DEPARTMENT OF THE AIR FORCE
WASHINGTON, DC

OFFICE OF THE ASSISTANT SECRETARY

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Change 2, 29-December-22

MEMORANDUM FOR DISTRIBUTION C
ALMAJCOM-FLDCOM-FOA-DRU/CC

FROM: SAF/IE
1665 Air Force Pentagon
Washington, DC 20330-1665

SUBJECT: Sundown Policy for Foam Fire Suppression Systems

The Assistant Secretary of the Air Force for Energy, Installations, and Environment led a joint effort across the Departments of the Air Force (DAF), Army, and Navy along with the Defense Logistics Agency to assess risks with respect to replacing fluorinated Aqueous Film Forming Foam (AFFF) fire suppression systems (FSS) in Department of Defense Facilities (DoD) facilities. After reviewing 32 years of historical data and 15 years of safety mishap data, the assessment team did not find a single instance where a hangar fuel related fire resulted in the loss of an aircraft or life. The only aircraft fuel related fire in the past 32 years in the DoD was suppressed by a water deluge system.

(CHANGE) In contrast, the historical data shows a trend of inadvertent activations of foam systems across the DoD of one in every two months (84 mishaps over past 15 years). The mishap cost associated with these events was in excess of 24.5 million dollars and contact with chemicals in the foam have caused one death, injured 21 people and damaged more than 120 aircraft. Considering the findings of this risk-informed analysis and the high cost of converting, maintaining, and clean-up of accidental discharges of foam systems, effective immediately, all DAF hangars and similar facilities equipped with a foam FSS will be categorized as Tier 2 Fire Protection Facilities **unless specifically approved for Tier 1 designation**. Tier 2 facilities will use an automatic water sprinkler system consistent with the attached guidance in lieu of foam FSS. **All foam systems (AFFF and High-Expansion Foam Systems [HEFS|) in Tier 2 facilities will be locked out and tagged out by 1 March 23, unless specifically exempted, in accordance with the updated Implementation Guidance.**

(CHANGE) The use of foam FSS is limited to facilities where the total loss of the facility, or the loss of the aircraft/assets serviced inside, would result in mission failure at the Department of Defense, Department of the Air Force, Combatant Command or Sub-Unified Command level. These facilities, which are of limited exception, will be categorized as Tier 1 Fire Protection Facilities. Categorization as a Tier 1 facility requires justification by Major Commands (MAJCOMs) or USSF-equivalent and approval by SAF/IE as outlined **in the**

Implementing Guidance. For approved Tier 1 facilities, bases shall replace the existing FSS with an Ignitable Liquid Drainage Floor Assembly (ILDFA). Low Expansion Foam Systems containing an approved Fluorine Free Foam (FFF) or High Expansion Foam System (HEFS) may continue to be used until end of life then converted to an ILDFA. The ILDFA is the primary option for new Tier 1 facilities. For new facilities requiring a tiering determination, the request must be submitted prior to authorization of design funding. Additional details on exception to policy submission are provided in the attachment.

(CHANGE) While programming efforts are underway, OSD has placed an even greater emphasis on each of the military departments to provide annual cost projections and expected results. **In turn, all installations must complete updated programming actions to solidify the Tier 2 facility end state costs using the updated Implementation Guidance. These efforts will enable DAF to accurately advocate and secure funding for all requirements derived from the FY20 NDAA and associated facility repairs.** The intent is to capture all facility FSRM requirements related to facility conversions within existing systems of record (i.e. NexGenIT) to ensure proper work accountability and tracking, regardless of project size. Operations and maintenance stakeholders are critical to this effort, as we must balance removal of AFFF with mission demands.

Points of contact for this policy are Lt Col Donnie Horn (william.horn.1@us.af.mil), Office of the Deputy Assistant Secretary of the Air Force for Environment, Safety, and Infrastructure (SAF/IEE), and Mr. Todd Wynn (robert.wynn@us.af.mil), Chief, Facilities Division, Air Force Directorate of Civil Engineers (AF/A4CF). The implementation guidance attached is the responsibility of AF/A4C. A4C may alter this guidance as it deems necessary to comply with this policy.

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EDWIN H. OSHIBA, SES, DAF
Acting Assistant Secretary of the Air Force
Energy, Installations, & Environment

Attachment:
1. Implementation Guidance (Change 2)

Attachment 1: Implementation Guidance (Change 2)

Current as of 15 Dec 22

***Significant changes and additions were made to the Implementation Guidance as well as the addition of guidance to assist the installations in policy compliance.**

(CHANGE) 1. Purpose. To provide guidance and direction to implement the DAF Sundown Policy for Foam Fire Suppression Systems, the 2020 NDAA-directed removal of Aqueous Film Forming Foam (AFFF), the lockout/tagout procedures, programming procedures, and new facility fire protection **guidance** as it pertains to hangar foam-based fire suppression systems (FSS), non-hangar **FSS, as well as non-chemical based FSS.** These requirements were developed based on the acceptable risk pertaining to a fuel spill fire scenario.

(ADD) This updated Implementation Guidance contains four appendices to assist the bases in executing the various actions to achieve policy compliance in a rapid manner. A brief description of each appendix follows with associated links:

(ADD) 1.1 APPENDIX 1: TECHNICAL LOCKOUT/TAGOUT GUIDANCE FOR –This appendix provides installations guidance for how to lockout/tagout all AFFF and High Expansion Foam System (HEFS).

(ADD) 1.2 APPENDIX 2: DESIGN AND CONSTRUCTION GUIDANCE FOR INCORPORATING AIR FORCE FOAM SUNDOWN POLICY IN PROJECTS – This appendix provides installations guidance on required changes for all projects at any stages in design or construction.

(ADD) 1.3 APPENDIX 3: PROGRAMMING GUIDANCE – This appendix provides specific programming guidance for removal/disposal work as well as facility repairs required for policy compliance. The guidance and project nomenclature are critical for higher headquarters to pull data rapidly and accurately for funds advocacy.

(ADD) 1.4 APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY – This appendix contains interim technical guidance for all AFFF, protein foam, Hi-Ex concentrates, or solutions until updates to UFC 4-211-01 are published. This should be used by government engineers as well as architect-engineering firms supporting DAF designs/construction.

(CHANGE) 2. Scope. This **Implementation** Guidance applies to all locations and temporary facilities, or other facilities purchased as equipment as defined in the policy. It includes all systems containing AFFF as well as all High Expansion Foam Systems (HEFS). This scope updates and clarifies previous guidance to include lockout/tagout, programming and technical direction.

3.Tier 1 Facility.

(CHANGE) 3.1. Approved FSS. The following system is authorized for Tier 1 facilities and shall comply with paragraphs 3.2 (Administration) and technical guidance in APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY: Ignitable Liquid Drainage Floor Assembly (ILDFA). HEFS and LEFS without AFFF are considered **interim systems and after end of life the system should be converted to ILDFA. AFFF must be replaced with fluorine free foam (FFF) in these systems as soon an approved foam is available but no later than 1 Oct 24.**

3.2 Administration. This policy designates all DAF hangars or similar facilities as a Tier 2 facility. The Assistant Secretary of the Air Force for Energy, Installations and Environment (SAF/IE) must approve all exceptions meeting the Tier 1 definition. Tier 1 requests require endorsement at the MAJCOM/CD (delegable to MAJCOM/A3 or USSF-equivalent) and AF/A3 levels before being submitted to SAF/IE for approval consideration. For the Reserve and Guard Components, Tier 1 requests require endorsement by

their respective A3 before being submitted to SAF/IE. Current Tier 1 facilities are listed in Table 1.

(CHANGE) 3.2.1 Projects including FSS already in the programming and/or design phase must be reviewed for compliance with this policy and if applicable, submitted for Tier 1 approval consideration prior to requesting funds **for design** and execution. **If not submitted for Tier 1 designation, the design must be updated for a water only FSS in accordance with interim criteria contained in APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY and UFC 4-211-01.** This applies to all projects regardless of funding source.

(CHANGE) 3.2.2 Tier 1 approval is required prior to installation of any new ILDFA system. New Tier 1 facilities shall be constructed with an ILDFA.

3.2.3 Requests for Tier 1 approval can be submitted via electronic staff summary sheet with a memorandum from the MAJCOM or USSF-equivalent to SAF/IE. The request should include the base name, facility number, Real Property Unique Identifier, and thorough justification detailing how the complete loss of the facility, or the loss of the aircraft/assets serviced inside, would result in mission failure at the DoD, DAF, CCMD or Sub-Unified Command level.

3.2.4 The real property-owning MAJCOM or USSF-equivalent is responsible for submitting all Tier 1 FSS requests. Tenant units or rotational forces requiring a Tier 1 FSS must coordinate with the real property-owning MAJCOM to submit a Tier 1 request.

(CHANGE) 3.2.5. Existing **foam-based FSS using new FFF in Tier 1 facilities** are permitted to be maintained throughout the end of useful life, or until funding is available to install an ILDFA, unless otherwise approved for further use.

3.2.6. For any approved Tier 1 facilities that contain AFFF, installations shall coordinate AFFF replacement options with AFCEC/COSM to meet the Congressionally mandated 1 Oct 24 phase out requirement date.

Table 1 - Tier 1 Hangars/Facilities[1]

Installation	Facility	Current Protection Type	Approval Office, Date	Interim/Final Protection
Joint Base Anacostia-Bolling (JBAB), Washington, D.C.	HMX-1, Building 389	Low level low expansion nozzles and overhead foam-water sprinklers	SAF/IE, 15 April 2022	Fluorine Free Foam to Ignitable Liquid Drainage Floor Assembly
Joint Base Andrews (JBA), MD	AF-1, Building 19	High-Expansion		High-Expansion Foam to Ignitable Liquid Drainage Floor Assembly
	SAM, Building 20	Low level low expansion nozzles and overhead foam-water sprinklers		Fluorine Free Foam to Ignitable Liquid Drainage Floor Assembly
	AF-1, Building 21	Low level low expansion trench system		Fluorine Free Foam to Ignitable Liquid Drainage Floor Assembly

[1] Tier 1 designation approval by SAF/IE (no delegation).

