable than the most recent F/A-18C/Ds, which will permit unescorted operations against highly defended targets early in the conflict. The full rate production contract for 222 of the planned 548 F/A-18E/Fs was awarded on 15 June 2000. First deployment of an F/A-18E squadron was completed in July 2003 aboard the USS Abraham Lincoln. Seven international allies have also procured the F/A-18.

The EA-18G will serve as the Navy's replacement for the aging fleet of EA-6Bs providing the capability to detect, identify, locate, and suppress hostile emitters. The EA-18G will provide enhanced connectivity to National, Theater, and strike assets and will provide organic accurate emitter targeting for employment of onboard suppression weapons. The EA-18G aircraft will be a missionized, post Milestone III F/A-18F aircraft retaining most of the capabilities of the F/A-18F coupled with the integration of the primary Airborne Electronic Attack (AEA) systems being developed or upgraded for the EA-6B under the Increased Capability Phase III Program (ICAP III). ICAP III is currently in low rate initial production. The modified F/A-18F airframe combined with the ICAP III will be the Navy's Advanced Electronic Aircraft (AEA). EA-18G is in the first phase of System Development and Demonstration (SDD).

2.0 BACKGROUND

The F/A-18 Program Team, 131 civilians and 35 military, is structured along the lines of product-focused, multi-disciplinary, contractor/government Integrated Product Teams (IPTs). The environmental IPT is known as the Green Hornet Team (GHT) and is chartered by the F/A-18 Program Manager to incorporate awareness of environment, safety, and occupational health (ESOH) concerns and responsibility for pollution prevention in the decision-making process. The GHT is a multi-disciplinary and interactive group responsible for advising F/A-18 Program Managers on initiatives and solutions to eliminate or minimize ESOH impact with respect to the F/A-18 manufacture, test and evaluation, integrated logistics support, maintenance, operations, training, and eventual disposition of the aircraft at the end of its useful life. The GHT also oversees execution of the F/A-18 Hazardous Material Management Programs (HMMPs) for airframe, engines, and all other elements of the F/A-18E/F & EA-18G Acquisition Programs. The GHT chairperson is the PMA265 ESOH Manager. The team meets quarterly on a rotating basis at members' sites. In addition, the GHT chairperson is a

member of the NAVAIR Acquisition Environmental Product Support Team led by the NAVAIR Environmental Policy and Support Team and the Joint Group on Acquisition Pollution Prevention. To assure ESOH considerations are truly integrated with acquisition systems engineering and to maintain appropriate awareness with PMA265 management, the F/A-18 ESOH Manager provides regular briefs at the PMA265 All-Hands meetings held on a weekly/bi-weekly basis.

GHT Representatives

- NADEP North Island
- NAVAIR Test and Evaluation
- NAVAIR Environmental Policy and Support
- NAVAIR Materials and Processes
- NAVAIR Cost Estimating Division
- F/A-18 Safety Engineering
- Fleet Introduction Teams at NAS Lemoore, NAS Oceana, and MCAS Cherry Point
- NAWCAD Lakehurst
- Boeing/St. Louis, F/A-18E/F and EA-18G Prime Contractor
- Northrop Grumman/El Segundo, F/A-18 Aft and Center Fuselage Contractor
- Northrop Grumman/Bethpage and Baltimore, ICAP III Contractor
- General Electric Aircraft Engines/ Lynn, F414 Engine Contractor
- Raytheon, AN/APG-79 Radar and ATFLIR Contractor

3.0 PROGRAM SUMMARY

Efforts during FY02-03 continued to focus on hazardous materials (HAZMAT) management and exploration on how to enhance current ESOH integration into F/A-18 acquisition programs. Emphasis from a program management perspective included the following duties and responsibilities:

