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Ser CHE/046.1
26 July 2023

From: Commander, Naval Facilities Engineering Systems Command

Subj: INTERIM TECHNICAL GUIDANCE FISCAL YEAR 2023-02.1 – Navy and Marine Corps Facilities with Aqueous Film Forming Foam (AFFF) Fire Suppression Systems

Ref: (a) National Defense Authorization Act for Fiscal Year 2020 (NDAA FY20)
(b) MIL-PRF-32725, *Fire Extinguishing Agent, Fluorine-Free Foam (F3) Liquid Concentrate, For Land-Based, Fresh Water Applications*, 6 JAN 23
(c) UFC 3-601-02, *Fire Protection Systems Inspection, Testing, and Maintenance*, 7 OCT 2021
(d) DoD Memorandum, *Response and Reporting of Aqueous Film Forming Foam Usage, and Accidental Releases/Spills on Military Installations and National Guard Facilities*, 7 APR 2022
(e) UFC 4-211-01, *Aircraft Maintenance Hangars*, Change Three, 3 APR 2021
(f) UFC 3-460-01, *Design: Petroleum Fuel Facilities*, Change One, 12 JAN 2022
(g) UFC 3-600-01, *Fire Protection Engineering for Facilities*, Change Six, 6 MAY 2021
(h) NFPA 409, *Standard on Aircraft Hangars*, 2022 Edition

1. Purpose. This Interim Technical Guidance (ITG) provides an update on the use of Aqueous Film Forming Foam (AFFF) at Navy and Marine Corps shore facilities and guidance on strategies to remove and remediate these systems.

2. Cancellation. This ITG cancels and supersedes ITG FY22-01, Navy and Marine Corps Facilities with Aqueous Film Forming Foam Fire Suppression Systems, dated 5 MAY 2022.

3. Background.

a. Reference (a) prohibits the purchase of fluorinated AFFF concentrate that contain in excess of one part per billion of per- and polyfluoroalkyl (PFAS) after 1 OCT 2023 and prohibits its use after 1 OCT 2024. Extensions to use fluorinated AFFF into 2025 and 2026 may be requested by the Secretary of Defense, but have not yet been approved.

b. Reference (b) is the new performance specification for Fluorine Free Foam (F3) for use at shore facilities, published on 6 JAN 2023. Compliant products are anticipated to be commercially available approximately the end of FY23.

4. Discussion.

a. Proper fire protection for Department of Navy aircraft hangars housing fueled aircraft consists of floor drainage, low-level foam system with an overhead water sprinkler system or the

installation of Ignitable Liquid Drainage Floor Assembly (ILDFA) and an overhead water sprinkler system.

b. The use of "water-only systems" is only permitted in hangars when aircraft are either defueled, or when coupled with ILDFA as described herein. The use of ILDFA is an acceptable industry standard protection method and must be maintained in proper working order to protect the hangars and aircraft being maintained or stored.

c. Guidance for the use of F3 are still being developed and will be reflected in future revisions to this ITG and affected criteria. Project managers for any project seeking to use F3 must engage with the cognizant echelon NAVFAC Chief Fire Protection Engineer for additional guidance during planning, design, or if modifying existing construction contracts. For the purpose of this guidance, F3 is assumed to be a drop in replacement for AFFF with no other modifications to the existing system.

d. Continue compliance with reference (d) for any use or accidental release from AFFF systems.

5. Applicability. This ITG is effective until 1 OCT 2024 or superseded by additional guidance, and applies to all existing and new (i.e. in planning, design or construction) Navy and Marine Corps facilities that house fueled aircraft, fuel distribution systems, and other facilities that utilize a foam fire protection system.

6. Action. The strategies described below are presented as options for providing a protected facility housing aircraft or fuel distribution systems, however the requirements described within each option are mandatory.

a. Aircraft Hangars For existing AFFF systems or projects in planning, design, or construction with foam systems (inclusive of renovation and repair), comply with the following:

(1) Existing Facilities must comply with one of the following options:

(a) Option 1. Retain current AFFF systems, provided the system is maintained in proper working order with regular inspections, testing, and maintenance procedures in accordance with reference (c) and coordinate with CNIC/NAVFAC on replacement of AFFF with F3 prior to 1 OCT 2024 as an interim solution.