Table current as of 2 December 2022

4. Tier 2 Facility.

(CHANGE) 4.1 Approved FSS. The following system is authorized in a Tier 2 facility and shall comply with paragraph 4.2 Administration below: Automatic Water Sprinkler System designed to provide life safety protection for occupants to evacuate the facility in the event of a fire.

4.2 Administration. Tier 2 fire protection facilities are designated by default, until the process in paragraph 3.2 is fully staffed and approved for Tier 1 designation.

(CHANGE) 4.2.1. New Tier 2 facilities shall not be designed or constructed with HEFS **or ILDFA**; **they shall be designed or constructed with automatic sprinkler systems compliant with technical criteria referenced in APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY until the UFC 4-211-01 update is published**. Projects already in design or execution must be modified **in accordance with APPENDIX 2: DESIGN AND CONSTRUCTION GUIDANCE FOR INCORPORATING AIR FORCE FOAM SUNDOWN POLICY IN PROJECTS.**

(CHANGE) 4.2.2. Programing actions to convert existing HEFS and AFFF systems to a water-only automatic sprinkler systems compliant with technical criteria referenced in paragraph 4.2.1 but be complete by **1 March 2023. HEFS not at end of useful life may be replaced/converted with a water-only automatic sprinkler system compliant with Appendix 4 using available funding streams as applicable (dFSRM, CTO, etc.).** Specific programming guidance shall be followed in APPENDIX 3: PROGRAMMING GUIDANCE.

(CHANGE) 4.2.3. To ensure progress is tracked accurately, **installations must review existing data for accuracy and provide updates for all aircraft hangars on the installation. Additionally, any other non-hangar facility with foam suppression system must be added to the data base. This review and updated on the** AFFF Inventory SharePoint site must be completed by **31 January 2023**.

(ADD) It is critical that installations ensure all aircraft hangars regardless of protection type (including no protection, water deluge, water sprinklers, detection only, and any type of foam) be entered into the data base including hangars, HAS/PAS and any other structure which fully encloses an aircraft. Only open sided sunshade/weather shelters are excluded. This includes DAF Plants facilities. Tenant occupied facilities regardless of construction or O&M funding source must be included in the installation data base to ensure an accurate inventory of facilities on the installation.

https://usaf.dps.mil/teams/10758/FPETeam/SitePages/Foam%20Fire%20Suppression%20System%20Data%20Call.aspx. Ensure all fields are completed.

APPENDIX 1: TECHNICAL LOCKOUT/TAGOUT GUIDANCE FOR SHUTDOWN OF FOAM CONCENTRATE SYSTEMS

This guidance is mandatory for all DAF foam fire protection systems regardless of foam type, except for DAF Plants and Tier 1 facilities. HAF/A4CF and AFCEC/CO are working with HAF/A4LM and AFMC to update T.O. 00-25-172, T.O. 1-1-3, and other T.O. documents to reflect new facility fire suppression requirements. The DAF intent is to continue all aircraft maintenance operations as normal while the technical documents are updated.

This guidance meets the FY2020 NDAA requirement to terminate the "use" of AFFF. The DAF's compliance with the "use" termination will occur by 1 March 2023 for a majority systems when they have been locked-out and tagged-out. Tier 1 facilities currenting using an AFFF system will comply with the "use" termination when AFFF has been changed out with FFF. This guidance does not address the removal/disposal of chemicals or decommissioning of hardware. Installations will utilize centralized contracts for removal and disposal after lockout/tagout IAW APPENDIX 1: TECHNICAL LOCKOUT/TAGOUT GUIDANCE FOR . These contracts are in development with the U.S Corps of Engineers (Huntsville District) and are led by AFCEC/COSM. The DAF acknowledges there will be limited quantities of AFFF concentrate and solution in system tanks and piping until the later phase, which will remove, rinse, and dispose of these limited quantities. The execution of this "use" termination guidance is not dependent on the later phase of product removal, associated rinsing, and disposal from facilities.

The DAF's policy eliminates the use of fire protection systems using any chemical-based foams in all **Tier 2** general purpose hangars and other facilities concurrently with the elimination of AFFF and PFAS containing foams. Therefore, this guidance addresses all chemical-based foam fire suppression systems and chemicals except those facilities specifically identified.

DAF facilities tenant on other Services' installations and Joint Bases under other Services management must modify their Host-Tenant agreements before implementing this guidance. This guidance does not automatically apply to facilities of other DoD and non-DoD agencies tenant on DAF installations or Joint Bases under AF management control since those agencies typically follow a different risk/loss tolerance model. DoD and non-DoD agencies on DAF installations are allowed through the Host-Tenant agreement process to adopt/authorize the use of this guidance, at their discretion. Regardless of system type, FFF must be used once available in accordance with FY20 NDAA.

All technical efforts required by this guidance is anticipated to be accomplished by the installation in-house work-force technicians (including BOS contractors). No additional contract resources are anticipated to be required to execute this work effort.

1. Aircraft Hangars

1.1 Aqueous Film Forming Foam (AFFF) Systems (including trench nozzle systems)

1.1.1 Lockout/tagout all control valves on the AFFF concentrate system.

1.1.2 Remove and tagout any solenoid coils from solenoid-operated valves in the concentrate system.

1.1.3 Ensure bladder tank (when provided) pressurization valves are locked out preventing any pressurization of the bladder prevent under any future operations.

1.1.4 Lockout/tagout electric service to any foam concentrate pumps (when installed).

1.1.5 Ensure eduction concentrate system (when provided) valves between concentrate tank and eductor are locked out/tagged out.

1.1.6 Ensure all water features remain in full service.

1.2 High-Expansion Foam (Hi-Ex) Systems

1.2.1 Lockout/tagout all high-expansion OS&Y water control valves.

1.2.2 Lockout/tagout all control valves on the Hi-Ex concentrate system.

1.2.3 Remove and tagout any solenoid coils from solenoid-operated valves.

1.2.4 Ensure bladder tank (when used) pressurization valves are locked out preventing pressurization of the bladder under any future operations. Ensure concentrate tank discharge valves are locked out/tagged out.

1.2.5 Ensure eduction concentrate system (when used) valves between concentrate tank and educator are locked out/tagged out.

1.2.6 Lockout/tagout electric service to any foam concentrate pumps (when installed).

1.2.7 Ensure all sprinkler system risers remain in full service.

2. Bulk Fuel Tanks

2.1 Stand-Alone Tanks (including water supply)

2.1.1 Lockout/tagout all pump controllers.

2.1.2 Lockout/tagout all control valves on the concentrate system.

2.1.3 Lockout/tagout all control valves on the AFFF concentrate system.

2.1.4 Remove and tagout any solenoid coils from solenoid-operated valves in the concentrate system.

2.1.5 Ensure bladder tank (when provided) pressurization valves are locked out preventing and pressurization of the bladder prevent under any future operations.

2.1.6 Lockout/tagout electric service to any foam concentrate pumps (when installed).

2.1.7 Ensure eduction concentrate system (when provided) valves between concentrate tank and educator are locked out/tagged out.

2.2 Manual Systems/Dry Systems – No action required.

3. Other Facilities

3.1 Aqueous Film Forming Foam (AFFF) Systems (including trench nozzle systems)

3.1.1 Lockout/tagout all control valves on the AFFF concentrate system.

3.1.2 Remove and tagout any solenoid coils from solenoid-operated valves in the concentrate system.

3.1.3 Ensure bladder tank (when provided) pressurization valves are locked out preventing and pressurization of the bladder prevent under any future operations.

3.1.4 Lockout/tagout electric service to any foam concentrate pumps (when installed).

3.1.5 Ensure eduction concentrate system (when provided) valves between concentrate tank and educator are locked out/tagged out.

3.1.6 Ensure all water features remain in full service.

3.2 High-Expansion Foam (Hi-Ex) Systems

3.2.1 Lockout/tagout all high-expansion OS&Y water control valves.

3.2.2 Lockout/tagout all control valves on the Hi-Ex concentrate system.

3.2.3 Remove and tagout any solenoid coils from solenoid-operated valves.

3.2.4 Ensure bladder tank (when used) pressurization valves are locked out preventing and pressurization of the bladder prevent under all future operations. Ensure concentrate tank discharge valves are locked out/tagged out.

3.2.5 Ensure eduction concentrate system (when used) valves between concentrate tank and educator are locked out/tagged out.

3.2.6 Lockout/tagout electric service to any foam concentrate pumps (when installed).

3.2.7 Ensure all sprinkler system risers remain in full service.

4. Lock-out/Tag-out Technical Procedures

4.1 For ball valves and wheel handle valves purchase lock-out devices and seal the valves in the appropriate position using aircraft safety wire and seals or plastic seals which must be broken to change the valve position. Available from local industrial and safety supply stores or multiple on-line sources.

4.2 For electrical switches use approved lock-out devices for the specific type of switch or breaker devices and seal the switch in the appropriate position using aircraft safety wire and seals or plastic seals which must be broken to change the switch/breaker position. Typically, available from local industrial and safety supply stores or multiple on-line sources.

4.3 Tag each locked out valve and switch indicating "WARNING - Out of Service or WARNING - Do Not Operate," date when locked out, craft person who locked out the valve/switch, where to contact before activating/unlocking the switch or valve (typically a 24/7 reporting number like service call). Tags typically available from local industrial and safety supply stores or multiple on-line sources.