- System contactors establish and maintain a HMMP Plan and submit related reports as contract deliverables. HAZMAT requirements are flowed down to subcontractors, who in turn provide HAZMAT input to their respective prime contractor. PMA265 ESOH Manager with selected GHT members review HAZMAT contractual deliverables for assessment and inclusion in further population of the PMA265 HMMP database.
- F/A-18E/F & EA-18G hardware project teams develop and/or update a Programmatic ESOH Evaluation (PESHE). These hardware projects include the AN/APG-79 Radar, the Advanced Targeting Forward Looking Infrared (ATFLIR) pod, SHARP, and EA-18G. The GHT is responsible for review of each PESHE ensuring completeness and making recommendations as necessary. To ensure ESOH considerations remain valid and risks are appropriately assessed and tracked, all PESHE's under the Acquisition Program's umbrella are reviewed and updated for major milestone decisions or at a minimum, annually.
- Each F/A-18E/F & EA-18G hardware project team develop a Deactivation, Demilitarization and Disposal (3D) Plan. The GHT is responsible for the review these plans to ensure completeness and make recommendations as necessary.
- The GHT, as a participant in design reviews, provides material and process recommendations and cautions.
- National Environmental Policy Act (NEPA)/Executive Order 12114 requirements are coordinated and documented by the F/A-18 ESOH Manager. Primary focus

has been in providing the operational and basing requirements in support of the Environmental Impact Statement (EIS) for east coast basing of the F/A-18E/F.
- PMA265 initiated explorations and initial phases for adopting Environmental Management System (EMS) principles and practices to the current PESHE process.

4.0 ACCOMPLISHMENTS (FY2002 & FY2003)

4.1 Incorporating ESOH Analysis into the Acquisition Decision Making Process

The PESHE serves as PMA265's strategy for integrating ESOH considerations into all aspects of F/A-18 Programs. Four key ESOH disciplines comprise the PESHE process and are analyzed, as appropriate, against each key acquisition life-cycle phase: Manufacture, Test and Evaluation, Deployment/Operation/ Maintenance, and 3D. The overall intent of the PESHE process is to identify ESOH risk areas and a series of strategies to eliminate or reduce the degree of risk, where practical, and to manage costs, liabilities, and schedule delays for PMA265. Figure 4.1-1 depicts the overall PESHE and risk management process.

Once potential ESOH concerns have been identified through the evaluation process, the degree of risk is quantitatively or qualitatively defined based on the severity of the risk consequences and the likelihood of occurrence. The ESOH risk assessment process for PMA265 is a tailored approach using the premises of Military Standard (MIL-STD)-882C/D and the F/A-18 Risk Management Plan of December 2002. This approach allows PMA265 management to readily understand identified ESOH risks in relation to the overall program risk assessment approach, yet allows for the use of the specific definitions of ESOH consequence and probability definitions defined in MIL-STD-882. Figure 4.1-2 is an illustrative example from one of PMA265s PESHE documents on the ESOH risk assessment matrix/approach used to characterize specific program risks.

Serious, high, and medium ESOH risks are rolled up into the overall F/A-18 and/or EA-18G risk databases. The current F/A-18E/F Best Practice of Program Risk Assessment uses the Boeing model and the overall process is captured in a risk management template and associated card to communicate the identified program risks. All risks, including ESOH, are periodically reviewed by the Navy led/PMA265 Program Risk Advisory Board (PRAB), comprised of key PMA265, NAVAIR, customer, contractor, and supplier representatives. Risk mitigation plans and the status towards resolving the identified risks are part of the PRAB review process. Likewise, as mentioned earlier, key ESOH issues and risks are appropriately briefed and discussed during PMA265 All-Hands/management meetings and in weekly team notes. ESOH risks (especially those with a high/moderate risk rating) are also discussed during the quarterly GHT meetings.

