

# Department of Defense Plan to Transition to a Fluorine-Free Firefighting Agent

Pursuant to Section 322(a) of the National Defense  
Authorization Act for Fiscal Year 2020 (Public Law  
116-92)



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Office of the Under Secretary of Defense  
for Acquisition and Sustainment

The estimated cost of this report or study for the Department of Defense is approximately \$17,000 in Fiscal Years 2023 - 2024. This includes \$14,000 in expenses and \$2,700 in DoD labor.

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## **I. INTRODUCTION**

Section 322(a) of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2020 (Public Law 116-92) requires that the Secretary of Defense submit to the congressional defense committees a report containing a detailed plan for implementing the transition to a fluorine-free firefighting agent by not later than October 1, 2023. This report contains the following information:

- A detailed description of the progress of the Department of Defense to identify a fluorine-free firefighting agent for use as a replacement firefighting agent at military installations;
- A description of technology and equipment required to implement the replacement firefighting agent;
- Funding requirements, by fiscal year, to implement the replacement firefighting agent, including funding for the procurement of a replacement firefighting agent, required equipment, and infrastructure improvements; and
- A detailed timeline of remaining required actions to implement such replacement.

## **II. PROGRESS TO IDENTIFY FLUORINE-FREE FIRE-FIGHTING AGENTS**

Section 322 of the NDAA for FY 2020, “Replacement of Fluorinated Aqueous Film-Forming Foam with Fluorine-Free Fire-Fighting Agent”, established the requirement to develop and publish a new military specification (MILSPEC) for a fluorine-free firefighting (F3) agent no later than January 31, 2023, and to have such agent available for use at military installations no later than October 1, 2023.

The Department of Defense (DoD) funded multiple research, demonstration, and validation projects to investigate emerging and commercially available F3 agents as alternatives to Aqueous Film-Forming Foam (AFFF) via the Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP), since 2017. Principal investigators from government, industry, and academia completed projects on a broad range of F3-related topics including potential impacts to human health and the environment and the firefighting capabilities of current and emerging F3 products.

DoD research and demonstration resulted in a comprehensive firefighting performance and chemical/physical properties data set for commercially available F3 products, leading to the development of a performance based MILSPEC for F3 liquid concentrate for land-based, fresh water applications. Creation of the MILSPEC was led by the Department of the Navy and involved major stakeholders from across the DoD, in addition to a broad technical review by other federal agencies, 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. The resultant performance based MILSPEC (MIL-PRF) -32725 “FIRE EXTINGUISHING

AGENT, FLUORINE-FREE FOAM (F3) LIQUID CONCENTRATE, FOR LAND-BASED, FRESH WATER APPLICATIONS” was published on January 6, 2023.

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

The Department is now assessing commercially available products, as submitted by manufacturers, for qualification. Since publication of the new F3 MILSPEC, manufacturers have submitted applications to qualify their products to the specification following the Defense Standardization Program Office guidance and procedures governing qualification. F3 products that conform to all specification requirements, are then approved for inclusion on a Qualified Products List (QPL) or Qualified Manufacturers List, which are part of the Qualified Products Database, hosted by the Defense Logistics Agency. Military Departments purchase MILSPEC F3 agents from that list.

Additionally, other agencies, airports, and industry have indicated that they will also be transitioning from AFFF to a MILSPEC-qualified F3 agent. This expected surge in demand, coupled with a limited number of qualified products and production capacity limits, adds a level of unpredictability for product availability that may affect the Department’s transition schedule.

In summary, DoD has funded research to identify F3 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. In September 2023, the first F3 product was qualified and approved for inclusion on the QPL, meeting the mandate established by the FY 2020 NDAA to have F3 concentrate available for procurement and use by October 1, 2023.

### **III. TECHNOLOGY AND EQUIPMENT REQUIRED TO IMPLEMENT THE REPLACEMENT FIRE-FIGHTING AGENT**

DoD’s AFFF transition planning accounts for removing AFFF from over 6,800 mobile assets worldwide, including both tactical and non-tactical assets such as firefighting vehicles and other equipment such as flight line carts, and firefighting backpacks. Approximately 1,500 facilities will also transition from AFFF fire suppression system to a fluorine-free alternative, with Services electing to convert many facilities to “water-only” sprinkler systems or install Ignitable Liquid Drainage Floor Assemblies (ILDFA) instead of using F3 agents.

The F3 MILSPEC was developed to provide as close to a direct replacement for AFFF as possible, to be used in existing systems, in order to reduce cost and time to transition. The specification was developed with a priority focus on mobile firefighting capabilities (e.g. Aircraft Rescue and Fire Fighting).

While the F3 products are anticipated to be implemented as designed for most mobile assets and fixed facility systems, certain systems and assets that had been using AFFF have configurations that are not compatible with the F3 agents. Most of these assets are field deployed tactical systems and either have pre-mixed firefighting foam systems (incompatible with the more biodegradable F3 products that cannot be pre-mixed with water) or are land-based assets with systems that utilize sea water (the current F3 MILSPEC does not include a requirement for compatibility with sea water based on limitations of most commercially available F3s). While the Department is working to identify alternatives for these systems including potential system alterations or identifying compatible fluorine-free firefighting alternatives, DoD anticipates that completing the transition of these systems within the required timeframe will be a challenge.

