What Are We Protecting?

Ordinary Combustibles
- Wood
- Cloth
- Paper
- Wool

Flammable Liquids
- Gasoline
- Acetone
- Kerosene

Energized Electrical Equipment
- Transformers
- Computers
- Electric Ovens

Combustible Metals
- Magnesium
- Titanium
- Zirconium
- Sodium
- Potassium

CLASS A FOAM
CLASS B FOAM
FOAM NOT RECOMMENDED
How Does It Work?

- Remove heat at a faster rate than it is released
- Separate the fuel from the oxidizing agent
- Dilute the vapor-phase concentration of the fuel and/or oxidizing agent below that necessary for combustion
Synthetic Foam Concentrates

- **AFFF – Aqueous Film Forming Foam (low expansion)**
  - Uses Fluorosurfactants to aid in lowering both surface tension and fuel pick-up (oleophobicity).
  - Concentrate is a Newtonian Fluid (behaves like water).

- **AR-AFFF – Alcohol Resistant Aqueous Film Forming Foam (low expansion)**
  - Similar to above but adds a polysaccharide “gum” to form a barrier between foam and polar solvent fuel.
  - Concentrate is a Non-Newtonian Fluid (much higher viscosity).

- **FFF or F3 – Fluorine Free Foam (low expansion)**
  - Contains no fluorine but has additional hydrocarbon surfactants to aid in foaming.

- **High Expansion Foam (Hi-Ex or HEF)**
  - A detergent based concentrate with no fluorine but formulated to support formation of a larger foam bubble.
What is C8 / C6?

Refers to the carbon molecule chain length contained within fluorosurfactants. These fluorosurfactants are present within fluorinated foams (ex. AFFF, AR-AFFF)

Older generations of AFFF contained C8 fluorosurfactants.

Most domestic AFFF foam manufacturers have transitioned to C6 chemistry to meet requirements of the EPA’s voluntary stewardship program as of January 2015.

C8 & C6 terminology does not apply to F3 or High Expansion foams as they do not contain fluorosurfactant chemistry.
Discharge Devices

- Shall be listed with the specific foam concentrate being used. (whenever possible)
- Verify with foam manufacturer.
- Verify with UL or FM online guides.
Balanced Pressure Proportioning
Common Foam Systems
Classification of Hangars

The classification or “Group” of the hangar must first be determined in order to define fire protection options.

NFPA 409 provides conditions to meet specific Group classification.
GROUP I - Hangars

A hangar with at least one of the following conditions:

- An aircraft access door height over 28 feet.
- A single fire area in excess of 40,000 square feet.
- Housing an aircraft with tail height over 28 feet.
NFPA 409

GROUP II - Hangars

A hangar with both of the following conditions:

★ An aircraft access door height of 28 feet or less.
★ A single fire area not larger than 40,000 square feet, but equal to or greater than those specified in NFPA 409, Table 4.1.2 for specific types of construction.
GROUP III - Hangars

This hangar may be a freestanding individual unit for a single aircraft, a row hangar having a common structural wall and roof system and housing multiple aircraft as well as having door openings for each aircraft, or an open bay hangar capable of housing multiple aircraft, and having both of the following conditions:

- An aircraft access door height of 28 feet or less.
- A single fire area up to the maximum permitted for specific types of construction as defined in NFPA 409, Table 4.1.3
NFPA 409

GROUP IV - Hangars

This is a membrane-covered, ridged, steel frame structure.
Protection Options

Once the aircraft hangar classification has been determined, fire protection requirements can be established.

There are (3) types of primary foam systems available for aircraft hangars.

- PRIMARY FOAM-WATER SPRINKLER SYSTEMS
  - May require supplemental oscillating foam monitors
- LOW LEVEL FOAM SYSTEMS (Monitors or Grate Nozzles)
- HIGH EXPANSION FOAM SYSTEMS

Supplemental Requirements for all above systems

- FOAM-WATER HAND HOSE LINE SYSTEMS
Foam Demand Calculations

APPLICATION RATE

over

an area of coverage

for a specific - time period

- All Low-Expansion foam systems are sized on a (GPM / FT²) application density of solution flow philosophy
- All Medium and High-Expansion foam systems are sized on a (CFM) volumetric rate of discharge philosophy
Group I Hangar Protection

OPTION 1

Group I hangars overhead foam-water deluge systems as primary protection. AFFF with non-aspirating sprinklers uses .16 gpm/ft² application density / 130 ft² maximum head spacing.

