MEMORANDUM

DATE: May 8, 2013
TO: Principal and Alternate Members of the Technical Committee on Foam (FOM-AAA)
FROM: Barry Chase, NFPA Staff Liaison
       Office: (617) 984-7259       Email: BChase@nfpa.org
SUBJECT: AGENDA – NFPA 11 First Draft Meeting (Fall 2014)
       May 22-23, 2013, Atlanta, GA

1. Call to Order – May 22, 8:00am ET
2. Introductions and Attendance
3. Review Agenda
4. NFPA Staff Liaison Presentation and Review of Key Dates in Current Cycle
5. Chairman Comments
6. Approval of Previous Meeting Minutes
   b. March 27, 2013 - NFPA 11 Pre-First Draft Meeting (F2014)
7. Act on Public Input and Generate First Revisions for NFPA 11
   a. Task Group on Self-Expanding Foam (Chair: E. Norman)
   b. Task Group on Galvanized Pipe (Chair: R. Kasiski)
   c. Task Group on Dry Foam (Chair: J. Leedy)
   d. Presentation on Dry Foam (Joe Riordan, Alyeska Pipeline)
   e. Presentation on Water-Driven Pump Proportioners (Wally Barker, FireDos)
8. Other Business
9. Next Meeting
10. Adjourn Meeting

Please submit requests for additional agenda items to the chair at least seven days prior to the meeting, and notify the chair and staff liaison as soon as possible if you plan to introduce any large-scale revisions at the meeting.

All NFPA Technical Committee meetings are open to the public. Please contact me for information on attending a meeting as a guest. Read NFPA's Regulations Governing the Development of NFPA Standards (Section 3.3.3.3) for further information.

Additional Meeting Information:
If you have any questions, please feel free to contact Elena Carroll, Project Administrator at 617-984-7952 or by email ecarroll@nfpa.org.

C. Standards Administration
Attachment #1: Previous Meeting Minutes

B) March 27, 2013 - Pre-First Draft Meeting, 2015 Edition
Minutes
Technical Committee on Foam

Teleconference
Friday, May 8th, 2009, 2 PM EDT

Attendance:
N/A

Minutes:

1. Chairman Purvis call the meeting to order at 2:04 EDT.
2. Tim Hawthorne, NFPA Staff Liaison, took roll call.
3. Minutes from the ROP Meeting held in Philadelphia, PA on June 17 – 18, 2008 were reviewed and approved unanimously without changes.
4. Tim Hawthorne reviewed the NFPA procedures that apply to the committee dealing with a document at this stage of the document cycle.
5. Two document items were voted upon and approved unanimously – 1) Revising Annex F to be up-to-date with the current environmental issues regarding foam and 2) adding a shutdown procedure to 4.3.2.3.
6. There was no old business to discuss.
7. New business – the expected schedule of the document was reviewed by Tim Hawthorne.
8. The meeting was adjourned at 3:14 EDT.

Respectfully Submitted,
Joan Leedy, Secretary
## MEETING MINUTES

### ATTENDANCE:

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<tr>
<th>Role</th>
<th>Name</th>
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<td>Chairman</td>
<td>Fay Purvis</td>
<td>Vector Fire Technology, Inc., PA</td>
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<td>Secretary</td>
<td>Joan Leedy</td>
<td>Dyne Technologies, MN</td>
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<tr>
<td>Staff Liaison</td>
<td>Barry Chase</td>
<td>National Fire Protection Association, MA</td>
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<td>Principals</td>
<td>Jean-Pierre Asselin</td>
<td>FireFlex Systems, Inc., QC</td>
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<td>V. Frank Bateman</td>
<td>UTC / Kidde Fire Fighting, CA</td>
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<td>Jerald Borowski</td>
<td>Amerex Corporation, WI</td>
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<td>Richard Coppola</td>
<td>Fire Protection Industries, Inc., PA</td>
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<td>Lawrence Fisher</td>
<td>US Coast Guard, DC</td>
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<td>Steven Fox</td>
<td>Sprinklerfitters U.A. Local 483, CA</td>
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<td>Robert Kasiski</td>
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<td>Ronald Mahlman</td>
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<td>Edward Norman</td>
<td>Aqueous Foam Technology, Inc., PA</td>
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<td>Keith Olson</td>
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<td>Gaston Santerre</td>
<td>Integrated Protection Services, CA</td>
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<td>Joseph Scheffey</td>
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<td>Donald Seaman</td>
<td>CSC Advanced Marine, DC</td>
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<td>Rapid Fire Protection, Inc., ND</td>
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<td>Alternates:</td>
<td>Gerard Back</td>
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<td>Clark Shepard*</td>
<td>ExxonMobil Corporation, VA</td>
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CALL TO ORDER

The meeting was called to order at 2:04 pm EDT. Attendance was taken, and the agenda was reviewed.