5. System Status

5.1 Ensure using organization(s) and facility managers are aware the foam fire suppression system use has been terminated by the lockout/tagout process. Any tampering with the locked-out/-tagged-out features must be immediately reported to Civil Engineering.

5.2 Ensure fire emergency services update pre-plans and facility inspection records to included computer aided dispatch data bases indicating hangars and other facilities converted to water only protection. Ensure appropriate installation risk assessment action is taken and documented appropriately at the required authority level.

5.3 Ensure maintenance activities update periodic inspection, test, and maintenance records as appropriate and included a new annual requirement to visually inspect the lockout/tagout devices ensuring valves and switches are sealed in the correct position and indicating there has been no tampering with the system configuration.

5.4 Installations must report each facility when the lockout/tagout process has been completed in the CE Dash, Fire Protection Engineering Workspace, Foam Fire Suppression Data Call at Foam Fire Suppression System Data Call (dps.mil) or https://usaf.dps.mil/teams/10758/FPETeam/SitePages/Foam%20Fire%20Suppression%20System%20Data%20Call.aspx. Instructions for completing the data call information are found on the site. Users will record the date each facility is lock out and tagged out in the "Comments" field in each facility record. If a facility is not in the existing data installation users will create a new facility data file.

6. Generated Waste

6.1 No waste (foam concentrate, foam solution, rinsate) is anticipated to be generated or released executing this lock out/tag out process.

6.2 In the unexpected chance waste is released, it must be collected and stored in new or previously foam concentrate contaminated drums or totes and stored in the foam equipment room of the facility for remediation under later program guidance. Clean totes can be acquired through DLA. Do not use drums or totes contaminated with any other chemicals.

7. Future Going Forward from Locked Out / Tagged Out

7.1 High expansion foam and low expansion fluorine free foam use is limited to applications as an interim bridging agent pending programming and transition to chemical free protection methods for Tier 1 facilities.

7.1.1 High-Expansion foam protected Tier 1 facilities (Table 1) will continue in-service with high expansion foam until new ignitable liquid drainage floors are programmed and installed; they will be fully maintained IAW UFC 3-601-02.

7.1.2 Low-expansion foam protected Tier 1 facilities (Table 1) will continue in-service with AFFF concentrate until AFFF is replaced with the new Military Specification low expansion fluorine free foam concentrate; they will be fully maintained IAW UFC 3-601-02. 7.2

7.1.3 The locked out/tagged out facilities will be repaired to a uniform risk profile across the DAF using the modernization guidance and prioritization scheme to be included in the next UFC 4-211-01 change.

For questions or additional information contact the AFCEC Reach Back Center, AFCEC.RBC@us.af.mil.

APPENDIX 2: DESIGN AND CONSTRUCTION GUIDANCE FOR INCORPORATING AIR FORCE FOAM SUNDOWN POLICY IN PROJECTS

This guidance is intended to assist program managers, project designer, and construction managers in applying the revised new aircraft hangar fire protection policy to ongoing aircraft hangar projects. This guidance is structured around the traditional decision points in the design and construction process; however, application is not limited and may be used by project management as necessary. If there is no SAF/IE **Tier 1** approval document contained in APPENDIX 1: TECHNICAL LOCKOUT/TAGOUT GUIDANCE FOR , then the hangar is **Tier 2**. Most hangar projects will be **Tier 2** hangar projects, the following guidance will apply based on the current project design or construction status. The Sundown Policy directs no new hangar will enter service with a foam fire suppression system. Since **Tier 2** will be the predominant hangar type this guidance will address **Tier 2** guidance first:

- **Tier 2** – Projects 35% or less design complete, revise to comply with the revised UFC 4-211-01, Chapter 5 criteria.

    - Sprinkler – Not less than 0.2 gpm/ft^2 over 5000 ft^2; DoD (including AF) has been designing to this requirement for many years. There is no change to these long-standing criteria.
    - Detection – Do not provided IR detection; delete all optical detection.
    - High- expansion foam – Delete all features.
    - Trenches – Provide drainage trench at aircraft doors for environmental protection to prevent fluids from escaping the hangar. Trenches are not part of the hangar aircraft servicing area fire protection scheme. AF has been designing to this requirement since 2017.
        - Design trench capture and out fall rate for aircraft leak/dump rate (gpm) plus 300 gpm for floor wash/rinse. Maximum flow rate will vary based on aircraft. Minimum design trench capture and outfall rate without overflowing is not less than 500 gpm.

- **Tier 2** – Projects greater than 35% design complete.

    - Sprinkler – Not less than 0.2 gpm/ft^2 over 5000 ft^2; is what DoD (including AF) has been designing to for many years. There is no change to these long-standing criteria.
    - Detection – Delete all IR detection features, as feasible.
    - High- expansion foam – Delete all features beyond the manifold header, as feasible.
        - Modify the manifold header design to remove the high-expansion riser or blind flange the manifold header where the riser connection would have been made.
        - Delete all foam concentrate storage and eduction/injection features.
        - Delete all piping and high-expansion generators.
        - Delete the fire suppression releasing panel intended to activate the high-expansion foam system.
        - Delete all foam start and stop stations.
    - Trenches – Provide drainage trench at doors for environmental protection to prevent fluids from escaping the hangar per existing project design direction. Trenches are not part of the hangar aircraft servicing area fire protection scheme.

- **Tier 2** – Awarded Projects in Execution.

  - Sprinkler – Not less than 0.2 gpm/ft^2 over 5000 ft^2; is what DoD (including AF) has been designing to for many years. There is no change to these long-standing criteria.
  - Detection – PM's decision how to modify project to delete all IR detection features if possible and at no cost to the government.
    - If PM can't delete, modify to provide evacuation alarm only upon activation of a single detector activation.
  - High- expansion foam – PM's decision how to modify project to delete all features if possible.
    - When construction of the high expansion foam system has not begun actual installation, modify, if possible, to delete all features and blind flange the high expansion risers at the manifold connection point. Consideration may be given to accepting the components without installation if the Contractor officer approves. Bottom line would be to avoid the installation of these features, if possible, even if components must still be accepted.
    - In the event features are or must be installed (see guidance for Tier 2 – Projects construction complete following).
    - Remove the foam start /stop stations and signage after testing. If installed, modify project, if possible, to remove the stations and blank cover the enclosures. Remove the signage. All removed parts must be labeled and packaged for long term storage in the fire protection equipment room.
  - Trenches – Provide drainage trench at doors per contract requirements for environmental protection to prevent fluids from escaping the hangar. Trenches are not part of the hangar aircraft servicing area fire protection scheme.

- **Tier 2** – Projects construction complete.

  - Detection – Must modify to provided evacuation alarm only activation on a single detector activation or if possible, remove all IR detection.
  - High-expansion foam – PM's decision how to modify project. Recommended actions include:
    - If installed, acceptance discharge testing using foam concentrate and all other testing required in accordance with contract must be accomplished.
    - Residual foam concentrate remaining post testing should be removed by contractor and no additional foam concentrate of any type is installed in the system.
    - After required testing, lock out/tag out all high expansion foam eduction system features; abandon high-expansion features in place.
    - Remove manual start and stop stations and signs after acceptance testing. Manual start and stop stations may have wires terminated with heat shrink end terminals and blank NEMA 4 enclosures covers installed. All removed parts must be labeled and packaged for long term storage in the fire protection equipment room.

There are no **Tier 1** hangars programmed or in design at this time. There is only one **Tier 1** hangar in construction currently. The following applies to **Tier 1** hangars. The AF Sundown Policy intent is no new hangar should enter service with an operational foam fire suppression system and any new **Tier 1** hangar will use ignitable liquid drainage floor assemblies for fire protection. Additional FSS features or modifications unique to special purpose hangars/facilities will be individually evaluated by the Designated FPE.

- **Tier 1** – Projects 35% or less design complete. No current projects programmed or in design.
- **Tier 1** – Projects greater than 35% design complete. No current projects programmed or in design.
- **Tier 1** – Awarded Projects in Execution. Only project in execution is Hangar 21 at Joint Base Andrews. No change to the installed system. When the system reaches end of life, ILDFA will be programmed to replace existing foam system.

The AFCEC/CO and CF teams can be reached through the AFCEC Reach Back Center afcec.rbc@us.af.mil to address individual issues for specific projects.

APPENDIX 3: PROGRAMMING GUIDANCE

It is imperative to program projects for Aqueous Film Forming Foam (AFFF) systems and High Expansion Foam Systems (HEFS) elimination to enable Total Force higher headquarters can advocate for funding and make data driven decisions. To develop and program AFFF system and HEFS elimination projects, bases must follow the guidance below after consulting with the design engineers and existing data for AFFF systems and HEFS. Programming repair projects must be completed by 1 March 2023.

Repairs to convert systems will follow decentralized and centralized guidelines. Smaller scope/cost projects will be decentralized unless the value meets the centralized thresholds and will compete for funding under established rules.

At minimum, the following programming database (e.g., NexGenIT) data fields appropriate must be filled in: project number, title, facility number(s), programmed amount, design FY, execution FY, and time on target date (if applicable).

For fire suppression system (FSS) facility repairs containing AFFF, assume funding is available in FY23 for design and FY24 for execution. If funding does not materialize, projects should move to the following year. Programmers may program projects in later fiscal years as mission and manpower dictates, however, at minimum, projects must be programmed within a four-year window (FY23-26) to complete a total conversion to water fire suppression systems in facilities by 1 October 2026.

