

Alternative non-Methylene Chloride Paint Strippers



PROJECT ID:
642



Aviation Machinist's Mate applies paint remover to the welds of a jet engine bracket. Prohibitions on the use of methylene chloride will impact maintenance processes across the Navy creating a critical need to identify a suitable replacement.

(U.S. Navy Photo by Mass Communication Specialist Seaman Christopher Frost).

OBJECTIVE

The project seeks to determine the performance metrics of non-methylene chloride chemical paint removers (meeting TTR2918 Type I and MIL-PRF-32587 Type I standards) against the established methylene chloride baseline. This evaluation will measure the removers' effectiveness across the full range of Naval Aviation Enterprise (NAE) organic coating stack-ups used in relevant service environments. Testing will account for performance variability under diverse conditions, including standard temperatures, simulated aging effects (such as heat cycling and UV exposure), and divergent coating chemistries (specifically comparing hexavalent chromium and non-chromium coating systems).

PROBLEM STATEMENT

The EPA's prohibitions on the manufacturing of methylene chloride (effective May 2025) and its commercial use (effective April 2026) necessitate the identification of an alternative

for paint removers. Current research by Naval Fleet Readiness Centers (FRCs) has not yet yielded a universal Commercial Off-the-Shelf (COTS) replacement that provides comparable effectiveness and Turn Around Time (TAT) for removing organic coatings.

DESCRIPTION

The necessity for safe alternatives to methylene chloride stems from the requirement to periodically remove aircraft organic coating systems—composed of epoxy primer (for corrosion protection) and a polyurethane topcoat (for UV resistance)—during inspection and repair activities. While the NAVAIR 01-1A-509 manual currently specifies chemical removal using methylene chloride (MIL-R-81294 Type I), its impending prohibition requires qualifying, safer TTR-2918 Type I and non-Hazardous Air Pollutant MIL-PRF-32587 Type I alternatives for Fleet use.

The first year of this effort will focus on controlled laboratory testing to compare these alternative products against the methylene



chloride baseline, evaluating performance on various primed and top-coated test panels that incorporate three different substrate surface treatments. Crucially, the testing will include panels whose coatings have been artificially aged via UV, cold, and hot temperature cycling to accurately simulate in-service conditions.

The second year of this project will transition successful candidates to real-world environments, first through monitoring the stripping rates of Beyond Economical Repair (BER) components at FRC Southeast (FRCSE), and then through field demonstrations at the cooler and dryer-climate at Naval Air Station (NAS) Fallon and NAS Oceana sites. The project will conclude with a final test report detailing the results, identifying the most efficient application procedures, and providing clear recommendations for product selection and revisions to the NAVAIR 01-1A-509 technical manual.

RETURN ON INVESTMENT

The ROI for this effort is realized through risk avoidance and sustained operational readiness. By identifying effective non-methylene chloride substitutes, the Navy avoids the severe increase in TAT—saving potentially thousands of dollars in potential maintenance labor costs, minimizing hazardous waste generation, and immediately improving personnel health and safety—ensuring aircraft remain operational and compliant with federal mandates.

NAVY BENEFITS

This effort benefits the Navy by ensuring operational readiness and cost mitigation ahead of the EPA's prohibition on methylene chloride by April 2026. By identifying the most effective substitute, the project avoids increased Turnaround Time (TAT) and maintenance costs, while proactively enhancing personnel safety and ensuring mandatory compliance across all maintenance sites using the 01-1A-509 manual.

This effort moves beyond simple replacement to safeguard both Fleet readiness and financial efficiency under a non-negotiable regulatory deadline.

TRANSITION DESCRIPTION

The NAVAIR 01-1A-509 manual will be updated to include the most effective products and procedures for cold-temperature, brush-applied chemical stripping. The changes that will occur to the 01-1A-509 technical manual shall also occur in the FRC Local Process Specification (LPS) and Local Engineering Specification (LES) documents for chemical paint stripper via brush application.

CONTACT

For more specific information about this project, contact the Principal Investigator at juliana.r.hancock.civ@us.navy.mil



ABOUT THE NESDI PROGRAM

The Navy Environmental Sustainability Development to Integration (NESDI) program is the Navy's environmental research and development demonstration and validation program, sponsored by Office of the Chief of Naval Operations (OPNAV) Compliance and Mission Readiness Division (N411) and managed by the Naval Facilities Engineering Systems Command (NAVFAC) from the Engineering and Expeditionary Warfare Center (EXWC) in Port Hueneme, CA.

The mission of the NESDI program is to support Fleet readiness by minimizing operational constraints associated with environmental and human health risks and to reduce cost of environmental compliance by demonstrating, validating, and integrating innovative technologies, processes, materials, and by filling knowledge gaps.

For more information, visit the program's web site at www.navfac.navy.mil/nesdi or contact the NESDI Program Managers at NESDI@us.navy.mil