ASSIGNMENT OF TASK GROUPS FOR THE REVIEW OF PUBLIC INPUT TO NFPA 11

The chair proposed the formation of three task groups to review the most demanding of the public input that was received for NFPA 11. The chair reviewed these topics and asked for volunteers to serve on each. A summary is provided here:

- **Task Group on Self-Expanding Foam**
  - Related Public Input:
    - 49 (1.1.1) 50 (1.2.1) 66 (3.3.6)
    - 67 (3.3.10.2) 68 (3.3.17.2) 69 (3.3.27.3)
    - 53 (5.2) 65 (5.3.3.3) 64 (5.3.4.1)
    - 70 (New Chap 8) 63 (8.3.4) 62 (11.2.5.3)
    - 61 (11.6.2.2) 60 (12.7)
  - Members:
    - (Chair) TBD
    - Edward Norman - Aqueous Foam Technology, Inc. [SE]
    - Raymond Quenneville - FireFlex Systems, Inc. [M]
    - Niall Ramsden - Resource Protection International [SE]
    - John Toney - Dooley Tackaberry, Inc. [IM]

- **Task Group on Galvanized Pipe**
  - Related Public Input:
    - 32 (4.7.2) 15 (4.7.2.1)
  - Members:
    - (Chair) Bob Kasiski - FM Global [I]
    - Richard Coppola - Fire Protection Industries, Inc. [M]
    - Steven Fox - Sprinklerfitters U.A. Local 483 [L]
    - Gaston Santerre - Integrated Protection Services, Inc. [SE]
    - David Sornsin - Rapid Fire Protection, Inc. [IM]
    - Austin Prather - Hayden and Company [M]
    - Martin Workman - The Viking Corporation [M]

- **Task Group on Dry Foam**
  - Related Public Input:
    - 25 (New Chapter 13) 51 (New Annex J)
  - Members:
    - (Chair) Joan Leedy - Dyne Technologies [IM]
    - Shawn Feenstra - The Viking Corporation [M]
    - Ronald Mahlman - The RJA Group, Inc. [SE]
    - Randall Hendricksen - Tyco/ChemGuard, Inc. [M]
Clark Shepard - ExxonMobil Corporation [U]
Kevin Westwood - BP International [U]

OTHER BUSINESS

- J. Scheffey requested clarification of the rules regarding copyright and distribution of substantiating materials that have been submitted as part of a public input. NFPA staff to research and provide clarification at a later date.
- J. Scheffey requested a TC copy of the latest edition of UL 162. This is related to PI #3. NFPA staff to request copy from the submitter (UL).
- It was noted that several of the public inputs have the duplicate substantiations that do not seem to be associated with the recommended revisions. NFPA staff to investigate.

ADJOURNMENT

The meeting was adjourned at 2:41 pm EDT.

Respectfully Submitted,
Barry Chase
NFPA Staff
Attachment #2: Public Input
Statement of Problem and Substantiation for Public Input

Currently, the Title does not coincide with the Scope (1.1.1). There is now a separate chapter (Chapter 7) dedicated to Compressed Air Foam Systems.

Submitter Information Verification

Submitter Full Name: Doug Hohbein
Organization: Northcentral Fire Code Develop
Submittal Date: Thu Aug 16 10:29:14 EDT 2012

Copyright Assignment

I, Doug Hohbein, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

By checking this box I affirm that I am Doug Hohbein, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature.
Public Input No. 5-NFPA 11-2012 [ Global Input ]

Revise Title of the Standard to read, "Standard for Low-, Medium-, and High-Expansion Foam and Compressed Air Foam Systems"

Statement of Problem and Substantiation for Public Input

Currently, the Title does not coincide with the Scope (1.1.1). There is now a separate chapter (Chapter 7) dedicated to Compressed Air Foam Systems.

Submitter Information Verification

Submitter Full Name: John Chartier
Organization: Northeastern Regional Fire Cod
Submittal Date: Thu Aug 16 10:43:58 EDT 2012

Copyright Assignment

I, John Chartier, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

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1.1.1
This standard covers the design, installation, operation, testing, and maintenance of low-, medium-, and high-expansion and, compressed air and self-expanding foam systems for fire protection.

