



Naval Air Systems Command P-8A Poseidon ESOH Team
FY-15 CNO Environmental Award
Environmental Excellence in Weapon System Acquisition
Large Program



Narrative

Weapon System Acquisition Program Description

The P-8A Poseidon Program is an Acquisition Category (ACAT) ID weapon system program under the Program Executive Officer, Air ASW, Assault and Special Mission Programs (PEO(A)). The program is managed by the Maritime Patrol and Reconnaissance Program Office (PMA-290) and supported by the Naval Air Systems Command (NAVAIR). The program has successfully entered into full rate production and is currently heavily focused on completing the transition of all P-3C squadrons to P-8A and on executing an evolutionary acquisition strategy, which adds new capability to fielded aircraft via a series of pre-planned upgrades. As of November 2015, the program has delivered 32 Production and 6 Test P-8A aircraft. The P-8A, a militarized version of the Boeing Next-Generation 737 aircraft, is the United States (U.S.) Navy's most technologically advanced long-range anti-submarine warfare, anti-surface warfare, and intelligence, surveillance, and reconnaissance aircraft.



Figure 1 : A P-3C Orion, left, taxis by a P-8A Poseidon in Kuala Lumpur, Malaysia

The P-8A has the capability to release missiles, depth charges, torpedoes, and sonobuoys to fulfill its mission. The P-8A leverages and enhances the combat capabilities of its predecessor, the P-3C aircraft (Figure 1), by extending the global reach, payload capacity, and operating altitude of the P-3C.

Program Management Approach

From the Program's inception, the Environment, Safety, and Occupational Health (ESOH) Team was established to ensure positive steps were taken to integrate ESOH considerations into the acquisition process. The PM established the ESOH Team under the Systems Engineering Integration Team (SEIT), to provide ESOH-related advice and pursue the program's ESOH requirements, as derived from Department of Defense (DoD) Directive 5000.01 and DoD Instruction 5000.02. The P-8A ESOH Team has engaged stakeholders at all levels ensuring their needs and concerns are addressed with respect to ESOH aspects of the weapon system acquisition process. The P-8A program continues to integrate ESOH requirements into the life-cycle management of its aircraft systems, ensuring timely deployments of P-8A aircrafts that are compliant with international, federal, state, and local environmental laws/regulations.

The P-8A ESOH Team operates as an integral element of the P-8A Program, managed under the Program's SEIT, and reporting to the P-8A SEIT Lead. The SEIT is responsible for ensuring warfighter needs are met, while balancing program acquisition and life-cycle requirements. As a component of the SEIT, the P-8A ESOH Team works directly with stakeholders in the following areas: Air Vehicle, Mission Systems, Product Support, Test and Evaluation, Human Systems, Manufacturing, Training Integrated Product Teams, VX-20, VX-1 and fleet users. Utilizing their stakeholder's feedback, the P-8A ESOH Team ensures all system-related ESOH hazards are identified, and the best management practices are established early in the life-cycle of the weapon system. The ESOH Team also coordinates with Fleet Forces Command (FFC), Naval Facilities Engineering Command (NAVFAC), the NAVAIR Ranges Sustainability Office (SO), and testing/basing locations for the P-8A.

The P-8A ESOH Team supports military readiness by addressing key environmental issues such as engine air emissions, community noise, and hazardous materials use, and taking positive steps to mitigate them. This process ensures on-time delivery of a safe aircraft to the war fighter. This approach also supports readiness by addressing reductions in Total Ownership Cost (TOC) as one of the key ESOH objectives in the Statement of Work (SOW) for both FRP contract and INC 3 contracts.

The P-8A ESOH Team tracks and identifies all hazardous materials (HAZMAT) by comparing information in each Hazardous Material Management Program (HMMP) and Hazardous Material Authorized Use List (HMAUL) database against upcoming or pending environmental regulations, such as the *Emerging Contaminants* (EC) and the *Registration, Evaluation, Authorization and Restriction of Chemicals* (REACH) lists. With this information, the P-8A ESOH Team proactively identifies chemical risks that the contractor may not be aware of, and alerts the contractor appropriately. This process has identified 21 EC chemicals and 17 REACH chemicals delivered as part of the P-8A platform to date, as well as 40 EC chemicals and 21 REACH chemicals used during maintenance. By maintaining cognizance of changing HAZMAT risks, the Team is poised to plan mitigation and avoidance measures more effectively, to ensure reduction of TOC.

