

Progress Toward and Status of Certification Efforts Related to Replacing Aqueous Film-Forming Foam with Fluorine-Free Firefighting Agent



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for Acquisition and Sustainment

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I. INTRODUCTION

The explanatory statement accompanying the James M. Inhofe National Defense Authorization Act for Fiscal Year 2023 (Public Law 117-263), page 46, requests that the Under Secretary of Defense for Acquisition and Sustainment submit to the congressional defense committees a report on the progress made towards, and the status of any certification efforts relating to the replacement of fluorinated aqueous film-forming foam (AFFF) with a fluorine-free firefighting agent (F3), as required under section 322 of the National Defense Authorization Act (NDAA) for Fiscal Year(FY) 2020 (Public Law 116-92). This report includes: (1) Researching Fluorine-free Fire-fighting Foam (F3) Agents; (2) Establishing an F3 Military Specification; and (3) Qualifying F3 Products for DoD Procurement and Use.

Per- and polyfluoroalkyl substances (PFAS) are found in everyday consumer items, from nonstick cookware to water-resistant clothing, and in a type of firefighting foam known as AFFF. The Department of Defense (DoD) is one of many users of AFFF, with other major users including civilian airports, the oil and gas industry, and municipal fire departments. DoD is working to eliminate the use of AFFF for firefighting operations at military installations. That work includes research and testing to identify viable, commercially available replacement foams that do not contain PFAS, drafting standards to assess the performance of those replacement agents, and completing testing and examinations on those agents in order to qualify and list those agents on a new Qualified Products List (QPL) for procurement and use at military installations for land-based applications.

II. RESEARCHING FLUORINE-FREE FIRE-FIGHTING FOAM (F3) AGENTS

The NDAA for FY 2020, section 322, “Replacement of Fluorinated Aqueous Film-Forming Foam with Fluorine-Free Fire-Fighting Agent”, established the requirement to develop and publish a new military specification for F3s for land-based applications at all military installations no later than January 31, 2023, and to have such agent available for use no later than October 1, 2023.

The first step in this process was to establish the criteria for chemical and physical properties and firefighting performance of F3 agents that could be used to establish a new military specification (MILSPEC), and further to support qualification of F3 products for use in DoD shore-based applications. Research, testing and investigation of commercially available F3s was needed to determine existing characteristics and capabilities of these products, and identify performance parameters that would help in defining and establishing a new military specification for F3 alternatives.

DoD funds multiple research, demonstration, and validation projects via the Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP). SERDP and ESTCP are independent programs that are jointly managed on behalf of the Office of the Assistant Secretary of Defense (Energy, Installations and Environment). SERDP and ESTCP conducted multiple studies related to F3 products over a period of four years (2019-2022). Teams of principal investigators from across

government, industry, and academia completed projects on a broad range of F3-related topics. Projects investigated chemical compositions, fire suppression performance, product stability over time and in extreme environments, and compatibility with existing firefighting systems to allow direct replacement and insertion in place of AFFF. Additional project research included initial screening for any serious or high risk impacts of F3 products to human health and the environment. This research collectively established the boundary conditions for F3 product consideration in terms of performance, stability, and compatibility with existing firefighting systems, in formulations that are less hazardous to human health and the environment.

To complete the necessary investigation of commercially available F3 characteristics and capabilities, DoD research and demonstration was initiated in the form of two projects under the DoD's ESTCP.

The first ESTCP project (WP19-5324) began with a literature review of leading, commercially available F3 foams and agents with approximately 25 products ultimately identified and subsequently evaluated by the Naval Research Laboratory (NRL) using small-scale, live fire testing. The screening tests indicated that while no F3 product performed as well as AFFF in extinguishing fire, an initial five commercially available F3s had superior fire extinguishing capabilities as compared to the other tested F3 products.

Using the results of WP19-5324, the second ESTCP project (WP20-5373) collected a comprehensive firefighting performance and chemical/physical properties data set for the selected commercially available F3 products. NRL then conducted a detailed analysis of the collected data to help define certain parameters that could be used for the new performance-based military specification for F3 agents for use in DoD land-based military applications. Based on this analysis, draft F3 Military Specification (MILSPEC) input was prepared for the Naval Sea Systems Command (NAVSEA) in support of the comprehensive specification development and review process.

III. ESTABLISHING AN F3 MILITARY SPECIFICATION (MILSPEC)

The development of MIL-PRF-32725 was led by the Department of the Navy and involved major stakeholders from across the DoD. NAVSEA was selected to lead development of the specification because of the Command's long history with development and maintenance of the AFFF specification (MIL-PRF-24385) and understanding of firefighting requirements and defining performance criteria. NAVSEA also has a robust Command Standards directorate capable of guiding specification development following the Defense Standardization Program Office (DSPO) policy and procedures. In addition to the Department of the Navy, experts from the DoD fire and emergency services, facility fire protection engineering, and the Defense Health Agency, all contributed to the specification.

Building upon the data derived from the aforementioned research and demonstration projects, NAVSEA finalized development of the performance-based specification MIL-PRF-32725 "FIRE EXTINGUISHING AGENT, FLUORINE-FREE FOAM (F3) LIQUID CONCENTRATE, FOR LAND-BASED, FRESH WATER APPLICATIONS."

A series of administrative and technical reviews, culminating with a broad technical review by government and industry alike, was completed in July 2022 when the draft specification was made available for public comment. In addition to other federal agencies, reviewers providing comments on the draft specification included a State government, representatives of the firefighting foam manufacturing industry, civil aviation stakeholders, research scientists from industry and academia, private consultants, and professional organizations from the firefighting community.

After 18 months of thorough coordination with key DoD stakeholders, and two technical reviews with other government and industry partners, the specification was published on January 6, 2023.

IV. QUALIFYING F3 PRODUCTS FOR DOD PROCUREMENT AND USE

Consistent with the law and policies governing qualification requirements in defense specifications, MIL-PRF-32725 includes a qualification requirement. Products qualification is completed in advance of, and independent of, a purchase (acquisition) through which a vendor's capabilities, products, and/or processes are examined, tested, and approved to be in conformance with specification requirements.

Since publication of the new F3 MILSPEC, manufacturers have submitted applications to qualify their products to the specification following the DSPO guidance and procedures governing qualification. As of June 30, 2023, NAVSEA had received seven applications for F3 product qualification. Five of the seven applications were approved by NAVSEA and the manufacturers were provided with authorization to begin qualification testing for their respective product. The other two applications remain under review. DoD expects additional manufacturers to submit products for qualification and will continue to review applications on a rolling-basis.

The qualification process is expected to take up to 120 days per product once the product is received for testing, and more than one F3 product may be qualified at a time.

F3 products that conform to all specification requirements, as determined by the Qualifying Activity (NAVSEA in the case of MIL-PRF-32725), will then be approved for inclusion on a Qualified Products List or Qualified Manufacturers List, which are part of the Qualified Products Database, hosted by the Defense Logistics Agency. At that time, the Military Services can begin purchasing MILSPEC F3 agents from that list.

V. CONCLUSION

DoD has funded research to identify fluorine-free firefighting products and agents, developed and published the required F3 MILSPEC before the Congressional deadline, and is coordinating with manufacturers as evaluation of their products continues through the qualification process. DoD expects to meet the requirement established by the FY2020 NDAA, to have F3 concentrate available for procurement and use by October 1, 2023.