(b) Option 2a. When AFFF systems are not currently functional, or when electing to turn off the AFFF systems, comply with the following:

i. If applicable, turn off the system by closing and locking/tagging out the control valves on the concentrate piping and on the water supply to the low-level AFFF system. Acknowledge that once the AFFF system has been turned off, restoring the system may incur significant delays. There are costs, workforce capacity, and risks involved in this effort to deactivate, drain and flush, and then later reactivate the systems.

ii. Coordinate with the Installation Environmental Program Director or equivalent and Public Works Officer to develop courses of action/plan for spill prevention during defueling and reuse/disposal of fuel. Any costs incurred for these actions will be paid for by the users of the facility.

iii. Defuel all aircraft prior to bringing into the hangar for maintenance or storage. Per reference (h), defueled is defined as an aircraft that has never been fueled or whose fuel system has had flammable or combustible liquid removed to meet one of the following criteria: (1) Individual tanks/cells contain less than 1 percent of their volumetric capacity; (2) Aircraft is drained to remove fuel to the greatest extent possible utilizing sump drains and other accessible non-maintenance means.

iv. Update written maintenance protocols and provide to the Public Works Officer and CNIC/USMC Aircraft Rescue, Fire and Emergency Services.

v. Signs are posted around the hangar bay stating "This Hangar Does Not Have a Foam Fire Suppression System. All Aircraft Must be Defueled." Signage and their locations need to be approved in advance by the base Safety Department and meet the requirements of reference (c), figure 1-1.

vi. All building personnel must be instructed annually that fueled aircraft cannot be in the hangar because a foam system is not installed or active in the hangar. This can accomplished as part of a safety brief.

(c) Option 2b. When AFFF systems are not currently functional, or when electing to turn off the AFFF systems, comply with the following:

i. Install ILDFA in accordance with reference (h) and the technical criteria described in Section 7.a.

ii. Update written maintenance protocols and provide to the Public Works Officer and CNIC/USMC Aircraft Rescue, Fire and Emergency Services.

(2) New Hangars – In Planning. AFFF is no longer a viable option and cannot be included for facilities planned for program year FY24 and beyond.

(a) Option 1. Follow requirements of paragraph 6.a.(1).(a) for replacement of AFFF with F3 as interim solution and begin coordination for the installation of ILDFA.

(b) Option 2. Follow requirements of paragraph 6.a.(1).(c) for ILDFA.

(3) New Hangars – In Design. Design Bid Build (DBB) projects designed beyond 35% and post solicitation Design Build (DB) must follow the guidance of paragraph 6.a.(4). Design-bid-build projects which have not yet reached 35% design, and design build projects that have not been solicited, must comply with one of the following:

(a) Option 1. Follow requirements of paragraph 6.a.(1).(a) for replacement of AFFF with F3 as interim solution and begin coordination for the installation of ILDFA.

(b) Option 2. Follow requirements of paragraph 6.a.(1).(c) for ILDFA.

(4) New Hangars – In Construction.

(a) Option 1. For projects that are part of an active construction contract with AFFF included in the scope, finish installation of the AFFF system in preparation for an F3 replacement as an interim solution.

i. Modify the contract to remove the delivery and acceptance of AFFF concentrate.

ii. Ensure AFFF proportioner valves are turned off when accepting system.

iii. At Beneficial Occupancy Date (BOD), the facility becomes an existing facility with a non-functioning system. The preceding guidance for existing non-functional systems must be followed.

(b) Option 2. For projects that are part of an active construction contract with AFFF included in the scope, modify contract to remove AFFF system completely and follow requirements of paragraph 6.a.(1).(c) for ILDFA.

b. Petroleum Fuel Facilities. For existing AFFF systems and projects in planning, design, or construction with foam systems (inclusive of renovation and repair), comply with the following:

(1) Existing Facilities. Maintain the AFFF system and plan to convert to an F3 system that meets the requirements set forth in reference (b), or consult with the cognizant echelon NAVFAC Chief Fire Protection Engineering to determine course of action. Comply with reference (d) for any use or accidental release from the AFFF systems.