AFFF conversion projects planned as a single acquisition across multiple facilities shall follow umbrella project programming guidance. Programmers will create the umbrella project number, serving as the "parent" project unifying the "child" requirements. Projects for AFFF facilities will include modification or replacement of existing FSS to meet UFC 4-211-01 or interim guidance in APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY. Projects for HEFS facilities will include modification of existing FSS to meet UFC 4-211-01 or interim guidance in APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY. For work accountability (audit readiness), a project number is necessary for each facility. In this situation, the parent project number represents the overall requirement, and each child projects represent the work in each of the multiple facilities. The 2-digit suffix for multiple-facility projects is comprised of the letter "M" and an alphabetic identifier for each included facility. If the parent project is FXSB204567, and includes similar work in separate facilities, the project number of each child will be FXSB204567MA, FXSB204567MB, FXSB204567MC, etc.

All projects are classified as REPAIR work. Though the action is typically stated in the project title, do not take up space in the project title for these projects by adding "Repair" to the front of the title. Reference paragraph PROJECT TITLE NOMENCLATURE below for project title guidance.

There are five common FSS at installations. Below is description of the systems with associate programming scope required to meet the FY2020 National Defense Authorization Act and the Sundown Policy for Foam Fire Suppression Systems. Should an installation have question or concern in determining the type of system and scope required for programming, please contact AFCEC/COSM through the AFCEC Reach Back Center on CE DASH or at afcec.rbc@us.af.mil. After the FSS descriptions, there are specific project title nomenclature requirements that shall be followed.

1. **AFFF Systems[1] (Low Level nozzle systems without overhead sprinklers)** (UFC 4-211-01 para 5-17.2A)
   a. Required programming projects and associated scope:
      i. There are no Tier 1 facilities in this category.
      ii. For Tier 2 facilities: After the removal and disposal project, this project will repair the existing system and provide an overhead UFC-compliant water-only system.
   b. Reference UFC 4-211-01 para 5-17.2 or APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY for more technical details.
   c. Reference PROJECT TITLE NOMENCLATURE section below for project title.

   Note 1: If the installation plans to complete a whole hangar/facility renovation which includes FSS repair, the FSS system shall follow scope contained in paragraph ii. Additionally, the installation will still need to program a stand-alone FSS repair project. This will enable HHQs to accurately pull data and accurately requests funds.

2. **Fuel Servicing Hangars and HAS/PAS with Legacy Installed Foam Systems[1]** (UFC 4-211-01 para 5-17.3)
   a. Required programming projects and associated scope:
      i. After the removal and disposal project, this project will repair the facility by removing existing system and provide an overhead UFC-compliant water-only system.
   b. Reference UFC 4-211-01 para 5-17.3 or APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY for more technical details for aircraft hangars and UFC 3-600-01 for other facilities.
   c. Reference PROJECT TITLE NOMENCLATURE section below for project title.

   Note 1: If the installation plans to complete a whole hangar/facility renovation which includes FSS repair, the FSS system shall follow scope contained in paragraph i. Additionally, the installation will still need to program a stand-alone FSS repair project. This will enable HHQs to accurately pull data and accurately requests funds.

3. **AFFF Systems[1] (Foam-water sprinklers with low-level foam nozzles or trench nozzles and foam-water sprinklers without low-level foam nozzles)**
   a. Required programming projects and associated scope:
      i. For Tier 1 facilities: FFF will replace AFFF as part of a centralized contract. The system will be used until end of life. At that point, installations will program the installation of ignitable liquid drainage floor assemblies in lieu of a foam system.
      ii. For Tier 2 facilities: After the removal and disposal project, this project will repair the existing system by modifying existing system and provide an overhead UFC-compliant water-only system.
   b. Reference UFC 4-211-01 para 5-17.4 or APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY for more technical details.
   c. Reference PROJECT TITLE NOMENCLATURE section below for project title.

   Note 1: If the installation plans to complete a whole hangar/facility renovation which includes FSS repair, the FSS system shall follow scope contained in paragraph i or ii. Additionally, the installation will still need to program a stand-alone FSS repair project. This will enable HHQs to accurately pull data and accurately requests funds.

4. **AFFF Low Level Nozzles with Water Sprinklers over-head[1]**
   a. Required programming projects and associated scope:
      i. No Tier 1 facilities are in this category.
      ii. For Tier 2 facilities: After the removal and disposal project, this project will repair the existing system by modifying existing system and provide an overhead UFC-compliant water-only system.
   b. Reference UFC 4-211-01 para 5-17.5 or APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY for more technical details.
   c. Reference PROJECT TITLE NOMENCLATURE section below for project title.

   Note 1: if the installation plans to complete a whole hangar/facility renovation which includes FSS repair, the FSS system shall follow scope contained in paragraph ii. Additionally, the installation will still need to program a stand-alone FSS repair project. This will enable HHQs to accurately pull data and accurately requests funds.

5. **High Expansion Foam Systems[1]**
   a. Required programming projects and associated scope:
      i. Currently, there is no requirement to dispose of HEF foam after lock out/tag out. Installations have the option to fund removal if desired. Otherwise leave in place and remove in the future when the FSS undergoes a life cycle repair.
      ii. For Tier 1 facilities: This system will be used until end of life. At that point, installations will program the installation of ignitable liquid drainage floor assemblies in lieu of a foam system.
      iii. For Tier 2 facilities: This project will repair the existing system by modifying existing system and provide an overhead UFC-compliant water-only system.
   b. Reference UFC 4-211-01 para 5-17.10 or APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY for more technical details.
      Reference
   c. PROJECT TITLE NOMENCLATURE section below for project title.

   Note 1: If the installation plans to complete a whole hangar/facility renovation which includes FSS repair, the FSS system shall follow scope contained in paragraph ii or iii. This will enable HHQs to accurately pull data and accurately requests funds.

PROJECT TITLE NOMENCLATURE

Bases must follow the below nomenclature to ensure Higher Headquarters can rapidly and accurately pull project data and associated costs for funding advocacy.

1. **AFFF FSS Repair from Foam to Water FSS Project's Project Title Nomenclature:**
    - **AFFF to Water FSS - B**XXX**,** Facility Type
      (Bolded words must be exact. Input installation specific data for non-bolded words.)
        - Examples:
            - **AFFF to Water FSS – B**949**,** Haetae Hangar
            - **AFFF to Water FSS – B**1750**,** B-2 Mx Hangar
            - **AFFF to Water FSS – B**19**,** Fuel Storage Facility

2. **HEFS FSS Repair from Foam to Water FSS Project's Project Title Nomenclature:**
    - **HEFS FSS to Water FSS - B**XXX**,** Facility Type
      (Bolded words must be exact. Input installation specific data for non-bolded words.)
        - Examples:
            - **HEFS FSS to Water FSS - B**849**,** Black Cat Hangar
            - **HEFS FSS to Water FSS – B**1731**,** Fuel Mx Dock
            - **HEFS FSS to Water FSS – B**1234**,** Fuel Storage Facility

APPENDIX 4: UFC 4-211-01 CHAPTER 5 CHANGES DAF FOAM SUNDOWN POLICY

(Pending Revision of UFC 4-211-01, 13 April 2017 with Change 3, 20 April 2021)

Replace 5-1 with the following: 5-1 GENERAL

Apply Chapters 1, 2, 3, 4, 5 and all Appendices to Air Force projects. This UFC additionally applies to all Air Force RPA hangars. Refer to the Air Force RPA General Maintenance Hangar Facility Design Guide located on the Whole Building Design Guide for additional RPA hangar requirements. Address facility design and construction standards or other technical support questions to the AFCEC Reach Back Center at AFCEC.RBC@us.af.mil.

This UFC contains specific criteria, guidance, and procedures for the phase out of AFFF (PFAS) in accordance with the 2020 National Defense Authorization Act (NDAA) and for the phase out of all foam fire extinguishing agents in Air Force aircraft hangars. The guidance modernizes and standardizes hangar fire protection across the entire Air Force infrastructure enterprise and establishes a unified risk acceptance model for Air Force aircraft hangars.

Insert new 5.1.1: 5-1.1 Implementing Direction

This Chapter provides consolidated technical direction implementing Department of the Air Force Policy requirements in:

- AF/A4 Policy Memorandum, *Aircraft Hangar Fire Suppression System Modernization* dated 3 June 2019 (completion suspense 30 September 26),
- 2020 National Defense Apportions Act, 19 December 2020, PFAS elimination (completion suspense 30 September 2024),
- SAF/IE Assessment of Risks with Respect to Options for Replacing Fluorinated Aqueous Film Forming Foam (AFFF) Fire Suppression Systems in Department of Defense Facilities, Version 1.0 | July 7, 2021
- SAF/IE Policy memorandum SAF/IE *Sundown Policy for Foam Fire Suppression Systems* dated 16 November 2021 with Change 1 13 May 2022 (Programming suspense 7 June 2022; no suspended completion date)
- AF/A4C-2 Memorandum Exemption to UFC 1-200-01 DoD Building Code with Change 2, UFC 3-211-01, Aircraft Maintenance Hangars, and UFC 4-211-02 Aircraft Corrosion Control and Paint Facilities, to implement Sundown Policy for Foam Fire Suppression Systems, 18 January 2022.

Insert new 5-1.2: **5-1.2 Hangar Classification.**

Air Force general purpose aircraft maintenance hangars will be classified in two categories **Tier 2** – the default classification, and **Tier 1** – critical hangars where loss of the hangar or assets in the hangar will directly impact/reduce the Air Force's ability to serve national military objectives. **Tier 1** designation must be approved by SAF/IE.

Air Force special purpose hangars are unique facilities designed and designated to serve as; Corrosion control hangars (UFC 4-211-02), Aircraft Fuel system Maintenance hangars (this UFC), hangars approved for fuel servicing (this UFC), and hangars approved for integrated combat turns (this UFC). Except as otherwise specified Air Force special purpose hangars will include the additional features covered in this UFC.