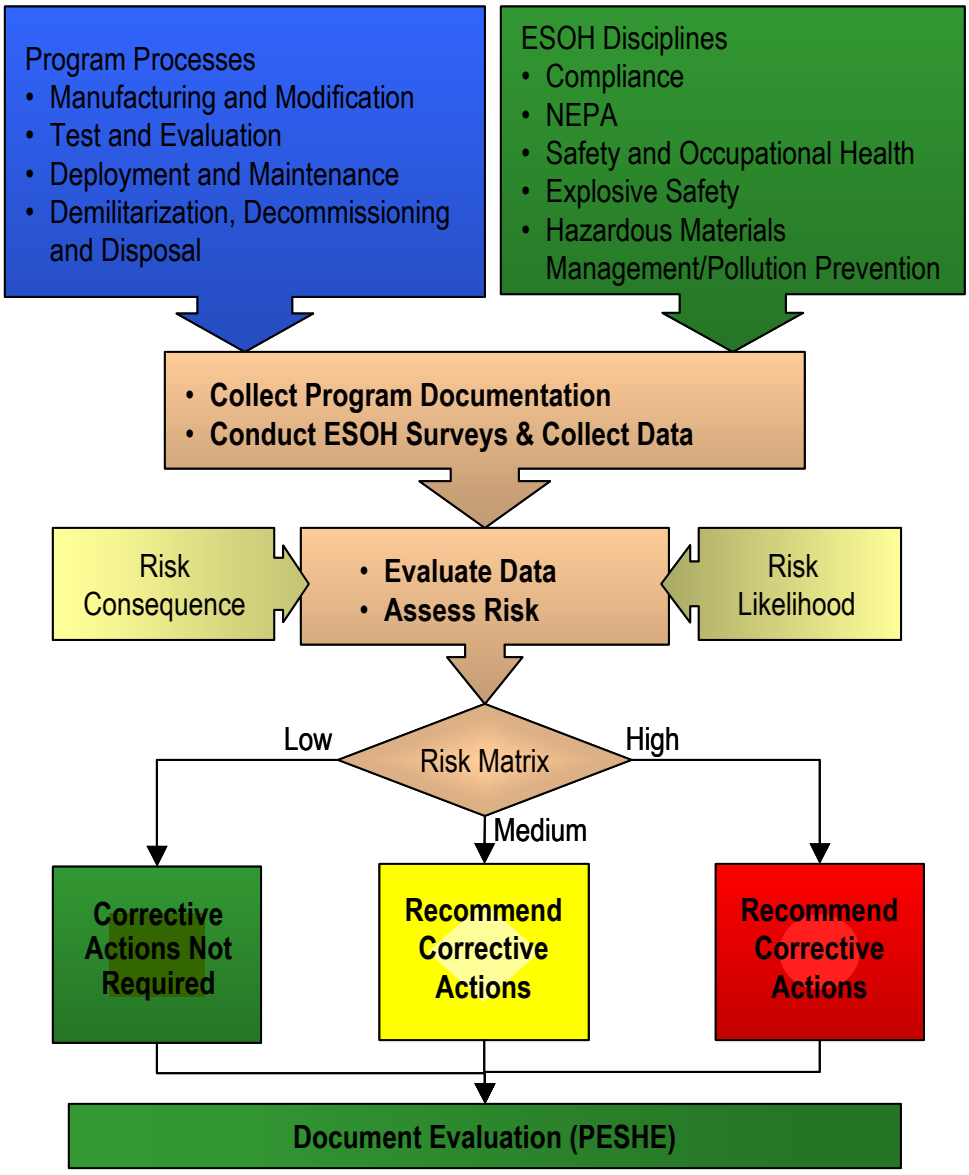

Figure 4.1-1: PESHE and Risk Assessment Process

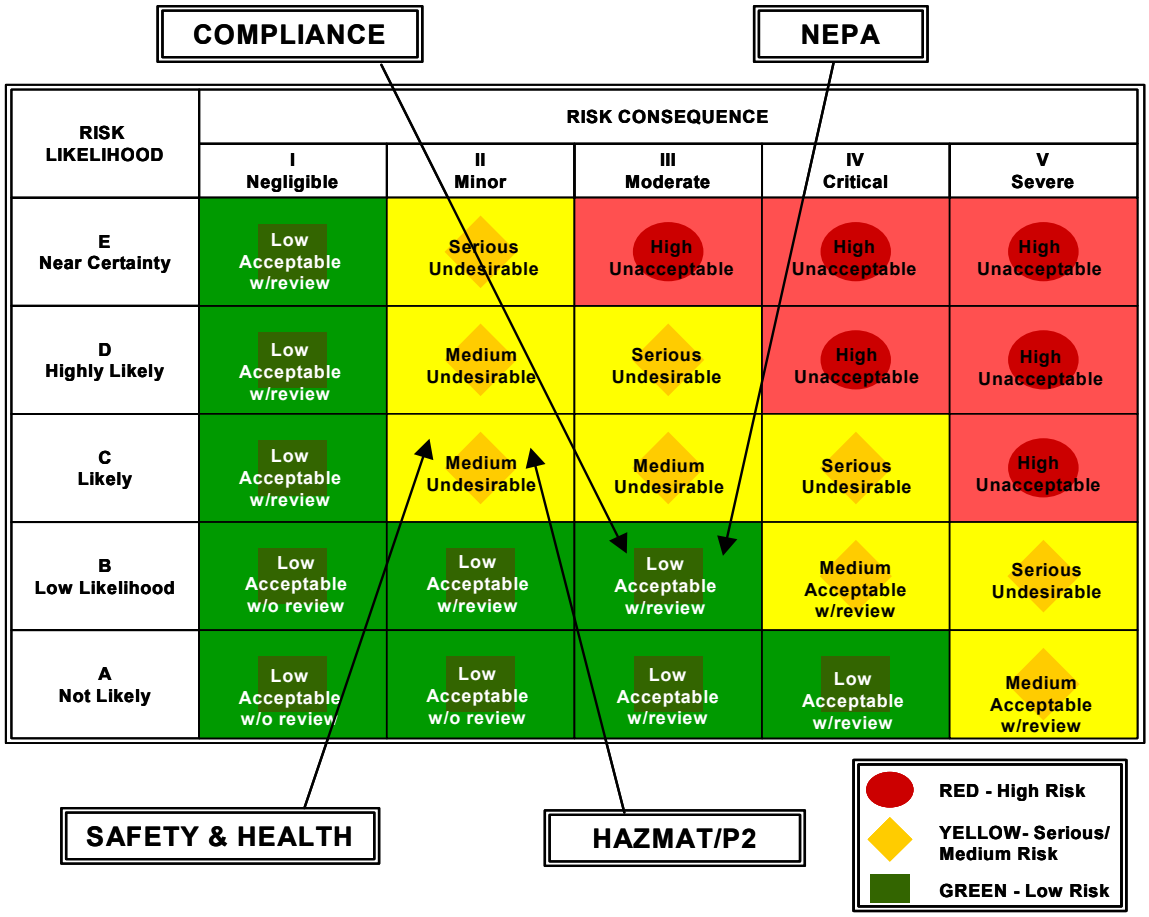

Figure 4.1-2: Representative Risk Matrix/Approach

The PMA265 ESOH Manager and GHT members continue to review related acquisition program documentation (e.g., AS, TEMP, CRD/ORD, etc.) as it is being prepared to incorporate appropriate ESOH considerations. ESOH recommendations have been submitted for inclusion in the EA-18G AS and ORD, as well as for the performance specification and statement of work. In all F/A-18 system contracts, ESOH requirements must be flowed down to the subcontractors. The primary focus is to continue capitalizing on ESOH efforts conducted to date and to minimize potential ESOH issues, especially from a HAZMAT perspective, relative to any new design or upgrade efforts. Proactive surveillance of existing and proposed regulations are conducted by the GHT to assess potential impact to the F/A-18 Program's cost, schedule, and performance. Efforts are being made to reduce and eliminate the use of HAZMAT, identify material reduction and recycling opportunities, and implement design changes that would reduce ESOH impact and cost.

4.2 ESOH Integration

Key consideration during FY03 has been to developing a viable approach to furthering the PESHE process with key EMS concepts and practices. Considering DoD

facilities are required to implement EMS by 2005, PMA265 considers it a very prudent course of action to evaluate similar EMS considerations, thereby helping reduce the ESOH management burden to a facility receiving a F/A-18 system. Development of a gap analysis matrix has been initiated to assess what PMA265 processes are reflective of EMS concepts and areas where further development is needed. Analysis is underway and critical to the success of implementing a PMA265 EMS will be discussions on lessons learned with the T-AKE ESOH representatives, who successfully implemented such a system.