The maximum protected floor area under an individual deluge system shall not exceed 15,000 ft².

Sprinklers shall have a minimum nominal orifice size of ¼ in. and shall be listed with the particular type of foam concentrate to be used in the system.

When the hangar contains aircraft with wing areas exceeding 3000 ft², the hangar must also be provided with a monitor system. A monitor system is also recommended when the hangar stores several aircraft with wing areas less than 3000 ft² each.

The minimum design density for this monitor system is to cover center fuselage and wing area at a density of .10 gpm/ft² for AFFF.
OPTION 2

- The hangar must contain a water sprinkler system (wet pipe or pre-action) and a low level foam-water system to cover the entire hangar floor area.

- The maximum sprinkler system size shall not exceed 52,000ft².

- The water system is based on .17 gpm/ft² application rate over any 15,000ft² area.

- 130 ft² maximum head spacing.

- QR K-5.6 or K-8.0 sprinklers shall be used with a temperature rating of 175°F. (200°F may be permitted)

- The foam-water monitor or grate nozzle system is based on .10 gpm/ft² (AFFF) application rate over the entire hangar area.
Group I Hangar Protection

OPTION 3

The hangar must contain a water sprinkler system (wet pipe or pre-action) and a high-expansion system to cover the entire hangar floor area.

The maximum sprinkler system size shall not exceed 52,000 ft².

The water system is based on .17 gpm/ft² application rate over any 15,000 ft² area.

130 ft² maximum head spacing.

QR K-5.6 or K-8.0 sprinklers shall be used with a temperature rating of 175°F. (200°F may be permitted)

The high-expansion foam system is designed to deliver foam at a rate providing a 3’ depth in 1 minute.

Foam generators are required to be supplied with fresh ‘outside air’. Relief venting is also required with free air flow not to exceed 1000 ft/min.
Group II Hangar Protection

OPTION 1

- Requirements similar to protection scheme for Group I Option I.
Group II Hangar Protection

OPTION 2

- The hangar must contain a water sprinkler system (wet pipe or pre-action) and a low level foam-water system to cover the entire hangar floor area.

- The maximum sprinkler system size shall not exceed 52,000ft².

- The water system is based on .17 gpm/ft² application rate over any 5000ft².

- 130 ft² maximum head spacing.

- QR K-5.6 or K-8.0 sprinklers shall be used with a temperature rating of 325°F - 375°F.

- The foam-water monitor or grate nozzle system is based on .10 gpm/ft² (AFFF) application rate over the entire hangar area.
Group II Hangar Protection

OPTION 3

The hangar must contain a water sprinkler system (wet pipe or pre-action) and a high-expansion foam system to cover the entire hangar floor area.

- The maximum sprinkler system size shall not exceed 52,000ft².
- The water system is based on .17 gpm/ft² application rate over any 5000ft².
- 130 ft² maximum head spacing.
- QR K-5.6 or K-8.0 sprinklers shall be used with a temperature rating of 325°F - 375°F.
- The high-expansion foam system is designed to deliver foam at a rate providing a 3’ depth in 1 minute.
Group II Hangar Protection

OPTION 4

- The hangar must contain a closed head AFFF foam-water sprinkler system.

- Maximum head spacing is limited to 100ft².

- The maximum protected floor area under an individual sprinkler system shall not exceed 15,000ft².

- Sprinklers shall have a minimum nominal orifice size of ¼ in. and shall be listed with the particular type of foam concentrate to be used in the system.

- Sprinkler temperature rating shall be 175°F - 225°F.

- System shall not be required to be pre-primed with foam-water solution.
Foam-Water Hand Hose Systems

All hangars housing fueled aircraft shall have Foam-Water Hand Hose Systems.

Exception: Group IV hangars with fire areas less than 12,000ft² do not require foam hose lines.

The hand hose lines must be situated with a sufficient length of hose to provide water or foam on each side and into the interior of the aircraft. Ansul recommends solid booster hose on continuous flow reels / 150’ maximum recommended length.

Two (2) hand hose lines flowing are minimum for agent and water calculations. Above length considerations may dictate additional hose lines are required to cover additional areas of the hangar.

The supply of foam concentrate must be sufficient to supply two (2) hand hose lines for a period of 20 minutes at a discharge rate of 60 gpm each.