[C] 5-1.2 The fire protection and life safety requirements for special purpose hangars are specifically identified in this UFC or other UFCs and while similar to **Tier 1** and **Tier 2** requirements for general purpose hangars there are variations necessary to meet the unique mission requirements of each special purpose type.

Renumber current 5-1.1 and 5-1.2 to 5-1.3 and 5-1.4

Revise 5-2.2.4 to read: **5-2.2.4 Monitoring System Construction**
Provide a containment system monitoring panel with a minimum NEMA 250 Type 3 enclosure rating.

Rate any devices, conduits, or electrical enclosures installed below grade for prolonged submersion, minimum NEMA 250 Type 6P. Provide any devices, conduits, or electrical enclosures within the tank for an electrical (hazard) classification of Class I Division 1.

Replace 5-6 thru 5-6.5 with the following: **5-6 FIRE PROTECTION AND LIFE SAFETY**

5-6.1 General

Construct / modify all hangars in accordance with NFPA 409, except were modified by this UFC

5-6.1.1 Tier 1 - General Purpose Hangars

5-6.1.1.1 Flammable Liquids Spill and Fire Control System

New **Tier 1** hangars will include a listed ignitable liquid drainage floor assembly (meeting FM Approval Standard 6090) recessed into the concrete floor for new construction.

Modernization and life-cycle upgrade projects in existing **Tier 1** hangars will include a listed ignitable liquid drainage flooring assembly (meeting FM approval standard 6090) installed on top of the existing concrete floor slab.

5-6.1.1.2 Fire Sprinkler Protection System.

New **Tier 1** hangars will include an automatic sprinkler system, conforming to the requirements of this UFC providing not less than 8 L/min/m^2 (0.2 gpm/ft^2)over the most remote 464.5 m^2 (5000 ft^2) design area.

5-6.1.2 Tier 2 - General Purpose Hangars

5-6.1.2.1 Flammable Liquids Spill and Fire Control System

None required.

[C] 5-6.1.2.1 SAF and HAF have assessed the risk of a flammable liquid fire in a hangar and the potential impact of a fire. It was determined there is only a remote chance of a spill fire and a **Tier 2** hangar does not warrant the installation of flammable liquids fire suppression features or flammable liquid spill controls. See the SAF/IE *Assessment of Risks with Respect to Options for Replacing Fluorinated Aqueous Film Forming Foam (AFFF) Fire Suppression Systems in Department of Defense Facilities*, Version 1.0 | July 7, 2021

5-6.1.2.2 Fire Sprinkler Protection System.

Tier 2 hangars will include an automatic sprinkler system, conforming to the requirements of this UFC providing not less than 8 L/min/m^2 (0.2 gpm/ft^2)over the most remote 464.5 m^2 (5000 ft^2) design area.

5-6.2 Fire Protection Controls and Notification.

Table 5-1 Sample Air Force Functional Matrix identifies the system operating inputs and expected operating functions expected to occur. This functional must be tailored by the QFPE for the specific project and any additional inputs/outputs included in the matrix.

5-6.2.1 Hangar Servicing Area Fire Alarm Control Unit

Provide a factory assembled listed fire alarm control unit to monitor and control the manual alarm stations and fire suppression systems in the aircraft servicing area. Listed releasing service units are required in hangars when pre-action or other releasing service is required.

When releasing service is required, provide a 2-position non-key operated switch located within the controls enclosure, when activated inhibits the releasing and notification. When the switch is placed in the inhibit mode/position, only the releasing and alarm functions of controls are disabled while leaving all other functions operational.

Table 5-1: Sample DAF Functional Matrix

	REQUIRED RESPONSE	ANNUNCIATION AT LOCAL PANEL			NOTIFICATION							AUXILIARY FUNCTIONS				
ALARM CONDITIONS		VISUAL ALARM INDICATION	AUDIO-VISUAL TROUBLE INDICATION	AUDIO-VISUAL SUPERVISORY INDICATION	GENERAL FIRE EMERGENCY MESSAGE T O RECEIVING STATION	AIRCRAFT SERVICING BAY FIRE EMERGENCY MESSAGE THROUGH THE FACILITY	ADJACENT AREA WATER TROUBLE SIGNAL TO FACU AND RECEIVING STATION	COMMON FIRE ALARM SUPERVISORY SIGNAL TO FACU AND RECEIVING STATION	COMMON WATER SUPERVISORY SIGNAL TO FACU AND RECEIVING STATION	OPTICAL FLAME DETECTION INHIBITED SUPERVISORY SIGNAL TO FACU AND RECEIVING STATION	GENERAL FIRE ALARM EMERGENCY MESSAGE THROUGH OUT FACILITY	HIGH LEVEL ALARM TO THE INSTALLATION UTILITY MANAGEMENT REPORTING SYSTEM	BLUE BEACON ACTIVATION	POSITION THE DIVERSION VALVE TO DIRECT OUTFALL TO CONTAINMENT	RELEASE PRE-ACTION SPRINKLER SYSTEM (IF PROVIDED)	DISABLE THE RELEASING AND ALARM FUNCTION OF THE OPTICAL DETECTORS THROUGH THE RSFACU
AIRCRAFT SERVICING AREA MANUAL PULL STATION	IMMEDIATE	X			X	X										
PRESSURE SWITCH OR FLOW SWITCH AIRCRAFT SERVICING AREA SPRINKLER SYSTEM		X			X	X										
ONE OR MORE OPTICAL FLAME DETECTOR(S) WITHIN THE PROTECTED AREA																
IGNITABLE LIQUID DRAINAGE FLOOR ASSEMBLY AUTOMATIC DISCHARGE TO CONTAINMENT		X			X	X							X	X		
ADJACENT / SUPPORT AREA MANUAL PULL STATION		X									X					
PRESSURE SWITCH OR FLOW SWITCH ADJACENT/SUPPORT AREA WATER SPRINKLER SYSTEM		X									X					
HEAT DETECTION IN THE HANGAR BAY (IF PROVIDED FOR PRE-ACTION SPRINKLER)		X			X	X									X	
FLOW DETECTION IN IGNITABLE LIQUID FLOOR DRAINAGE ASSEMBLY (not maintenance activated/commanded)		X			X	X							X			
CONTAINMENT HIGH LEVEL ALARM 9WHEN MONITORED BY THE FIRE ALARM CONTROL				X				X				X				
SUPERVISORY CONDITIONS																
COMMON SUPERVISORY	2 HOURS FOR INVESTIGATORS (can be emergency responders, alarm center runners, maintainers or user representative as directed in local policy guidance)			X					X							
NITROGEN SYSTEM FAILURE ON PRE-ACTION SPRINKLER SYSTEMS				X												
IGNITABLE LIQUID DRAINAGE FLOOR ASSEMBLY MANUAL WASH DOWN SYSTEM ACTIVATED (maintenance activated/commanded)				X					X							
IGNITABLE LIQUID DRAINAGE FLOOR ASSEMBLY AUTOMATIC DISCHARGE TO CONTAINMENT (pumps operating when provided)				X					X							
CONTAINMENT LEVEL EXCEEDS 5% LEVEL INDICATION				X					X			X				
PRE-ACTION SUPERVISED SOLENOID DISCONNECT (IF PROVIDED)				X				X	X							
OPTICAL FLAME DETECTION INHIBIT SWITCH																
IMPROPERLY POSITIONED VALVE (CLOSED OR OPEN)				X				X	X							
TROUBLE CONDITIONS																
COMMON TROUBLE	4 HOURS FOR MAINTAINERS		X				X									
BREAK IN A CONDUCTOR			X				X									
ACCIDENTAL GROUND			X				X									
EDITED BY QFPE: NAME, ORGANIZATION / DATE																

[C] Table 5-1 Do not copy this sample table directly into contract documents and drawings without editing for the specific hangar project.

5-6.2.2 Auxiliary Notification Devices

When an ignitable liquid drainage floor assembly is installed provide blue rotating or flashing beacons not less than 400 cd (120/208VAC) or equivalent 360-degree LEDs. Control the beacon activation through the ignitable liquid drainage floor assembly control panel. A backup power supply or supervision of the power supply supplying the beacons is not required when supplied from the dedicated fire protection features panel. Mount beacons 20 - 30 ft. (6.1 - 9.1 m) above the floor of the aircraft servicing bay. Provide a sign below each device with 3-inch red letter on a yellow or lime-yellow background, with wording "DRAINAGE FLOOR ACTIVATED". Blue beacons are in addition to any general fire alarm clear visual notification devices.

- For single door hangars, provide one beacon approximately centered on each of the three walls.
- For drive through hangars, provide one beacon 10-25 ft. (3.0-7.6 m) from each corner of the aircraft servicing bay.

Replace 5-11.1 through 5-11.1.3 with the following: 5-11 FLOOR AND TRENCH DRAINS

5-11.1 Tier 1 – Ignitable Liquid Floor Drainage Assembly

Hangar floor drainage is provided by the listed ignitable liquid drainage flooring floor assembly (FM approval standard 6090) recessed into the concrete floor; no additional drainage or door trench drain is required.

Hangar floor drainage in legacy hangars is provided by the listed ignitable liquid drainage flooring assembly (FM approval standard 6090) installed on top of the existing concrete floor slab; existing door trench drains may remain.

The use of trench drains complying with Section **7.11** of this UFC without the low-level foam-water nozzle system are a permitted alternative to ignitable liquid drainage floor assemblies, when approved by the CFPE.

[C] 5-11.1 Ignitable liquid floor drainage assemblies are an equivalent to foam-based fire suppression systems flammable liquids applications in aircraft hangars. (NFPA 409). The floor assemblies also perform the same function as the trench drains in section 5-2.3; therefore, in Tier 1 hangars only the floor assembly is required providing fire control/-suppression as well as general purpose and environmental drainage.

