Engineering and Technical Services for Joint Group on Pollution Prevention (JG-PP) Pilot Projects

Field Evaluation Report VI:

Inspection of Harpoon Missile Canisters for Validation of Alternatives to Chromate-Containing Primer Coatings for Aircraft Exterior Mold Line Skins

November 25, 1998

Contract No. DAAA21-93-C-0046
Task No. N.072
CDRL No. B001

Prepared by
National Defense Center for Environmental Excellence (NDCEE)

Operated by Concurrent Technologies Corporation

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1. INTRODUCTION

The Joint Logistics Commanders (JLC) chartered the Joint Group on Acquisition Pollution Prevention (JG-APP) to coordinate joint service activities affecting pollution prevention issues identified during a weapon system's acquisition process. JG-APP has become the Joint Group on Pollution Prevention (JG-PP) to accommodate an expanded focus to address sustainment needs.

The Joint Logistics Commanders (JLC) and Headquarters National Aeronautics and Space Administration (NASA) co-chartered JG-PP to coordinate joint service/agency activities affecting pollution prevention issues identified during system and component acquisition and sustainment processes. The primary objectives of the JG-PP are to:

- Reduce or eliminate the use of hazardous materials (HazMats) at manufacturing, remanufacturing, and sustainment locations
- Avoid duplication of efforts in actions required to reduce or eliminate HazMats through joint service cooperation and technology sharing.

JG-PP projects typically involve an original equipment manufacturer (OEM) producing multiple defense systems for more than one of the Services, as well as at least one depot servicing one or more of the defense systems. JG-PP technical representatives for each project begin by selecting a target HazMat that is used in the production or sustainment processes and may cause environmental and/or worker health concerns. Project participants then identify alternative technologies for evaluation.

At the Boeing Company Aircraft & Missiles pilot site located in St. Louis, Missouri (formerly McDonnell Douglas Aerospace), chromium in primer coatings was identified as the target HazMat to be eliminated or reduced. The chromate primers are applied to aircraft exterior mold line skins by wet-spray coating. The main substrate is aluminum alloy that has been anodized or chromate conversion coated, but other substrates such as steel, carbon epoxy, and titanium are also present on aircraft exterior surfaces and will be coated by these primers.

The project technical representatives reached consensus on the critical technical and performance requirements that an alternative must satisfy to be qualified for use in the identified application. These requirements were documented in the *Joint Test Protocol (MD-P-1-1) for Validation of Alternatives to Chromate-Containing Primer Coatings for Aircraft Exterior Mold Line Skins*, dated December 23, 1997. The *Potential Alternatives Report (MD-A-1-1) for Alternatives to Chromate-Containing Primer Coatings for Aircraft Exterior Mold Line Skins*, dated May 1, 1998, provides a list of alternatives recommended for testing.

The testing was executed in three phases: two phases of laboratory testing and one of field evaluation. The *Joint Test Report (MD-R-1-1) for Laboratory Validation (Testing) of Alternatives to Chromate-Containing Primer Coatings for Aircraft Exterior Mold Line Skins*, dated February 24, 1998, documents the laboratory testing accomplished on the potential alternatives. The results of the laboratory testing were analyzed to select a limited number of nonchromate primers to be applied to operating aircraft to allow further evaluation of the nonchromate primers. After examining the test panels and analyzing the test results, the project participants selected Dexter Aerospace Materials/Crown Metro Aerospace 10PW22-2/ECW-119 and Spraylat Corporation EWAE118A/B for field evaluations on operating aircraft.

This field evaluation report documents the first inspection of Harpoon Missile canisters being used for the operational testing. The results of all field evaluations will be consolidated and reported in a subsequent JTR, *Joint Test Report (MD-R-1-2) for Field Evaluation and Validation of Alternatives to Chromate-Containing Primer Coatings for Aircraft Exterior Mold Line Skins* (in preparation).

2. BACKGROUND ON OPERATIONAL TESTING

As part of the JG-APP and Boeing effort to identify suitable nonchromate primers for application to aircraft exterior mold line skins, nonchromate primer has been applied to portions of operating aircraft and missile canisters by wet-spray techniques.

The text and sketches in Section 3 document the first inspection of the chromate and nonchromate primer systems on the Harpoon missile canisters. These canisters, # 095127 (nonchromate primer) and # 075026 (chromate primer), were deployed aboard the USS Nicholson in early June 1998. The Nicholson is currently assigned to the USS Enterprise Battle Group.

Both missile canisters were painted at the Naval Weapon Station, Yorktown, Virginia. Number 095127 canister was painted on December 4, 1997 with Dexter/Crown Metro Aerospace 10PW22-2 / ECW-119 nonchromate primer. Canister # 075026 was primed with MIL-P-23377 chromate primer and painted in February 1998. Both canisters were chromate conversion coated prior to priming and were topcoated with MIL-C-85582 polyurethane topcoat.

Larry Triplett, Boeing, Aircraft & Missile Systems, performed the inspection on November 5, 1998.