(2) New Petroleum Fuel Facilities – In Planning. Projects may begin planning for the use of F3; coordinate with cognizant echelon NAVFAC Chief Fire Protection Engineer for additional guidance.

(3) New Petroleum Fuel Facilities – In Design.

(a) Option 1a. Projects that have been designed beyond 35% in a design-bid-build execution and already included AFFF can be finished and solicited for award as is. At that point, they become “new petroleum fuel facilities – in construction” and must follow the guidance in paragraph 6.b.(4).

(b) Option 1b. For design-bid-build projects have not yet reached 35%, and design build projects that have not been solicited, coordinate with cognizant echelon NAVFAC Chief Fire Protection Engineer for additional guidance.

(4) New Petroleum Fuel Facilities – In Construction. For projects that are part of an active construction contract with AFFF included in the scope, modify contract for installation of the AFFF system to accommodate F3 replacement at a later date; coordinate with cognizant echelon NAVFAC Chief Fire Protection Engineer for additional guidance.

c. Flammable or Combustible Liquids Storage Facilities (FCLS Facilities). For existing AFFF systems or projects in planning, design, or construction with foam systems (inclusive of renovation and repair) comply with the following:

(1) Existing FCLS Facilities. Maintain the AFFF system and consult with the cognizant echelon NAVFAC Chief Fire Protection Engineer to determine course of action for installation of new system in compliance with reference (g). Comply with reference (d) for any use or accidental release from the AFFF systems.

(2) New FCLS Facilities – In Planning. Comply with reference (g).

(3) New FCLS Facilities – In Design. Comply with reference (g).

(4) New FCLS Facilities – In Construction. Continue as planned and designed, ensuring compliance with reference (g).

7. Technical Criteria.

a. ILDFA. Design and construct ILDFA in accordance with reference (h) and this Section:

(1) Provide ILDFA in the hangar bay to remove hazardous fuels. ILDFA may also be used to convey preconditioned air, compressed air, and water service lines to support other operational functions of the maintenance hangar.

(2) Provide ILDFA in the hangar bay to cover the aircraft silhouette and service area. For the purpose of the ILDFA coverage, the aircraft service area is defined by "Table 2-1: Minimum Aircraft Maintenance Bay Clearances" in UFC 4-211-01. The distance from the walls can exceed those "Table 2-1: Minimum Aircraft Maintenance Bay Clearances" in reference (e) by 5 feet if the ILDFA still covers a 16 ft to 18 ft radius drawn from the outer edge of any potential area containing fuel in the aircraft, such as fuel tanks and engines.

(3) Triple Infrared (IR) Optical Flame Detectors.

(a) Provide triple infrared (IR) optical flame detectors listed/approved for the expected fuel hazards in the hangar bay. Provide detectors that are immune to radar and radio frequency emissions from hand held equipment or equipment on-board the aircraft. Provide shielded circuiting for both the Signaling Line Circuit SLC and power circuit supplying the optical detectors.

(b) Flame detectors in hangars protected by ILDFA are not required to be tied to a releasing service fire alarm control unit (RSFACU). Flame detectors must be individually addressed and permitted to be tied to the building fire alarm system.

(c) Provide optical flame detectors around the perimeter of the hangar bay, such that all portions of the hangar bay are within the range and cone-of-vision of at least one detector. Exception: The area of the hangar bay within 5 ft. of the perimeter wall is not required to be within the cone-of-vision of an optical flame detector.

(d) Angle detectors and provide manufacture approved blinds (field of view inhibitors) so the cone-of-vision does not extend beyond the hangar doors, or is within the view of hot sources such as radiant heaters. Locate optical flame detectors at a sufficient distance per the manufacturer's recommendations from sources that may cause false alarms such as welding, solar glare, radiant heaters, aircraft engine exhaust, strobes, hot surfaces and other relevant sources

(4) ILDFA Discharge

(a) Waste Water Treatment Purveyor requires discharge to containment:

i. Do not reuse existing AFFF containment tank(s) if previous PFAS contaminated discharge has entered existing containment tank(s).

ii. Route ILDFA discharge to a containment tank. Containment tank must be sized to a minimum of 15,000 gallons or to accommodate a total of a flow rate of 200 gpm for 30 minutes plus the largest aircraft fuel cell in gallons, whichever is greater.