5-11.2 Tier 2 – Door Trench Drains

Provide trench drains across the full width at each aircraft movement door for all new **Tier-2** aircraft servicing bays to remove liquid spills, rain water and other fluids. Compressed air, water service lines, ventilation air, and other utilities mounted to the sides of the trench drain are permitted. The floor of the drainage trench must be clear to prevent damming or restricting liquid flow in the trench.

Projects in legacy **Tier 2** hangars do not require new or upgraded drainage for fire protection applications. New or upgraded drainage for general purpose or environmental applications is authorized when required by other guidance.

[C] 5-11.2 The SAF/IE Sundown Policy assessment of risk establishes there is not a requirement for the control/suppression of flammable fire events in the majority of aircraft hangars (Tier 2) because of the infrequent occurrence of fuel spills and fire events. Fire control methods including spill fire controls are limited to critical hangars (Tier 1) housing the most critical mission assets and other special purpose hangars identified in this Chapter.

5-11.2.1 Trench Sizing

Trench will be sized to accommodate floor rinse water 1136 lpm (300 gpm) and full flow from the aircraft dump valve without overflowing the trench. To allow for sufficient space for maintenance in the trench, consider the volume of piping within the trenches and turning radius of the fittings in the design.

Slope drainage trench inverts at a minimum 1.0% ± 0.5% towards the out fall point(s) from the drainage trench. Capture oily wastewater contaminants from the aircraft servicing area door trench system, as directed by the office overseeing environmental policy for the installation using an oil/water separator or other approved methods.

[C] 5-11.2.2 The volumes used for trench sizing are intended to prevent these worst-case events from overflowing the drain and compromising the general purpose and environmental function of the drain and do not indicate the trench drain provides any fire control or suppression protection/function. The flow should never be less than 250 gpm rinse water and the aircraft dump flow less than the aircraft specific Technical Order, unless revised by the DFPE.

5-11.2.2 Trench Covers

Provide ductile iron or galvanized steel trench drain design to withstand a minimum proof-load of not less than 50,000 pounds from a tire with a 250-psi pressure or the most critical of the aircraft wheel loads listed in this UFC, whichever is greater.

5-11.3 Floor Drainage Outfall

Floor drainage outfall must be gravity based. Route the outfall from trench drains and ignitable liquid drainage floor assemblies to containment tank/structure unless required otherwise by installation environmental activity.

Pumped outfall to above grade containment tank/structure must be approved by the local environmental activity office and the AHJ. Outfall pumps must be located exterior to the hangar with appropriate weather protection or against an exterior wall within the hangar protected by bollards or chain-link fencing.

5-11.3.1 Diversion Valve

When required based on local environmental guidance provide an automatic diversion valve allowing drainage outfall to be directed to an approved waste stream (sanitary, industrial, storm, etc.) or to retention/containment. Control of the diversion valve must be by the ignitable liquid drainage floor assembly control panel.

5.11.3.2 Retention/Containment Capacity

The containment must provide not less than 18,927 l (5,000 gallons) of containment volume plus any required head space for valves and controls. Do not use the trenches, ignitable liquid drainage floor assembly, or piping of the containment system to contain any of the required volume. Discharge of fire sprinkler water, ARFF vehicles and hose streams is not required to be included in the containment volume. Fire events are considered catastrophic events and not planned or routine discharge volumes.

5-11.3.2.1 Tier 1 with ignitable liquid drainage floor assemblies design the containment system to accommodate the anticipated spill volume and a 20-minute operation the ignitable floor assembly flushing water discharge.

5-11.3.2.2 Tier 2 with door trench drains design adequate capacity to contain the maximum fuel spilled from the failure of a single fuel tank/bladder on the anticipated aircraft(s) in the aircraft servicing bay and not less than 20 minutes of floor rinse water discharge.

5-11.3.4 Containment System Monitoring

Provide the containment system with a remote capacity monitoring panel. Provide monitoring panel with audible and visual (yellow strobe or beacon) alarms. Automatically activate audible and visual alarms when the capacity level exceeds 5%. Provide a silence switch for the audible alarm. Constantly illuminate visual alarms at the panel until the level condition is returned to normal. Containment system monitoring must be through the ignitable liquid drainage floor assembly control panel or through a separate control panel in the absence of an ignitable liquid drainage floor assembly located in the aircraft servicing area. Provide an alarm to the FACU and Energy Management Control System when the capacity level exceeds 5%.

5-11.3.5 Monitoring System (When Provided)

Provide a containment system monitoring panel with a minimum NEMA 250 Type 4 panel.

Rate any devices, conduits, or electrical enclosures installed below grade for prolonged submersion, minimum NEMA 250 Type 6P. Provide any devices, conduits, or electrical enclosures within the tank for an electrical (hazard) classification of Class I Division 1.

Replace 5-12 with the following: **5-12 AIRCRAFT FUEL SYSTEM MAINTENANCE HANGARS**

Hangars for aircraft fuel system maintenance are special purpose hangars and the requirements of this section apply to **Tier 2** hangars used for that purpose. **Tier 1** hangars are not anticipated to be used for fuel system maintenance activities. The requirements of this section are based on the hazardous operations being conducted. Facilities meeting the previous fire and safety requirements for fuel systems repair facilities in accordance with DAF guidelines remain compliant.

Replace 5-12.2 with the following: **5-12.2 Permitted Operations,**

Fuel systems repair facilities are intended to support the complete range of fuel system maintenance operations normally restricted from being conducted inside other hangars and structures. Normally restricted operations permitted in fuel systems repair facilities include, but are not limited to: fuel cell repair, defuel/refuel/fuel transfer specifically required to achieve a fuel system maintenance objective, de- puddling/purging of fuel tanks/cells for entry, ventilation in preparation for entry, ventilation during entry, and fuel systems components and fuel tank/cell pressurization testing. Facilities complying with this Section are not appropriate for preflight and post-flight fuel servicing operations T.O. 25-00-172; see Section **5-15** for flight related fuel servicing and the related approval process in accordance with DAFI 91-202.

Replace 5-12.4 thru 5-12.4.3 with the following: **5-12.4 Fire Protection Criteria**

Provide new fire protection features in accordance with this UFC for **Tier 2** hangars. For legacy hangars comply with the requirements of Sections **5-17.1** thru **5-17.10** as appropriate

Replace 5-12,7 thru 5-12.7.1 with the following: **5-12.7 ELECTRICAL**

Grounding. Provide sufficient grounding points throughout the facility to include grounding bars in the aircraft servicing bay along the walls with a maximum space of 50 linear feet (15.24 m) and along the walls near tank storage and repair workbenches in the Fuel Foam/Cell Repair Room.

5-12.7.1 Hazardous (Classified) Locations

Design hazardous (classified) locations including the fuel cell aircraft servicing bay, fuel bladder/cell repair room, and adjacent spaces in accordance with 3-9.4: Hazardous (Classified) Locations and TO 00-25-172 *Ground Service of Aircraft and Static Grounding/Bonding* paragraph 1.2.7 for definitions and 4-14 specific requirements and TO 1-1-3 *Inspection and Repair of Aircraft Integral Tanks and Fuel Cells.*

Design the fuel bladder/cell repair room as a Class I Division 2 hazardous (classified) location to the ceiling/deck in accordance with NFPA 70. At a minimum, classify adjacent spaces not suitability cutoff as defined in 3-9.4 Hazardous (Classified) Locations as Class I Division 2 up to 18 inches (460 mm) above the floor of the fuel bladder/cell repair room. In the aircraft servicing bay, provide wall mounted outlets designed for Class I Division 1 or 2 hazardous (classified) locations throughout all areas. This is an aircraft maintenance (user) safety requirement and is intended to prohibit the use of unclassified tools or equipment in the classified area around the aircraft.

Replace 5-14 thru 5-14.1.4 with following: 5-14 FACILITIES FOR UNFUELED AIRCRAFT

Air Force Air Logistics Complexes (ALCs) have programmed depot maintenance (PDM) special purpose hangars where aircraft are disassembled, repaired, maintained, refurbished, and/or returned to flying status. These hangars are dedicated to specific industrial processes as part of the intermediate and depot level maintenance activities. Air Force Plants (AFPs) are Government-Owned/Contractor-Operated (GOCO) industrial installations have production, fabrication, and test facilities dedicated to specific industrial processes as part of their aircraft production activities. These facilities were constructed in accordance with protection features detailed in NFPA 409 Aircraft Hangars.

5-14.1 Legacy Unfueled Aircraft Hangars

Previously approved unfueled aircraft hangars are considered **Tier 2** compliant. Legacy hangars servicing unfueled aircraft with foam fire protection features are modernized in accordance with Sections **5-17.1** thru **5.17.10**

5-14.2 New Unfueled Aircraft Hangars

New unfueled aircraft hangars comply with **Tier 2** general purpose hangar requirements.

5-14.3 Marking

These facilities must be identified by permanent ANSI or OSHA compliant warning signs indicating “Only unfueled aircraft are permitted to be stored or serviced in this hangar” See UFC 4-211-01 & T.O. 1-1-3. Signs must be not less than 12” wide x 18” tall. Signs must be displayed on the exterior and interior of the hangar at the following locations. The exterior side of the hangar aircraft movement doors within 5 feet of the opening edge. Each interior wall centered along the wall’s length. Signs must be mounted 7 feet to the bottom edge of the sign above the hangar floor or pavement surface. See Figure 5-1: ANSI Warning Sign.