Other accomplishments regarding ESOH integration are a direct result of PMA265 Program Manager's support of the GHT, who is able to greatly influence thought and action through all program phases. The GHT, as a participant in design reviews, provides material and process recommendations and cautions. What follows is the result of this proactive participation.

4.2.1 Weapon System Design

ICAP III is not under the management of the F/A-18 Program Office. However, as elements of the ICAP III are incorporated into the EA-18G AEA system, the same philosophy of ESOH risk management will be incorporated into our acquisition program. The EA-18G PESHE developed by the Green Hornet Team, seeks to insert F/A-18 ESOH Program standards into the ICAP III program. Over time, environmentally friendly design changes may result from this new awareness.

The Navy faces significant potential litigation concerning noise generated from aircraft while on training missions. Additionally the Navy spends $350 million annually treating hearing impairment of personnel working in the acoustic near field of jet aircraft. Given this environment, the F/A-18 Program Office in conjunction with the National Center for Physical Acoustics at The University of Mississippi is in the initial stage of a $15 million jet engine noise reduction technology project. The project will study the noise suppression physics of trailing edge chevrons, micro air jets, micro water jets, power resonance tube, and combinations of the above. The research, development, test, and evaluation project will run from FY05 through FY09. The major milestones include:

- Scale model development for noise reduction
- Scale model development for reduced noise on carriers
- Full scale demonstration of technology
- Full scale demonstration of technology for near field noise reduction

The resultant technology may be incorporated into future engine design or retrofits.