Statement of Problem and Substantiation for Public Input

Self-Expanding Foam System is a different fire protection arrangement than prescribed in the current standard.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPoulos
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Thu Jan 03 13:10:08 EST 2013

Copyright Assignment

I, CHRISTOS SIDEROPoulos, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

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1.2.1
This standard is intended for the use and guidance of those responsible for designing, installing, testing, inspecting, approving, listing, operating, or maintaining fixed, semifixed, or portable low-, medium-, and high-expansion- and, compressed air and self-expanding foam fire-extinguishing systems for interior or exterior hazards.

Statement of Problem and Substantiation for Public Input

Self-Expanding Foam System is a different fire protection arrangement than prescribed in the current standard.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPoulos
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Thu Jan 03 13:14:47 EST 2013

Copyright Assignment

I, CHRISTOS SIDEROPoulos, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

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1.2.3
Low-, medium-, and high-expansion foam and compressed air foam systems are intended to provide property protection and not life safety.

Statement of Problem and Substantiation for Public Input

Sections addressing Scope (1.1.1) and Purpose (1.2.1) were revised on previous cycle to reflect the addition of compressed air foam systems and should also be added here unless compressed air foam systems are specifically intended to provide life safety.

Submitter Information Verification

Submitter Full Name: John Chartier
Organization: Northeastern Regional Fire Cod
Submittal Date: Thu Aug 16 10:46:04 EDT 2012

Copyright Assignment

I, John Chartier, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

By checking this box I affirm that I am John Chartier, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature.
Public Input No. 3-NFPA 11-2012 [ Section No. 2.3.8 ]

2.3.8 UL Publication.
Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.


Statement of Problem and Substantiation for Public Input

Update referenced standard to most recent edition.

Submitter Information Verification

Submitter Full Name: John Bender
Organization: UL LLC
Submittal Date: Tue Aug 14 13:20:39 EDT 2012

Copyright Assignment

I, John Bender, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

By checking this box I affirm that I am John Bender, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature.
Chapter 3 Definitions

3.1 General.
The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster’s Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved.
Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ).
An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Labeled.
Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* Listed.
Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.5 Shall.
Indicates a mandatory requirement.

3.2.6 Should.
Indicates a recommendation or that which is advised but not required.

3.2.7 Standard.
A document, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

3.3 General Definitions.

3.3.1 Combustible Liquid.
A liquid that has a closed-cup flash point at or above 37.8°C (100°F). [30, 2008]

3.3.1.1 Combustible Liquid Classification.

3.3.1.1.1 Class II.
A liquid that has a closed-cup flash point at or above 37.8°C (100°F) and below 60°C (140°F). [30, 2008]

3.3.1.2 Class IIIA.
A liquid that has a closed-cup flash point at or above 60°C (140°F), but below 93°C (200°F). [30, 2008]

3.3.1.3 Class III B.
A liquid that has a closed-cup flash point at or above 93°C (200°F). [30, 2008]

3.3.2* Concentration.
The percent of foam concentrate contained in a foam solution.

3.3.3 Coupled Water-Motor Pump.
A correctly designed positive displacement pump in the water supply line coupled to a second, smaller, positive displacement foam concentrate pump to provide proportioning.

3.3.4 Discharge Device.
A device designed to discharge water or foam-water solution in a predetermined, fixed, or adjustable pattern. Examples include, but are not limited to, sprinklers, spray nozzles, and hose nozzles.

3.3.4.1 Air-Aspirating Discharge Devices.
Devices specially designed to aspirate and mix air into the foam solution to generate foam, followed by foam discharge in a specific design pattern.

3.3.4.2 Compressed Air Foam Discharge Device.
A device specifically designed to discharge compressed air foam in a predetermined pattern.

3.3.4.3* Non-Air-Aspirating Discharge Devices.
Devices designed to provide a specific water discharge pattern.

3.3.5 Discharge Outlet.

3.3.5.1 Fixed Foam Discharge Outlet.
A device permanently attached to a tank, dike, or other containment structure, designed to introduce foam.

3.3.5.2* Type I Discharge Outlet.
An approved discharge outlet that conducts and delivers foam gently onto the liquid surface without submergence of the foam or agitation of the surface.