Figure 5-1: ANSI Warning Sign

Replace 5.-15 thru 5-15.8.3 with the following: 5-15 HANGAR REQUIREMENTS FOR AIRCRAFT FUEL SERVICING

Hangars for fuel servicing for flight operations are special purpose hangars and the requirements of this section apply to **Tier 1** and **Tier 2** hangars. The requirements of this section are based on the hazardous operations being conducted.

Fuel servicing is prohibited inside of structures by National Fire Protection Association Standard 407, *Aircraft Fuel Servicing*, Air Force T.O. 00-25-172 *Ground Servicing of Aircraft*, and NAVAIR 00-80T-109 *Aircraft Refueling NATOPS Manual.*

5-15.1 Facility Criteria Limitation

Fuel servicing operations inside of new or existing structures must be authorized in accordance with the DAFI 91-202 required SSEA process. Compliance with this UFC's facility criteria alone is not authority to conduct fuel servicing operations inside of structures. The criteria in this Section are the minimum general facility requirements necessary to apply for evaluation under DAFI 91-202 and T.O. 00-25-172 Ground Servicing of Aircraft for a System Safety Engineering Analysis (SSEA) evaluation for approval of fuel servicing inside structures.

Existing legacy approvals to conduct fuel servicing inside structure are documented in T.O. 00-25-172 Ground Servicing of Aircraft, Table 4-2 and remain valid only as long as the original fire protection, ventilation, and electrical features remain in operation, or the structure has been modernized in compliance with Section.

[C] 5-15.1 See T.O. 00-25-172 Table 4-2 for the current list of facilities approved for in structure aircraft fuel servicing operations. Only the specific facility and aircraft type included in the Table in T.O. 00-25-172 are approved. The system safety engineering analysis process is managed by AFMC AFLCMC/SES and AFSEC.

In-hangar fuel servicing criteria is based on a single aircraft in a fire-separated area undergoing fuel servicing in accordance with approved SSEA operating procedures after a formal SSEA and approval process. A System Safety Engineering Analysis (SSEA) is allowed to require additional facility features for specific aircraft, fueling methods, facility types before permitting fuel servicing.

[C] 5-15.1 Under the conditions of pressurized fuel servicing fuel type (AVGAS, JP-4, JP- 5, JP-8, JP-10, and all similar fuels) does not change/modify the requirements of this UFC. This criteria in this UFC is not appropriate/adequate for gaseous or liquefied gaseous fuels, propellants or oxidizers.

[C] 5-15.1 Previous SSEA approvals do not apply to new construction or existing construction not specifically identified in a SSEA report.

5-15.2 Separation

Provide a 1-hour fire resistive masonry wall construction between aircraft fuel servicing areas the rest of the building and all other aircraft servicing areas.

Alternative provide 2-hour fire resistive wall of any construction type between aircraft fuel servicing areas the rest of the building and all other aircraft servicing areas. Combinations of the construction types is not allowed

[C] 5-15.2. Only one aircraft is allowed in an unseparated location during fuel servicing operations. Exception: SSEA approvals for multiple aircraft under specific combat situations/limitations.

5-15.3 Electrical

Class I Division2 (CID2) (Zone 2) to not less than the height of highest door.

[C] 5-15.3 Operations alternative in an existing legacy building, provide a shunt trip to de-energize all electrical not required for the fuel servicing operation.

5-15.4 Fueling System

Type V fuel system preferred; in absence of Type V, pantographs inside the hangar supplied by aircraft refueler vehicles connected to a single point connection outside the hangar.

[C] 5-15.4 Authorization to use fuel supply methods other than the requirements in 5-15.4 is outside this installed facility criteria and is a post construction operational safety approval process.

5-15.5 Wall Surfaces

Wall surfaces in direct line with aircraft fuel vents must have an impervious surface unaffected by aircraft fuels and fuel sprays. Concrete, CMU, and metal surfaces painted or unpainted meet these requirements, sheetrock including type X and other moisture resistant types painted or unpainted are not allowed. Other materials must be submitted for DFPE approval

5-15.6 General Fuel Servicing Area Ventilation

Provide ventilation in accordance with this UFC, UFC 3-410-01, and UFC 3-410-04N. The ability to vary the amount of outside air needs to be in the design. Locate outside air intakes in areas free from contamination. Provide a system capable of ventilating the bay at not less than 1.7 cfm/ft^2 during fuel servicing and for a period of time not less than 1 hour following fuel servicing. Ventilate the aircraft servicing bay space at all other times at a minimum ventilation rate of 0.05 cfm/ft^2. Control the ventilation system by monitoring the concentration of vapors in the space. The use of photoionization detectors (PID) is the preferred method. The level must be maintained below 100 milligram per meter cubed milligram per meter cubed (mg/m^3) (14.4 parts per million (ppm)) for JP-8 per the National Institute of Occupational Safety & Health (NIOSH) recommended exposure limit. During maintenance periods, operate the system to maintain fuel vapor concentrations below 14.4 ppm. A minimum of three monitoring points is required unless the size of the hangar is within the listed coverage of two sensors will adequately protect the space.

5-15.6.1 Emergency Fuel Servicing Area Ventilation

A separate emergency ventilation system will be used to ventilate the aircraft servicing bay in the event of high fuel vapor concentrations in the hangar. The emergency ventilation system will energize to maintain the space at or below 14.4 ppm. The ventilation rate is based on providing a minimum of 20 air changes per hour (ACH) at up to 2 ft. (610 mm) above the finished floor. In aircraft servicing bays with lifts, landing gear pits and recessed inspection areas, locate an additional detector in each below-floor area, and increase the emergency ventilation rate to 30 ACH to ensure proper ventilation and removal of the vapors.

5-15.6.2 Positive Pressure Ventilation

Provide office space, break room, and support equipment/tool room with positive pressure ventilation to prevent vapors and gases from migrating from the aircraft fuel servicing area into all adjacent areas even when separated by 2-hour rated construction.

5-15.6.3 Negative/Neutral Pressure Ventilation

When appropriate, provide negative pressure ventilation in restrooms and locker rooms. When these spaces are located next to, and thus will pull air from, areas with fuel/toxic vapors, provide sufficient supply air to allow this space to be at a neutral pressure (to prevent fuel/toxic vapor infiltration.)

5-15.7 Flammable Liquids Spill and Fire Suppression/Control

None required. See 5-6.1.2.1.

5-15.8 Requirements for Aircraft Fueling Servicing Under New and Existing Weather Shelters

Weather shelters are generally considered organizational equipment (not facilities), however, certain utility features including electrical features are installed as real property or are maintained as real property similar equipment. Structures with more than 2 sides (including doors) are classified for safety and protection purposes aircraft hangars, regardless of identifying nomenclature and must meet the requirements of this UFC for hangars.

[C] 5-15.8 Weather shelters with 2 or fewer sides (≤ 50% perimeter) are considered open ramp and are permitted to conduct fuel servicing operations in accordance with T.O. 00-25-172.

5-15.8.1 New Electrical Equipment Installations

Areas below the surface of the parking ramp are classified Class I Division 1 (Zone 1). Areas above the surface of the parking ramp and within the fuel safety servicing zone (FSSZ) area up to within 12 inches of the roof of the weather shelter are electrically classified Class I Division 2 (Zone 2).

5-15.8.2 Legacy Electrical Equipment Installations Renovation & Repairs

Option 1: Areas below the surface of the parking ramp must be classified Class I Division 1 (Zone 1). Areas above the surface of the parking ramp and within the fuel safety servicing zone (FSSZ) area up to within 12 inches of the roof of the weather shelter must be electrically classified Class I Division 2 (Zone 2).

Option 2: Provided a shunt trip outside the fuel safety servicing zone (FSSZ) to de-energize all electrical service not required for the fuel servicing operation.

5-15.8.3 Wall Surfaces

Wall surfaces and structural elements in direct line with aircraft fuel vents must have an impervious surface unaffected by aircraft fuels and fuel sprays. Concrete, CMU, and

metal surfaces painted or unpainted meet these requirements, sheetrock including type X and other moisture resistant types painted or unpainted are not allowed. Other materials must be submitted for DFPE approval

Replace 5-16 thru 5-16.4 with the following: 5-16 PROTECTIVE AND HARDENED/SEMI-HARDENED AIRCRAFT SHELTERS (PAS AND HAS)

Protective and hardened/semi-hardened aircraft shelters are sited and constructed in accordance UFC 3-340-01 and UFC 3-340-02. PAS and HAS are special purpose hangars.

[C] 5-16 These shelters are combat assets intended to be fully operational under combat conditions with no installation utility support; capable of launch and recovery of aircraft for multiple missions.

5-16.1 Hazardous (Classified) Locations

Classify the entire HAS/PAS and personnel shelters, offices, or other structure within the HAS/PAS as Class I, Division 2. Where approved in overseas areas, electrical equipment is permitted in accordance with local codes with equivalent electrical hazardous location requirements. Electrical codes/standards cannot be mixed within a building or structure only a single code/standard is allowed. Example: Directive 94/9/EC – ATEX95; European Union Zone 2, United Kingdom Zone 2, Japanese Industrial Standards Zone 2. OCONUS locations not having established national/regional electrical codes must use the National Electric Code or seek guidance from the CFPE.

[C] 5-16.1 These shelters have been evaluated through the SSEA process for most aircraft types to permit in-shelter fuel servicing when these electrical requirements are present. Failure to provide these electrical features would compromise a significant operational mission capability. See T.O. 00-25-172 for additional information.

5-16.2 Flammable Liquids Spill and Fire Suppression/Control

None required. See 5-6.1.2.1.

5-16.3 Fire Controls and Notification

Notification will be visual and audible (NFPA temporal pulse) using high noise area speakers. Activation will be by manual stations adjacent the personnel entrance door and in the opposite rear corner of the shelter.