iii. Provide alarms at two levels: (1) A Low Level visual alarm at 20% (3,000 gallons for a 15,000 gallon containment tank). A High Level visual and non-silenceable audio alarm at 30% capacity (4,500 gallons for a 15,000 gallon containment tank). Alarms at these levels will provide more than adequate time for the Public Works Business Line to respond to the notifications to drain the containment tanks without risking overflow discharge from the containment tank.

iv. When containment is required, utilizing a below grade gravity fed containment tank is preferred over containment necessitating discharge routed to tanks via pump(s).

iv. ILDFA must continue to operate once containment tank is full. Arrange containment system to prevent ILDFA discharge from backing up into the hangar bay or hangar bay trenches once containment tank is full.

(b) Waste Water Treatment Purveyor does not require discharge to containment:

i. Direct ILDFA drainage outflow to an oil water separator (OWS).

ii. Outflow must be gravity fed to an OWS rated for a minimum of 400 gm. Provide OWS with a higher capacity when necessary.

(5) Installation of ILDFA. Floor installation must be performed by ILDFA manufacturer personnel or performed by local contractors, subcontracted by the ILDFA manufacturer and under direct supervision and quality control of the ILDFA manufacturer.

(6) Grounding Connection. The ILDFA grounding grid must be connected to the facility

grounding and bonding in accordance with UFC 3-575-01. The ILDFA grounding grid must not be connected to any portion of the facility lighting protection system above grade.

(7) Grounding Points. Grounding points shall be integrated in the ILDFA. These floor openings are designed to allow flow of spilled liquids around the grounding points. For retrofits, the ILDFA grounding grid will be connected to existing aircraft grounding points, ground rods or building ground.

(8) Galvanic Protection. Where a potential exists for aluminum ILDFA materials to be in contact with metals such as cast-iron trench grates, steel rebar or carbon steel angle non-conductive isolation materials need to be used to prevent galvanic corrosion. Provide epoxy coating on concrete surface where aluminum ILDFA is in contact with concrete.

(9) Protection of In-Trench Cable. All cables routed inside trenches must be routed in fireproof conduit. Solenoid valves must be housed in a separate sub-grade enclosure mounted adjacent to the trench.

(10) Pump Enclosures. Pump skid enclosure must consist of a bollard structure consisting of a 4in pipe frame and panels to fully enclose the pump and pump controller to reasonably protect it from potential tugs or forklift type vehicles.

(11) ILDFA Ramps and Transition Plates. Where ramps or transition plates are utilized; a matte finish metal must be specified to prevent glare. All ramp and transition plates must meet the same structural strength requirements as the ILDFA. Where ramps or transition plates are utilized; design and installation must include built in thermal expansion.

(12) ILDFA Control Panel. The HMI (Human Machine Interface) screen located on the ILDFA control panel must utilize a glare resistant screen.

(13) ILDFA Retrofit Design Phase.

(a) Design phase for retrofit projects must include survey of the slab utilizing ground penetrating radar to ensure no utilities will be impacted by trench cutting.

(b) For retrofit projects, concrete cutting, concrete removal, soil excavation and new trench placement is permitted to be carried out by local contractors. The ILDFA Manufacturer must be provided with a survey of actual trench depth, length, width and overall dimensions in order to prevent floor section rework during ILDFA installation.

(c) Specify applicable mortar for backfilling of trenches; do not specify quick setting cement.

b. Fluorine Free Foam (F3). Reserved.

8. Points of Contact.

a. For clarification or additional information related to fire protection systems, please contact the Fire Protection Engineering Technical Warrant Holder, Mr. John Chan, P.E., at (808) 472-1324 or john.c.chan.civ@us.navy.mil, or the Fire Protection Engineering Deputy Technical Warrant Holder, Mr. Doug Stultz, P.E., at (757) 322-4408 or douglas.p.stultz2.civ@us.navy.mil.

b. For clarification or additional information related to hangars, please contact the Aviation Facility Engineering Technical Warrant Holder, Mr. George Malamos, P.E., at (757) 322-4435 or george.c.malamos.civ@us.navy.mil.

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