#### **IV. FUNDING REQUIREMENTS TO IMPLEMENT F3 AGENTS**

There are substantial funding requirements for the transition from AFFF to an F3 product, including the procurement of the replacement product, the limited available options for disposal of AFFF, necessary modifications of systems, any identified maintenance or repairs needed for a system to accept the new F3 product, and disposal of AFFF and related rinse water. While the Military Departments have been developing transition plans to account for and capture these considerations to transition from AFFF to a fluorine-free alternative, total cost estimates are still in development. Generous Congressional support dedicated to the transition from AFFF has allowed for the Department to award contracts to initiate the transition; however, DoD assesses that to accomplish the Congressionally required AFFF replacement, additional funding will be needed by the Military Departments as depicted in the following Table.

Table 1: AFFF Replacement - Estimated Funding Requirements by Military Department<sup>1</sup>

	<b>FY 2024</b>	<b>FY 2025 and beyond</b>
<b>Department of the Army</b>	\$102,043,000	\$355,370,000
<b>Department of the Navy<sup>2</sup></b>	\$147,900,000	\$964,800,000
<b>Department of the Air Force</b>	\$41,000,000	\$546,100,000

1. Data as of December 2023

2. Department of the Navy includes costs for both Navy and Marine Corps

These estimates are based on current information and assumptions as of December 2023, and will change as additional information is collected throughout the transition. These estimates include costs associated with:

- The removal and disposal of AFFF for facilities, non-tactical mobile assets, and some tactical mobile assets,
- The procurement and installation of the new F3 product for facilities, non-tactical mobile assets, and some tactical mobile assets,
- Necessary facility modifications or repairs to convert the existing fire suppression system to a system that utilizes F3 products or another alternative such as water only or ILDFA.

As the Department transitions from AFFF to the new F3 products, there are additional costs that are still being assessed and may further increase funding requirements. These include costs to establish adequate training facilities for firefighters to perform live-firefighting training with the new F3 products, for the research and development of additional fluorine-free firefighting products for tactical assets whose systems are currently incompatible with the F3 products, and for necessary equipment modifications for both fixed and mobile assets. The Department will update funding requirements as program needs and associated costs are better understood.

## **V. REMAINING ACTIONS TO IMPLEMENT F3 AGENTS**

As DoD continues efforts to procure and transition to the new F3 agents, additional considerations and actions are needed to ensure the removal of AFFF and the implementation of the new F3 agents has minimal impact to mission operations, and the Department can ensure continued protectiveness of life and property during the transition.

Extension Requests for Continued AFFF Use: The NDAA for FY 2020 section 322(c), requires DoD to cease use of AFFF no later than October 1, 2024, unless the Secretary of Defense submits a one-year waiver. This waiver may be requested for two one-year periods. Given the large number of facilities and equipment that DoD must transition from AFFF, and the current estimate that each system will require multiple days to complete the change-out, DoD anticipates the need to submit the two allowable one-year waiver requests, extending DoD AFFF use to October 1, 2026. This anticipated need is based on sustaining the operational availability of sufficient firefighting systems to ensure the protection of life at DoD installations and during military operations, while executing the transition from AFFF-based firefighting systems to fluorine-free alternatives.

AFFF Disposal: The Department anticipates disposal requirements for AFFF concentrate and AFFF-impacted rinsate (water used to flush AFFF from systems) to exceed 3.5 million gallons. DoD issued *ASD EI&E Memorandum: Interim Guidance on Destruction or Disposal of Materials Containing Per- and Polyfluoroalkyl Substances in the United States dated July 11, 2023*. This guidance document identifies various disposal technologies, including landfilling, incineration, and deep well injection, consistent with the Environmental Protection Agency's "Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances and Materials Containing Perfluoroalkyl and Polyfluoroalkyl Substances," dated December 18, 2020. However, the Department remains under a moratorium concerning use of incineration and anticipates increasing limitations on disposal options.

Firefighting Training: Firefighting techniques for the application of MILSPEC F3 products differ from those used when applying AFFF. These changes in firefighting technique requires DoD firefighters to develop the appropriate proficiencies in tactic and techniques for F3 application in live-firefighting training, not possible through water/propane or virtual reality scenarios. This need arose from the F3 fire suppression dynamics which rely on a more precise product application for effective firefighting than was necessary for AFFF. DoD is currently assessing the costs, benefits, timeline, and resource requirements to meet firefighting training

requirements for the new F3 agents, including refurbishing legacy firefighting training facilities, or building new facilities.

Additional Research: The Department continues to support and fund projects through SERDP-ESTCP for per- and polyfluoroalkyl substances (PFAS) treatment and destruction technologies. These research and development projects are in progress and several show effectiveness at laboratory and field scale. As they mature in results and achieve commercial scale, DoD will continue to review them as possible solutions. Additionally, SERDP-ESTCP projects are also researching products to make the F3 formulations perform more effectively in fighting fires. DoD will continue efforts with industry to pursue capability advancements for future MILSPEC F3s. Finally, as previously discussed, DoD is working to identify alternatives for assets and equipment that currently use AFFF and are not compatible with the new F3 formulations.

## **VI. CONCLUSION**

DoD has deliberately planned and is executing actions to meet the congressional requirement to cease use of AFFF pursuant to section 322 of the NDAA for FY 2020. DoD anticipates the need to submit the two allowable one-year waiver requests, extending some DoD AFFF use to October 1, 2026. A new F3 MILSPEC has been published as of January 6, 2023. Vendors have submitted F3 products for consideration and DoD is assessing them for conformance to the specification, qualification, and listing on the QPL-32725, with the first qualified product added to the QPL as of September 2023. DoD Components have identified contracts and are prepared to begin transitioning to F3s or other fluorine-free alternative firefighting solutions, although the Department's transition timeline may be affected by several factors such as funding, product availability, and disposal limitations. DoD will continue to monitor and assess potential impacts of these factors as the transition progresses.