Incorporating ESOH Risk Management into the Acquisition Process

The P-8A ESOH Team established a robust ESOH program to ensure compliance with all technical requirements and as defined by DoD Directive 5000.01, DoD Instruction 5000.02, and other applicable policies. Key elements of this program include: tracking ESOH issues based on Military Standard (MIL-STD) 882 criteria, biweekly ESOH team meeting dealing with near term issues, and quarterly reviews of long term issues. In addition, critical requirements, such as the prohibited and restricted materials list, community noise limit, and engine air emission limits were incorporated into system design specifications and other contract documents. Risk mitigation in these areas is monitored via routine technical interchange meetings and annual reports from the contractor.

To ensure that ESOH related risks are tracked and mitigated throughout the entirety of the P-8A system's lifecycle, the PMA-290 ESOH Team continues to lead the effort to incorporate ESOH

initiatives into the P-8A systems engineering process. This is done by implementing the following strategies:

- Develop and continually validate the ESOH requirements that are captured within the Systems Engineering Plan.
- Analyze and document the ESOH hazards/risks resulting from program execution, by generating a Programmatic Environment, Safety, and Occupational Health Evaluation (PESHE). Review and update the PESHE as necessary, per program needs and status.
- Regularly update the NEPA/EO 12114 Compliance Schedule to ensure all P-8A system-related activities that may trigger NEPA/EO 12114 requirements are identified and tracked.

The most recent contract signed with Boeing includes the purchase of Lots 6 and 7, which will provide aircraft for the U.S. Navy and the Royal Australian Air Force (RAAF). Given the cooperative program relationship between the U.S. Navy and RAAF, the ESOH Team has been heavily involved in risk management and compliance efforts regarding both U.S. and Australian environmental laws/regulations. The collaboration with the RAAF has presented some unique risk management challenges for the ESOH Team. Australian laws concerning manufacturing and maintenance using hazardous materials differ from the U.S., but nevertheless require tracking and strict compliance in order to ensure successful execution of the cooperative P-8A program.



Figure 2: Patrol Squadron (VP) 16, prepare to load a MK-54 torpedo onto a P-8A Poseidon aircraft in Jacksonville, Fla.

In 2015, during a visit of several RAAF system safety/ESOH personnel, the P-8A ESOH Team provided input on several key safety topics, including: safe practices during composite repair, best practices for tracking maintenance materials, monitoring noise levels, laser safety, and confirmation of the absence of asbestos. Furthermore, to aid the RAAF in their preparation of receiving P-8A aircraft, the ESOH Team cleared for release several key P-8A ESOH documents: the Hazardous Materials Management Program/Pollution Prevention (HMMP/P2) Plan, Hazardous Material Management Program/Pollution Prevention/Environment, Safety & Health (HMMP/P2/EHS) Report, Hazardous Materials Authorized Use List (HMAUL), cabin noise report, and the Deactivation, Demilitarization, and Disposal Plan. The team also responds to ad-hoc requests for information, which in 2015 included verification of the petroleum, oils, and lubricants list currently in use. By providing information and guidance, the ESOH Team is able to pass on established processes and lessons learned to future systems.

For the 2013-2015 award period, the P-8A ESOH Team's efforts are highlighted by the following outstanding accomplishments:

Developing a HMAUL to Meet the Navy's Operational Needs

One of the most valuable ESOH documents is the HMAUL. The HMAUL is a list of all HAZMAT authorized for use in a Work Center, Unit, or Installation. As a Boeing contract deliverable, the HMAUL is specific to the commercial 737 aircraft. All the items listed are controlled by the task cards and materials listed in the Boeing-delivered Aircraft Maintenance Manual (AMM). Upon reviewing the HMAUL, the ESOH Team discovered several disconnects between the standards used by Boeing (e.g. private aerospace manufacturing standards, Boeing standards and materials) and those followed by the Navy (e.g. MIL-STDs, base environmental restrictions, materials currently available and used by other aircraft). The Team was able to quickly rectify these disconnects, ensuring continuing protection of the users and maintainers without impacting the fleet.

During the last two years, the Jacksonville Fleet Support Team (FST), NAVAIR Product Support, the NAVAIR Materials Engineering Division, and the P-8A ESOH Team have worked with Boeing to streamline the aircraft's delivered HMAUL toward meeting the Navy's operational needs. This cross-competency NAVAIR/Boeing collaboration has produced accomplishments to include:

- Updating out-of-date Safety Data Sheets (SDSs) and ensuring all SDSs are written in English.
- Verifying National Stock Numbers (NSNs), and completing packages for items missing NSNs.
- Consolidating multiple items of similar type and usage.
- Determining appropriate item quantities and sizes.
- Comparing Military, Boeing, and industry specifications to determine correlations.
- Updating the database software, to improve level of detail and ease of data storage.
- Expanding the database to include additional categories (e.g. preferred suppliers, stocking codes)
- Updating the Aircraft Maintenance Manual (AMM), via the Interim Rapid Action Change (IRAC) process. Many changes have either been implemented or are currently being processed.