Concentrate supply can be included in main system tanks or provided independently. Water supply must come from it’s own riser from the water supply header. Ansul recommends AFFF to always be used for this application.
# Primary System Discharge Times

<table>
<thead>
<tr>
<th>Hangar</th>
<th>Foam Fire Protection System Description</th>
<th>Foam Discharge Duration in Minutes</th>
<th>Water Supply in Duration Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group I</strong></td>
<td>Deluge foam / water sprinkler</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Supplementary foam system</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Closed head water sprinkler with low level foam system</td>
<td>10 (AFFF) 12 (High-expansion)</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Hand hose reels</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>Group II</strong></td>
<td>Closed head water sprinkler with low level foam system</td>
<td>10 (AFFF) 12 (High-expansion)</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Low-expansion foam system</td>
<td>10</td>
<td>At least twice foam discharge time</td>
</tr>
<tr>
<td></td>
<td>High-expansion foam system</td>
<td>12</td>
<td>At least 24 minutes</td>
</tr>
<tr>
<td></td>
<td>Closed head foam / water sprinkler</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Hand hose reels</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hangar</th>
<th>Foam Fire Protection System Description</th>
<th>Foam Discharge Duration in Minutes</th>
<th>Water Supply in Duration Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group III</strong></td>
<td>Same as Group II Hangar</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Group IV</strong></td>
<td>Low-expansion foam system</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>High-expansion foam system</td>
<td>12</td>
<td>45</td>
</tr>
</tbody>
</table>

**Note:** Add 500 gpm for outside hose lines and 120 gpm for foam hose reel stations inside the hangar when doing water supply calculations.
## High Expansion Demand Calculation

**PROJECT NAME -** ISHAM AVIATION GROUP I HANGAR

<table>
<thead>
<tr>
<th>Hangar Dimensions</th>
<th>Length</th>
<th>Width</th>
<th>Sq. Ft.</th>
<th>cfm / Sq. Ft.</th>
<th>Required cfm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>165</td>
<td>140</td>
<td>23100</td>
<td>3</td>
<td>69300</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GPM / Sq. Ft.</th>
<th>GPM</th>
<th>cfm / gpm</th>
<th>Breakdown cfm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprinkler breakdown factor (Rs)</td>
<td>0.17</td>
<td>15000</td>
<td>2550</td>
</tr>
</tbody>
</table>

Required cfm: 

\[ \text{Required cfm} = \text{Required cfm} + \text{Breakdown cfm} \times 1.15 \]

### Foam Generator Used

<table>
<thead>
<tr>
<th>Foam Generator Used</th>
<th>Minimum PSI</th>
<th>cfm output</th>
<th>Flow GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet-X-15A UL</td>
<td>50</td>
<td>14491</td>
<td>119</td>
</tr>
</tbody>
</table>

### Agent Calculation

Required cfm High Expansion Foam / cfm output per Generator = 7.52 or 8

### Generators Required

\[ \text{Generators Required} = \frac{\text{Total flow all generators (GPM)}}{\text{Generators Sprinkler Handline}} \]

\[ \text{Required Gallons of Jet-X Concentrate} = \frac{952 + 2550 + 120}{263} = 263 \]

Required Sprinkler Demand = 2550 gpm

Required Foam-Water Hose Demand

\[ \text{Required Discharge Duration} \times \text{Conc. Percentage as decimal} = 72 \text{ Gallons of AFFF required.} \]

Minimum flow requirements for all Systems

<table>
<thead>
<tr>
<th>Generators</th>
<th>Sprinkler</th>
<th>Handline</th>
</tr>
</thead>
<tbody>
<tr>
<td>952</td>
<td>2550</td>
<td>120</td>
</tr>
</tbody>
</table>

\[ \text{GPM*} = 3622 \]

*Note: This does not include any overage allowance or outside hose stream requirements.*
NFPA 409 states that generators shall be arranged to achieve initial foam coverage in the anticipated aircraft parking area. Design objective is to achieve coverage of entire aircraft storage and service area to within 5 ft of perimeter walls within 3 minutes.

Chart is useful for overhead generator location planning. Remember discharges outputs from multiple generators that contact each other help foam to travel to uncovered areas faster and fill irregular shapes.
Outside Air

NOTE:
WHEN USING OUTSIDE AIR
RELIEF VENTING MUST BE
CONSIDERED.

NOTE:
BECAUSE OF CONSTRUCTION
VARIATIONS ACTUAL MOUNTING
HARDWARE TO BE SUPPLIED
BY OTHERS.
2016 NFPA 409 requires a 100% reserve supply to be kept on site or ability to be obtained from an outside source within 24-hours. Follows guidance from NFPA 11.