4.2.2 Weapon System Manufacturing

NEPA categorical exclusions (CATEXs), signed by the F/A-18 Program Manager, are applied to weapon system contractors and written verification of environmental compliance are solicited as part of the CATEX process. System performance specifications and the SOW for the EA-18G specifically identify banned and restricted materials for the system contractors to consider during the design phases.

4.2.3 Weapon System Test & Evaluation

ESOH considerations, with a primary focus on NEPA compliance, are continually assessed for F/A-18 Programs. Representative accomplishments include the following:

- ATFLIR Pod testing at NAS Patuxent River has been coordinated with the NAS Patuxent River Operational Environmental Planning (OEP) Office, who issued a Record of Environmental Consideration reflecting the ATLFIR tests are within the scope of their EIS. The F/A-18 Program Manager signed a Memorandum For The Record concurring with the OEP Office's decision. Inert weapons and mass equivalents are used to minimize harm to the Chesapeake Bay.
- AN/APG-79 Radar testing will be conducted at NAS Patuxent River and NAWCWD China Lake. No significant impacts are expected, however, there is the potential for air emissions associated with AN/APG-79 Radar maintenance while at the NAS Patuxent River or NAWCWD China Lake test and evaluation facilities. NAS Patuxent River has been evaluated for compliance with regard to its F/A-18 maintenance processes and no operating restrictions are imposed on NAS Patuxent River with respect to air emissions. NAWCWD China Lake is in the process of conducting evaluations.
- EA-18G developmental testing plans are being evaluated with regard to potential NEPA requirements and similarly NEPA considerations are also underway with regard to homebasing of the EA-18G, whereby all viable sites are to be included as part of the analysis process.

4.2.4 Weapon System Operations

During the past two years, the F/A-18 Program has worked closely with the Fleet and the Naval Facilities Engineering Command to develop the EIS for the east coast basing of 12 squadrons of F/A-18E/Fs. The EIS addressed eight potential scenarios that consisted of single and dual site alternatives. In addition to being a member of the EIS development team, the F/A-18 Program provided engine noise and engine air pollution data for incorporation into the document. The F/A-18 Program insisted on including cost estimates for each alternative in the EIS. The cost estimates, depending on the scenario, ranged from baseline cost to one billion dollars above baseline cost.

The Record of Decision identified the NAS Oceana-MCAS Cherry Point dual site as the location of the East Coast F/A-18E/Fs. The F/A-18 Program Office has worked closely with the Naval Facilities Engineering Command and the Program's Resource Sponsor to identify the required additional resources and established a firm time line for the requisite military construction. Without this coordination, the Program runs the risk of having 24 F/A-18E/Fs temporarily stationed at NAS Oceana prior to MCAS Cherry Point being ready for occupancy. This would violate the Final EIS and the Record of Decision.

In June 2004, an F/A-18E squadron is scheduled to arrive at Atsugi, Japan. The F/A-18 Program Office is working closely with the Commander Naval Forces, Japan regarding noise related concerns by the Japanese government and has provided engine noise data. The Program Office is also coordinating with Army Corps of Engineer's Japan Engineering District on the issue of quiet jet engine test cell design.

4.2.5 Weapon System Logistics Support

An F/A-18E HAZMAT issue was identified during the USS Abraham Lincoln deployment and is used as an example of the effectiveness of the GHT. Throughout the deployment, the F/A-18E maintainers were confronted with the lack of F/A-18E unique HAZMAT in the Naval Supply System. The F/A-18 Program Office was notified of the problem during the USS Abraham Lincoln's transit to her homeport. Because of the readiness impact to future F/A-18E/F squadron deployments, this issue was given high priority. A Boeing technical representative met the ship when it docked and provided the ship's supply department with a list of suitable substitutes currently in the supply system. This list was also provided to the supporting shore facility. Efforts are in process to update the Ships HAZMAT List, to update the ship's HAZMAT information system by removing the "Not for Shipboard Use" designation on required substances, and to ensure the source for ordering all HAZMAT includes F/A-18E/F unique HAZMAT.