Metrics tracked while improving the HMAUL include total number of line items and the number of items missing NSNs. Total line items include HAZMAT products used in both scheduled and unscheduled maintenance. NSNs are tracked to facilitate standardization of item names, characteristics, and management data used to purchase, manage, move, store, and dispose of material. Figure 3 illustrates the progressive improvement of the HMAUL, from July 2012 to March 2015, where both the total number of line items and number of items missing NSNs decreased over time – a 35% reduction of total line items, and 67% decrease of total items without NSNs.

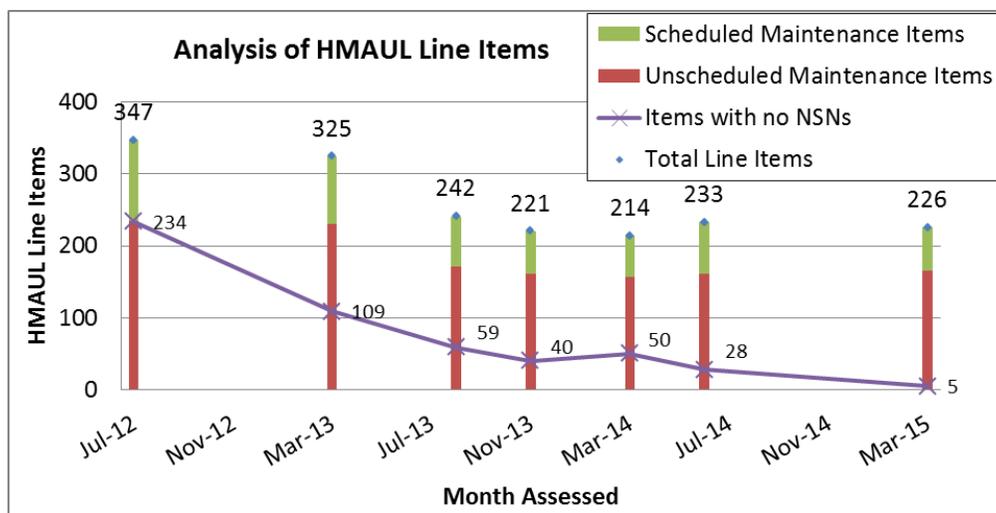


Figure 3: Analysis of HMAUL Line Items

An in-depth analysis was recently performed by the Jacksonville FST, on the replacement and simplification of solvents listed in the HMAUL. The solvents targeted for replacement include toluene, 1,1,1-trichloroethane, and methyl ethyl ketone, all listed in NAVAIR's Chemicals of Concern List as Priority II – "Targeted Chemicals." "Targeted Chemicals" are considered a priority for NAVAIR to find and use an alternative material, when feasible, due to their toxicity, bioaccumulation, and environmental persistence potential. By working in conjunction with the Materials Engineering Division, the FST is targeting at least 44 tasks to implement alternative, less hazardous materials.

The FST is also working to reduce the number of hazardous solvents required to accomplish similar maintenance tasks. Consolidating the lists of solvents will reduce the HAZMAT inventory at the Depots, as well as to reduce the materials needed to be shipped for deployment. Although the analysis is still in progress, the goal is to reduce the types and number of solvents by 50%, and to verify that all solvents are logistically supportable.

ESOH Risk Management - Material Availability/Rare Earth Elements

Rare Earth Elements (REE) are a group of metals and chemicals used in numerous applications, including magnets and batteries. Due to the fact that they are mined and refined in limited locations, there is an increasing risk of the DoD being able to obtain these materials easily in the future. There have been numerous Acts passed by Congress, stating various policies to monitor and track the use of REE, including The Fiscal Year 2015 National Defense Authorization Act. This Act required examination of REE Sourcing in all DoD ACAT I programs, which resulted in DoD and Chief of Naval Operations (CNO) data calls. To proactively understand the risks to the P-8A program, the ESOH Team performed an analysis of known REE delivered on the P-8A platform, using the HMMP HAZMAT Database. The greatest challenge to the team was that not all REE is considered HAZMAT, and therefore, not all REE data is captured by the current HMMP Database.