3.3.5.3 Type II Discharge Outlet.
An approved discharge outlet that does not deliver foam gently onto the liquid surface but is designed to lessen submergence of the foam and agitation of the surface.

3.3.6* Eductor (Inductor).
A device that uses the Venturi principle to introduce a proportionate quantity of foam concentrate into a water stream; the pressure at the throat is below atmospheric pressure and will draw in liquid from atmospheric storage.

3.3.6.1* In-Line Eductor.
A Venturi-type proportioning device that meters foam concentrate at a fixed or variable concentration into the water stream at a point between the water source and a nozzle or other discharge device.

3.3.7 Expansion.
The ratio of final foam volume to original foam solution volume.

3.3.8 Fire.

3.3.8.1 Class A.
A fire in ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics. [10, 2010]

3.3.8.2 Class B.
A fire in flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases.

3.3.8.3 Class C.
A fire that involves energized electrical equipment where the electrical resistivity of the extinguishing media is of importance.
3.3.9 Flammable Liquid.
A liquid that has a closed-cup flash point that is below 37.8°C (100°F) and a
maximum vapor pressure of 2068.6 mm Hg (40 psia) at 37.8°C (100°F). [30, 2008]

3.3.9.1 Flammable Liquid Classification.

3.3.9.1.1 Class I.
A liquid that has a closed-cup flash point below 37.8°C (100°F) and a vapor
pressure not exceeding 2068.6 mm Hg (40 psia) at 37.8°C (100°F). [30, 2008]

3.3.9.1.2 Class IA.
A liquid that has a closed-cup flash point below 22.8°C (73°F) and a boiling point
below 37.8°C (100°F). [30, 2008]

3.3.9.1.3 Class IB.
A liquid that has a closed-cup flash point below 22.8°C (73°F) and a boiling point at
or above 37.8°C (100°F). [30, 2008]

3.3.9.1.4 Class IC.
A liquid that has a closed-cup flash point at or above 22.8°C (73°F) but below 37.8°C
(100°F). [30, 2008]

3.3.10* Foam.
A stable aggregation of bubbles of lower density than oil or water.

3.3.10.1 Compressed Air Foam (CAF).
A homogenous foam produced by the combination of water, foam concentrate, and
air or nitrogen under pressure.

3.3.11 Foam Chamber.
See 3.3.5.1, Fixed Foam Discharge Outlet.

3.3.12* Foam Concentrate.
A concentrated liquid foaming agent as received from the manufacturer.

3.3.12.1* Alcohol-Resistant Foam Concentrate.
A concentrate used for fighting fires on water-soluble materials and other fuels
destructive to regular, AFFF, or FFFP foams, as well as for fires involving
hydrocarbons.

3.3.12.2* Aqueous Film-Forming Foam Concentrate (AFFF).
A concentrate based on fluorinated surfactants plus foam stabilizers to produce a
fluid aqueous film for suppressing hydrocarbon fuel vapors and usually diluted with
water to a 1 percent, 3 percent, or 6 percent solution.

3.3.12.3* Film-Forming Fluoroprotein Foam Concentrate (FFFP).
A protein-foam concentrate that uses fluorinated surfactants to produce a fluid
aqueous film for suppressing hydrocarbon fuel vapors.

3.3.12.4 Film-Forming Foam.
A concentrate that when mixed at its nominal use concentration will form an
aqueous film on hydrocarbon fuels. The hydrocarbon fuel typically used as a
minimum benchmark for film formation is cyclohexane.

3.3.12.5* Fluoroprotein Foam Concentrate.
A concentrate very similar to protein-foam concentrate but with a synthetic
fluorinated surfactant additive.

3.3.12.6* Medium- and High-Expansion Foam Concentrate.
A concentrate, usually derived from hydrocarbon surfactants, used in specially
designed equipment to produce foams having foam-to-solution volume ratios of
20:1 to approximately 1000:1.

3.3.12.7* Protein Foam Concentrate.
Concentrate consisting primarily of products from a protein hydrolysate, plus
stabilizing additives and inhibitors to protect against freezing, to prevent corrosion
of equipment and containers, to resist bacterial decomposition, to control viscosity,
and to otherwise ensure readiness for use under emergency conditions.

3.3.12.8 Synthetic Foam Concentrate.
Concentrate based on foaming agents other than hydrolyzed proteins and including aqueous film-forming foam (AFFF) concentrates, medium- and high-expansion foam concentrates, and other synthetic foam concentrates.