4.2.6 Weapon System Disposal

PMA265 has developed an F/A-18 3D Plan. The Defense Logistics Agency (DLA) has approved this plan, which has been the only 3D Plan for an aircraft platform submitted to DLA for review and approval. DLA is using the F/A-18 3D Plan as a model for other aircraft programs to use.

The 3D plan contains information on not only the aircraft, but also on all support equipment and trainers. For each component within a system, the 3D plan contains item identification, basic function, composition, disassembly and demilitarization instructions, safety guidance, and ESOH considerations.

In addition, the plan calls for recycling F/A-18 parts, beyond those identified by the Naval Inventory Control Point save list, in a rapid-response ready-for-issue framework for the Fleet. The recycling effort is based on the successful F-14 program at NAS Oceana. That program has a twenty to one return-on-investment. Since the F/A-18E/F completely replaces the F-14 by FY2007 and depot support ends in FY 2003, the F/A-18 Program Office is encouraging NAVICP to shut down the F-14 recycling program and initiate the F/A-18 recycling program.

The GHT has also developed 3D Plans for the ATFLIR Pod and the AN/APG-79 Radar. The GHT is working with the EA-6B Program Office to develop the 3D Plan for the EA-18G's ICAP III pods. These subsystem plans are programmed to be incorporated into an over arching PMA265 3D Plan.

4.2.7 Overall Weapon System Life Cycle Costs

The first F/A-18E/F built with a redesigned forward fuselage entered service with the US Navy in September 03. The new design contains 40 percent fewer parts and 50 percent fewer cadmium plated fasteners and reduces production time by 31 percent. Using composite skins, with conductive features to reduce corrosion and maintenance-induced damage, has extended aircraft's useful life. Composite skins replace metal skins that had to be alodined or anodized. This replacement reduces the manufacturing and maintenance waste streams as well as decreasing maintenance time. This reduces the aircraft's overall life-cycle costs.

5.0 MATERIAL SUBSTITUTIONS

The F/A-18 Program Office is a participant in the following projects. It is hoped that some of these efforts will be cost-effective enough to transition from the research and development or test phase to production or operational use:

- HVOF as a Hard Chrome Replacement
- Cadmium Replacement
- Aviation Jet Fuel Additives for Pollution Prevention
- Halon Alternative Research
- Stainless Steels in Aircraft Structural Applications
- Right-Sized Corrosion Control Kits
- Right-Sized Composite Repair Kits
- Lead-Free Solder Demonstration/Validation
- Low Maintenance Durable Alloys
- PD-680 Replacements Afloat
- Low Emission, Non-Chromated Aircraft Paint System

HVOF as a hard chrome replacement is being tested on landing gear components. The high stress of a carrier landing is of some concern with this process; however, HVOF appears to be the only viable alternative to hard chrome. Navy Depot Jacksonville is repairing the landing gear on carrier-based EA-6B aircraft using HVOF as a field test. If this test is successful, the Navy depots may be able to use HVOF on F/A-18s. The benefits include seal life three times that of a chrome plated hydraulic piston rod and repair time of eight hours instead of 72 hours for plating.

6.0 EDUCATION AND OUTREACH

The PMA265 ESOH Manager and F414 engine GHT representatives are members of the Propulsion Environmental Working Group (PEWG). Once per year, the GHT has its quarterly meeting in conjunction with a PEWG meeting, thereby promoting the cross sharing of ESOH initiatives and lessons learned.

The PMA265 ESOH Manager is also an active member of the Hard Chrome Alternatives Team. Of particular interest to the F/A-18 Program Office is chrome replacement on landing gear and hydraulic components.

From time to time, the F/A-18 Program Office provides F/A-18E/F engine air pollution and noise data to the Joint Strike Fighter Program Office. The data are used for comparison purposes in reports. The F/A-18 Program Office also shares lessons learned during the EIS development for F/A-18E/F East Coast Basing with other programs.

7.0 REDUCTIONS ACHIEVED

The F/A-18E/F Acquisition Program has achieved additional reductions in HAZMAT usage, waste streams, and cost through various Acquisition Program management initiatives. These initiatives are being leveraged to reduce HAZMAT throughout the F/A-18 family by pursuing every promising technology in an effort to reduce HAZMAT production and use. The long-term goal is to make the F/A-18, and especially the EA-18G, as environmentally friendly as possible without degrading readiness or mission effectiveness.