The P-8A ESOH Team identified several components that use REE. One example is samarium, which is used in the On-Board Inert Gas Generating System and the Embedded Global Positioning Inertial Navigation Control System. In order to identify and monitor REE components going forward, the ESOH Team coordinated with NAVAIR Product Support team to revise contract requirements for the Logistics Product Database (LPD). This contract now requires all P-8A components containing REE to be registered with a specific demilitarization code to aid in the disposal and/or recycling of hardware components. This will allow REE to be identified in future demilitarization/disposal operations. This is a beneficial requirement that can be easily transferred to other acquisition programs, to aid them in material availability risk analysis and mitigation planning.

Internal Execution and Documentation - Tracking and Mitigating NEPA Program Risk

From recent litigation (Conservation Council for Hawaii v. National Marine Fisheries Service), it is clear that the public and regulatory agencies are concerned with the potential adverse effects of Navy activities on marine life. Therefore, it is imperative that the Navy accurately convey the anticipated level of activities, as well as the potential impacts. The P-8A ESOH Team has been diligently consulting with test planners and those responsible for modeling marine effects, to ensure the modeled test parameters match as accurately as possible to real world test parameters.

One of the key capabilities of the P-8A is the ability to deploy ordnance such as harpoon missiles, torpedoes, and sonobuoys. Since these types of ordnances emit either explosive and/or acoustic sound, the P-8A Program carefully plans tests in order to meet developmental requirements while simultaneously protecting the marine environment from the effects of underwater sound. One of the key means to analyze the potential effects on marine life is through participation in the Navy's Tactical Training Theater Assessment and Planning Program (TAP). Under the TAP program, comprehensive environmental analyses, mandated by the *National Environmental Policy Act* (NEPA) and *Executive Order* (E.O.) 12114, is completed through regional Environmental Impact Statements of testing and training activities every 5 years. This process also supports the *National Oceanic and Atmospheric Administration* (NOAA) and the *National Marine Fisheries Service* (NMFS) Letters of Authorization (LOA) to continue testing and training in marine theaters. The number of permits allocated varies by testing and/or training needs, and is tracked year-to-year using the SYSCOM LOA Management Tool.



Figure 4: A P-8A Poseidon assigned to the War Eagles of Patrol Squadron (VP) 16 flies above the USS Harry S. Truman (CVN 75).

At the beginning of the TAP process, each participating program must provide estimates regarding anticipated training and testing over a five year period. To provide accurate estimates,

the P-8A ESOH Team works directly with program stakeholders, to successfully capture all program testing needs. Due to sonobuoy testing requirements, constant coordination is also required with PMA-264, the Airborne Anti-Submarine Warfare Systems program office.

Under the TAP process, the effects of testing or training activities on marine life are predicted using a sophisticated computer model/simulation. These effects range from changes in swim patterns, to changes in behavior, to physical harm. As modeling techniques improve and additional marine life density data is gathered, the Navy is better equipped to model the potential impacts of sonar and explosives. To further improve the model, the P-8A ESOH Team frequently meets with test planners to update and refine testing scenarios variables (e.g. locations, timing, test duration).

For the most recent TAP data call effort, the ESOH Team met with PMA-264 to review all modeling variables and assumptions used for acoustic testing scenarios. As a result of the in-depth discussions, several instances were found where previous assumptions made for testing parameters were too broad and general. For example, it was determined that the active ping time of High Duty Cycle sonobuoys used in previous TAP models was overestimated by more than double. By verifying future testing scenarios, the PMA-290 ESOH team ensures more realistic assumptions are reflected in future TAP analyses, and the modeled marine mammal effects will be more precise.

Summary of Accomplishments

- Successfully integrated ESOH risk management into all aspects of the acquisition process. Through collaboration with Boeing and NAVAIR stakeholders, accomplished reduction in total line items in the HMAUL by 35%, and decreased total items without NSNs by 67%. This improved the quality of the information in the database, as well as its usability.
- Identified potential supply-chain risks associated with the use of REEs throughout the platform, and establish a method of risk monitoring for the future.
- Refined the testing scenarios used in the Navy's TAP analyses to ensure all modeling assumptions are more accurate than previous analyses. This effort will help to ensure a more precise TAP process for future modeling assessments of P-8A testing and training activities.

By participating in all aspects of system design, testing and product support, the P-8A ESOH Team not only met all ESOH requirements, but used innovative approaches to improve processes that further decrease ESOH risks and TOC for the P-8A program.