5-16.4 Egress Marking

Photo luminescent marking will be used. The door leaf will be outlined with a 1-inch (25 mm) wide band and the door frame will be outlined in a 1-inch (25 mm) side band on the sides and top. A running man not less than 6-inch x 6-inch (150 mm x150 mm) will be mounted at the floor level centered on the door just above the 1-inch (25 mm) band.

A second running man will be mounted either top center on the door or just above the door depending on the best general visibility through-out the shelter. The installation is permitted to add additional egress marking, if desired.

The secondary means of escape is normally out the exhaust opening; locations of the photo-luminescent marking will be locally determined. Pathway marking to either the door or the secondary means of escape is not required. When a ladder or wall mounted rungs are provided consideration should be given to photoluminescent marking on each rung.

Replace 5-17 through 5-17.5 with the following: 5-17 MODERNIZATION OF EXISTING (LEGACY) FIRE PROTECTION SYSTEMS

This section provides technical guidance for the phase out of PFAS containing foam fire suppression and for the continuing phase out of all foam-based fire extinguishing systems in aircraft hangars by 1 March 2023. This section prioritizes the follow-on actions to aid programmers and project managers in targeting their efforts on the on the most critical corrective actions and modernizations first (e.g., addressing the 1-A facilities before the 1-B facilities and so on through the priority list). The target dates in this section are subject to revision as the Foam Sundown program matures, consult with the CFPE for the most current target dates.

This section provides criteria for the modernization and life-cycle sustainment requirements of existing aircraft hangar fire protection. Apply this section to existing aircraft hangar servicing area fire protection systems wholly or partially designed to criteria other than in this UFC for new facilities. Lifecycle obsolesce must be evaluated on several factors: frequency of repair, component condition, availability of parts or new/retrofit component availability. Age alone is not a determining factor in lifecycle obsolesce but is considered a predictor of future supportability.

[C] 5-17 General priorities for programming modernization projects are suggested in the following criteria paragraphs; however, each installation should adjust their project priorities as appropriate to meet the required deadlines for AFFF use and for fire suppression system modernization. The phase-out of all foam systems is also an Air Force objective and should be included in installation project priorities.

C] 5-17 The minimum lifecycle for installed hangar fire suppression systems is typically 50 years with ITM in accordance with UFC 3-601-02 and periodic modernization. AF/A4 has directed all out-of-service hangar fire suppression systems must be operational not later than the end of FY26 or the hangar is no longer allowed to be used for aircraft storage, maintenance, and repair.

[C] 5-17 See CE Dash Fire Engineering resource page for Aircraft Hangar Foam Sundown & Modernization Technical Guide for additional information on programming, design, and construction.

5-17.1 Replacement of Overhead Sprinkler Piping

Existing legacy automatic sprinkler systems complying with NFPA 409 providing 6.9 L/min/m^2 (0.17 gpm/ft^2) or greater over 464.5 m^2 (5000 ft^2) or greater will be acceptable in meeting the requirements of this UFC for modernization / upgrade projects.

Replacement of overhead piping served by a riser will only be considered if analysis of not less than four (4) 10-foot pipe sections (one high point, one low point, and two random points each remote to one another) indicates either point corrosion (pitting) or general corrosion exceeds more than 10% wall thickness.

5-17.2 Priority 1-A – AFFF Systems (Low Level nozzle systems without overhead sprinklers)

5-17.2.1 Lock-out/tag-out all AFFF concentrate features; keep all system features in water only operation. Abandon in place all foam concentrate, concentrate system, and solution system components after lock out/tag out.

5-17.2.2 Rinse with potable water all AFFF concentrate and solution containing components, and remove and capture all foam concentrate, solution, and rinsate for disposal. Abandon in place all foam system components after foam concentrate removal. Floor mounted low level nozzle features and piping systems (nozzles) in the aircraft servicing bay permitted to be removed at the installation's discretion and wall / overhead piping supporting low-level nozzles capped and abandon in place.

5-17.2.3 Provide overhead water only sprinkler installation to the new construction criteria of this UFC. Remove AFFF low level nozzle piping, AFFF storage, and features concurrent with the new sprinkler installation. New floor drainage trenches are not required.

5-17.3 Priority 1-B - Approved Fuel Servicing Hangars and HAS/PAS with Legacy Installed Foam Systems

[C] 5-17.3 Technical Order (T.O.) 00-25-172 Table 4-2 list specifically approved hangars and other facilities for aircraft fuel servicing. The T.O. and this Chapter include separate sections addressing fueling servicing in aircraft alert, hardened/protective aircraft shelters, hush houses, and fuel system maintenance facilities.

5-17.3.1 Rinse with potable water all AFFF concentrate and solution containing components, and remove and capture all foam concentrate, solution, and rinsate for disposal.

5-17.3.2 For fuel servicing hangars follow guidance in Sections **5-17.2, 5-17.4, 5-17.5, or 5.17.10** for the appropriate existing foam-water system. No flammable liquids protection is required. See Section 5-6.1.2.1.

5-17.3.3 For HAS/PAS no flammable liquids fire protection is required. See Section 5-6.1.2.1.

5-17.4 Priority I-C – AFFF Systems (Foam-water sprinklers with low-level foam nozzles and foam-water sprinklers without low-level foam nozzles)

5-17.4.1 Lock-out/tag-out all AFFF features; keep all system features in water only operation. Abandon in place all foam concentrate, concentrate system, and solution system components after lock out/tag out.

5-17.4.2 Rinse with potable water all AFFF solution and concentrate containing components, and remove and capture all foam concentrate, solution and rinsate for disposal. Abandon in place all foam system components after foam concentrate removal. Floor mounted low level nozzle features and piping systems (nozzles) in the aircraft servicing bay is permitted to be removed at the installation's discretion and wall / overhead piping supporting low-level nozzles capped and abandon in place.

5-17.4.3 Replace all sprinkler heads with new heads and restore sprinkler systems to automatic water only operations. Conduct pre-acceptance testing and acceptance testing including hydrostatic testing in accordance with NFPA 13 for either wet pipe or pre-action water only sprinkler systems as appropriate.

[C] 5-17.4.3 No action should be required for pre-action sprinkler detection systems since those have been maintained in accordance with UFC 3-601-02 Maintenance of Fire Protection Systems and are expected to be fully functional.

[C] 5-17.4.3 Most foam water sprinkler systems are designed at 6.5 L/min/m^2 (0.16 gpm/ft^2) or greater over the entire floor area of the servicing bay therefore conversion of these systems to water only sprinklers systems are acceptable for meeting the Air Force performance goals and requirements of this UFC. New hydraulic calculations are not required.

5-17.4.5 Replace the legacy sprinkler system when the life cycle is exceeded or is obsolete with sprinkler protection in accordance with Section **5-6.1.2.2**. New floor drainage trenches are not required. Remove abandoned AFFF system features at the sprinkler life-cycle replacement point.

5-17.5 Priority 1-D – AFFF Low Level Nozzles with Water Sprinklers over-head.

5-17.5.1 Lock out/tag out all AFFF features, keep all system features in water only operation. Abandon in place all foam concentrate, concentrate system, and solution system components after lock out/tag out.

5-17.5.2 Rinse with potable water all AFFF solution and concentrate containing components, and remove and capture all foam concentrate, solution and rinsate for disposal. Abandon in place all foam system components after foam

concentrate removal. Floor mounted low level nozzle features and piping systems (nozzles) in the aircraft servicing bay is permitted to be removed at the installation's discretion and wall/overhead piping supporting low-level nozzles capped and abandon in place.

5-17.5.4 Replace the legacy sprinkler system when its life cycle is exceeded or is obsolete with sprinkler protection in accordance with Section **5-6.1.2.2**. New floor drainage trenches are not required. Remove abandoned AFFF system features at the sprinkler life-cycle replacement point.

5-17.6 Priority 1-E – Fire Protection Water Supply Systems

Complete the required repairs and modernization directed in the AF/A4 policy memo aircraft hangar fire suppression system modernization, 3 June 2019.

5-17.7 Priority 1-F – Obsolete Systems

Obsolete systems include systems over 50-years old (with evaluation), and systems the manufacturer is no longer providing parts and service. Program for compliance with the new construction criteria of this Chapter with the exception new floor drainage trenches are not required. Replace all sprinkler heads.

5-17.8 Priority 2 – Existing Unprotected Hangars

Program for installation of the new construction requirement of this Chapter with the exception new floor drainage trenches are not required.

5-17.9 Priority 3 - Existing Water Only Deluge Systems

Program the replacement/conversion to the new construction requirement of this chapter with the exception new floor drain trenches are not required. Conversion of the deluge system piping to a wet pipe or pre-action system (head replacement only) is permitted when analysis of not less than four (4) 10-foot pipe sections (one high point, one low point, and two random points each remote to one another) indicates neither point corrosion (pitting) nor general corrosion exceeds more than 10% wall thickness loss to corrosion effects. Converted deluge systems do not require new hydraulic recalculation.

5-17.10 Priority 4 – High Expansion Foam Systems

5-17.10.1 Lock out/tag out all high expansion foam system features; abandon high-expansion features in place. Remove manual start and stop stations and signs. Terminate manual start and stop stations wires with heat shrink end terminals and install blank NEMA 4 enclosures covers. Abandon in place all high expansion foam system components in place. Keep the existing overhead sprinkler system in automatic operation.

5-17.10.2 Rinse with potable water all high expansion foam solution and concentrate containing components, and remove and capture all foam concentrate, solution and rinsate for disposal. Abandon in place all foam system components after foam concentrate removal.

5-17.10.3 Replace the legacy sprinkler system when its life cycle is exceeded or is obsolete with sprinkler protection in accordance with Section **5-6.1.2.2**. New floor drainage trenches are not required. Remove all abandoned high expansion system features at the sprinkler life-cycle replacement point.