Previous editions of NFPA 409 required a direct connected reserve tank.
Bird Netting
Additional Considerations

- **Draft Curtain Requirements**
  - Draft Curtains Required to segregate fire areas into no more than 15,000 Sq. Ft. each for all Group 1 hangars and Group II where foam-water deluge sprinkler systems are provided.
  - Minimum Draft Curtain depth to be no less than 1/8 of the roof structure height

- **Column Protection Requirements**
  - Columns within hangar area to be protected with fire proofing or additional sprinkler protection.

- **Fire Extinguishers**
  - Wheeled and portable extinguishers shall be provided in accordance with NFPA 10.
The FAA Contract Tower Program (FCT)

Presented to: Air Transportation Advisory Committee Meeting

By: Franklin J. McIntosh
Director Operations (A), Air Traffic Services, CSA

Date: November 7, 2019
Contracting for air traffic control services within the FAA resulted from the 1981 FAA Air Traffic Controllers strike. FAA air traffic controller resources were being strained and required that FAA allocate assets to locations with the greatest need. This meant that some of the former FAA staffed airport traffic control towers (ATCT) would be faced with closure.

The previously staffed FAA towers were referred to as Level I Visual Flight Rule (VFR) towers. Once the effects of the strike were stabilized, the FAA was able to address the need for air traffic control services at these locations.
The FAA Contract Tower (FCT) Program started in 1982 as a pilot program to determine if contracting out low activity visual flight rule (VFR) towers would be a cost effective way to provide air traffic control services at those locations. Over the ensuing years more locations were added to the program as it was proving not only to be cost effective but also on par with the safety objectives of FAA staffed control towers. The earlier contracted towers were awarded under multiple single source contracts throughout the various FAA Regions.

A National contract was later established in 1994. There are currently 256 contracted towers in the Program.
### FAA Contract Tower (FCT) Statistical Overview

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Time Employees</td>
<td>1368</td>
</tr>
<tr>
<td>ANG Air Force</td>
<td></td>
</tr>
<tr>
<td>Operated/DoD Employees</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>1398</td>
</tr>
</tbody>
</table>

*Note: The numbers are approximate*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of FAA-owned FCTs</td>
<td>104</td>
</tr>
<tr>
<td>Number of Sponsor-owned FCTs</td>
<td>152</td>
</tr>
<tr>
<td>Total number of FCTs</td>
<td>256</td>
</tr>
</tbody>
</table>
Fort Worth District FCTs
16 Total

<table>
<thead>
<tr>
<th>RVA Area IV</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ardmore Muni, OK</td>
<td>ADM</td>
</tr>
<tr>
<td>Waco Downtown, TX</td>
<td>CNW</td>
</tr>
<tr>
<td>Shreveport Downtown, LA</td>
<td>DTN</td>
</tr>
<tr>
<td>Denton, TX</td>
<td>DTO</td>
</tr>
<tr>
<td>Fort Worth Spinks, TX</td>
<td>FWS</td>
</tr>
<tr>
<td>Arlington Muni, TX</td>
<td>GKY</td>
</tr>
<tr>
<td>Grand Prairie, TX</td>
<td>GPM</td>
</tr>
<tr>
<td>North Texas Regional</td>
<td>GYI</td>
</tr>
</tbody>
</table>
## Fort Worth District FCTs (Cont.)

16 Total

<table>
<thead>
<tr>
<th>RVA Area IV</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hobbs, NM</td>
<td>HOB</td>
</tr>
<tr>
<td>Mesquite, TX</td>
<td>HQZ</td>
</tr>
<tr>
<td>Lawton, OK</td>
<td>LAW</td>
</tr>
<tr>
<td>Dallas Executive, TX</td>
<td>RBD</td>
</tr>
<tr>
<td>San Angelo, TX</td>
<td>SJT</td>
</tr>
<tr>
<td>McKinney, TX</td>
<td>TKI</td>
</tr>
<tr>
<td>Texarkana, AR</td>
<td>TXK</td>
</tr>
<tr>
<td>Tyler, TX</td>
<td>TYR</td>
</tr>
</tbody>
</table>
FCT Program Cost Benefit

FCTs have demonstrated great value for the U.S. Tax Payers, the Flying Community, and the FAA

• FCTs represent 49 percent% of all the Federal air traffic control towers in the United States.