3. INSPECTION RESULTS

There was no apparent repainting or touch-up performed on either canister since they were painted. Each canister is mounted in a quad launcher, one on each side of the ship. Quad launchers support the canisters with the forward end up at an approximately 45-degree angle to the deck. The canister with nonchromate primer, # 095127, is mounted on the starboard launcher in the upper right position, when looking to the starboard side. The canister with chromate primer, # 075026, is mounted on the port side, in the lower left position looking to the port side of the ship. While the canisters are mounted on opposite sides of the ship they should be subjected to the same overall exposure with the exception of more sunlight on the canister with nonchromate primer.

3.1. Inspection Results for Canister # 095127 (Nonchromate Primer)

There were no paint defects noted on this canister. However, the presence of salt residue on the under side, shown in Figure 1, may be a precursor to corrosion and will be need to be examined closely after the six-month cruise is completed. There were also marks, apparently caused by storage cradles, present on this unit and several other canisters. These marks are approximately ten inches wide and extend around the lower one-third of the canister at the locations shown in Figure 1. The white residue may contain salts that could result in corrosion sites.

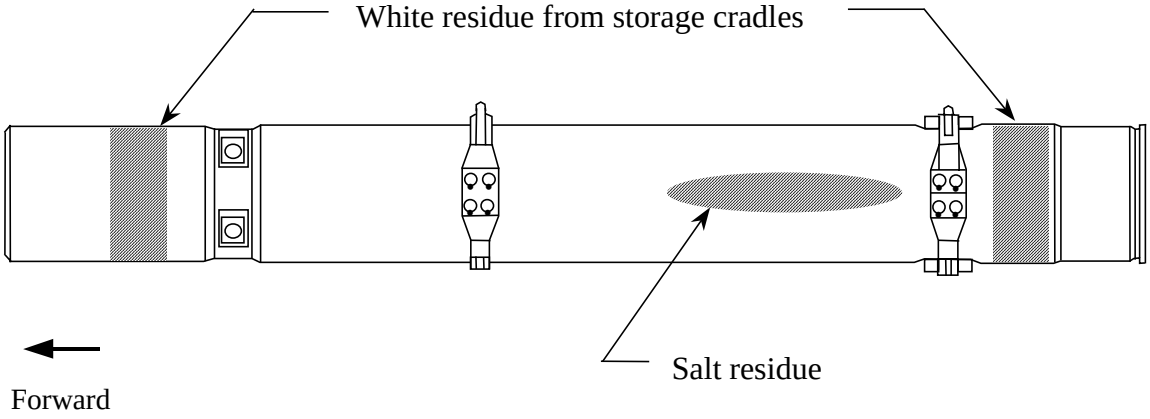

Figure 1. Canister # 095127 Looking Up

3.2. Inspection Results for Canister # 075026 (Chromate Primer)

There were no paint defects noted on this canister. As with the nonchromate test canister, there was salt residue on the under side, location shown in Figure 2. There was slightly less residue on this unit, and the residue was located approximately two feet forward of the location on the nonchromate primer test unit. Marks from the storage cradles were also present on this canister and others on the launcher.

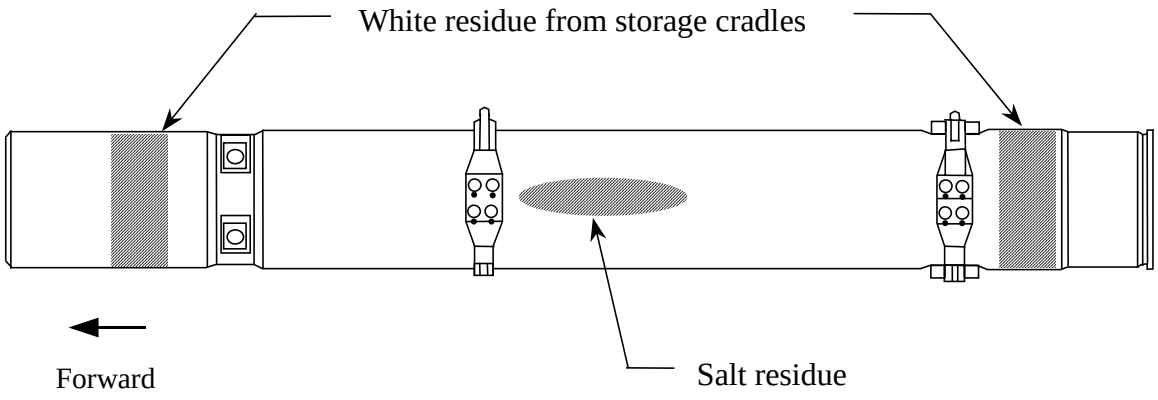

Figure 2. Canister # 095127 Looking Up

4. SUMMARY

Both canisters exhibited similar conditions of salt residue and storage marks but no peeling paint or corrosion defects were noted. The canisters will be inspected in approximately May 1999, after completion of the six-month deployment.