• There are approximately 1,400 contract controllers, all of whom meet the same qualification and training requirements as FAA controllers.

• FCTs provide service for more than 16 million operations in CY18 (48% of U.S. general aviation traffic and 29% of total U.S. air traffic, including 2.2% of commercial passengers).

• Total number of FAA and FCT Control Towers 520

*Source of data: FAA Air Traffic Activity System (ATADS), March 2018
## FCT Operations Profile

<table>
<thead>
<tr>
<th>Operations From January 1, 2018 – December 31, 2018</th>
<th>IFR Itinerant</th>
<th>2,874,818</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IFR Overflight</td>
<td>152,346</td>
</tr>
<tr>
<td></td>
<td>VFR Itinerant</td>
<td>5,480,539</td>
</tr>
<tr>
<td></td>
<td>VFR Overflight</td>
<td>920,022</td>
</tr>
<tr>
<td></td>
<td>Local</td>
<td>6,635,985</td>
</tr>
<tr>
<td></td>
<td>Tower Operations</td>
<td>16,063,710</td>
</tr>
</tbody>
</table>
Interest in the FCT Program

- Entry into the FCT program requires that an airport have a minimum Benefit Cost (B/C) ratio of 1.0. Airports whose B/C drops below 1.0 after entry into the program are offered to remain in the program under a Cost Share Agreement between the FAA and the airport sponsor.

- Since its inception, the FAA Contract Tower (FCT) program has proven it can save the government money without comprising safety. A cost comparison study conducted in 1998 showed that a savings of over 30 million dollars was realized by converting 109 control towers to contract operations.
New Start Phases

Interest Phase:
• The Airport Sponsor has expressed interest in the FCT Program but has not submitted an application package.

Applicant Phase:
• The Airport Sponsor has submitted a completed application package with all of the required supporting documentation.

Candidate Phase:
• The Airport Sponsor has received a Benefit to Cost Ratio (B/C) of 1.0 or greater.

Participant Phase:
• The airport has an operational control tower, a satisfactory Operational Readiness Inspection (ORI), the Contracting Officer (CO) has signed the TOA and funding is available.
## FAA POC for FCT

<table>
<thead>
<tr>
<th>CSA</th>
</tr>
</thead>
</table>
| Programs Implementation Manager  
Abraham Oomen  
817-222-4261 |
Questions
The Corporate Airport of Choice
Current Airport Project

- Airport – Perimeter Fencing
  - Phase I – West Boundary was 100% local funding
  - Phase II – Security Perimeter Fence – 70% TxDOT/FAA funded.
Private Sector Developments

• Harrison Aviation – Executive Hangar
  • 35,000 sq. ft. Hangar
  • 70,000 sq. ft. Apron

• ATP – Flight Training Academy
  • 14,000 sq. ft. Training Center
  • 12,000 sq. ft. Hangar
  • 2,000 sq. ft Office
CAT EX Questionnaire

• Form used to request a categorical exclusion from the requirement to perform an environmental assessment.
• Required if the project will make a change to an Airport Layout Plan (ALP).
• Demonstrates that a project does not have a significant effect on the human environment.
• CATEXs are not exemptions from NEPA; rather, they are one type of NEPA review.
CAT EX Questionnaire

• TxDOT prepares for grant-funded projects.
• Airport or developer must prepare for private developments.
• Submitted to TxDOT for review.
• TxDOT may sign off or forward to the FAA for additional review.
Sections of a CAT EX

- Project Description
- National Historic Preservation Act (NHPA) resources
- Department of Transportation Act Section 4(f) and 6(f) resources
- Threatened or Endangered Species
- Other Resources
- Disruption of an Established Community
- Environmental Justice
- Surface Transportation
Sections of a CAT EX, cont’d

• Noise
• Air Quality – non-attainment areas require an emissions inventory.
• Water Quality
• Highly Controversial on Environmental Grounds
• Inconsistent with Federal, State, Tribal or Local Law
• Light Emissions, Visual Effects, and Hazardous Materials
• Indirect/Secondary/Induced Impacts
Airport Staff Can Prepare It

• Each question must have a documented answer, but the information is publicly available on the Internet and from your City/County.
• The exception is the emissions inventory, if the airport is in a non-attainment area – Denton, Dallas, Collin, Tarrant, Johnson, Ellis, Kaufman, Parker, Rockwall, Hunt, Hood, Henderson.
Questions?

Karen VanWinkle
817-459-5559
karen.vanwinkle@arlingtontx.gov