### 3.3.12.8.1 Other Synthetic Foam Concentrate.
A concentrate based on hydrocarbon surface active agents and listed as a wetting agent, foaming agent, or both.

### 3.3.13 Foam Concentrate Type.
A classification of a foam concentrate that includes the chemical composition as defined under foam concentrate (see 3.3.12), including the use percentage, the minimum usable temperature, and the fuels on which the concentrate is effective.

### 3.3.14 Foam Generators.

#### 3.3.14.1 Foam Generators — Aspirator Type.
Foam generators, fixed or portable, in which jet streams of foam solution aspirate sufficient amounts of air that is then entrained on the screens to produce foam, and which usually produce foam with expansion ratios of not more than 250:1.

#### 3.3.14.2* Foam Generators — Blower Type.
Foam generators, fixed or portable, in which the foam solution is discharged as a spray onto screens through which an airstream developed by a fan or blower is passing.

### 3.3.15 Foam Injection.

#### 3.3.15.1 Semisubsurface Foam Injection.
Discharge of foam at the liquid surface within a storage tank from a floating hose that rises from a piped container near the tank bottom.

#### 3.3.15.2 Subsurface Foam Injection.
Discharge of foam into a storage tank from an outlet near the tank bottom.

### 3.3.16* Foam Solution.
A homogeneous mixture of water and foam concentrate in the correct proportions.

#### 3.3.16.1 Premixed Foam Solution.
Solution produced by introducing a measured amount of foam concentrate into a given amount of water in a storage tank.

### 3.3.17 Foam System Types.

#### 3.3.17.1 Compressed Air Foam System (CAFS).
A system employing compressed air foam discharge devices or hoses attached to a piping system through which foam is transported from a mixing chamber. Discharge of CAFS begins with automatic actuation of a detection system, or manual actuation that opens valves permitting compressed air foam generated in the mixing chamber, to flow through a piping system and discharged over the area served by the discharge devices or hoses. Hazards that compressed air foam systems are permitted to protect include flammable liquids as defined in 3.3.9 and combustible liquids as defined in 3.3.1. Compressed air foam systems are not permitted to be used on the following fire hazards: (1) Chemicals, such as cellulose nitrate, that release sufficient oxygen or other oxidizing agents to sustain combustion; (2) Energized unenclosed electrical equipment; (3) Water-reactive metals such as sodium, potassium, and NaK (sodium–potassium alloys); (4) Hazardous water-reactive materials, such as triethyl-aluminum and phosphorous pentoxide; and (5) Liquefied flammable gas.

#### 3.3.17.2 Fixed System.
A complete installation in which foam is piped from a central foam station, discharging through fixed delivery outlets to the hazard to be protected with permanently installed pumps where required.

#### 3.3.17.3* Mobile System.
Any type of foam-producing unit that is mounted on wheels and that is self-propelled or towed by a vehicle and can be connected to a water supply or can utilize a premixed foam solution.

#### 3.3.17.4 Portable System.
Foam-producing equipment, materials, hose, and so forth that are transported by hand.

3.3.17.5* **Semifixed System.**
A system in which the hazard is equipped with fixed discharge outlets connected to piping that terminates at a safe distance.

3.3.18* **Foam-Generating Methods.**
Methods of generation of air foam including hose stream, foam nozzle, and medium- and high-expansion generators, foam maker, pressure foam maker (high back pressure or forcing type), or foam monitor stream.

3.3.18.1 **Compressed Air Foam-Generating Method.**
A method of generating compressed air foam recognized in this standard using a mixing chamber to combine air or nitrogen under pressure, water, and foam concentrate in the correct proportions. The resulting compressed air foam flows through piping or hoses to the hazard being protected.

3.3.19* **Handline.**
A hose and nozzle that can be held and directed by hand.

3.3.20 **Monitor.**

3.3.20.1* **Fixed Monitor (Cannon).**
A device that delivers a large foam stream and is mounted on a stationary support that either is elevated or is at grade.

3.3.20.2 **Portable Monitor (Cannon).**
A device that delivers a foam monitor stream and is mounted on a movable support or wheels so it can be transported to the fire scene.

3.3.21 **Nozzle.**

3.3.21.1* **Foam Nozzle or Fixed Foam Maker.**
A specially designed hoseline nozzle or fixed foam maker designed to aspirate air that is connected to a supply of foam solution.

3.3.21.2* **Self-Educting Nozzle.**
A device that incorporates a venturi to draw foam concentrate through a short length of pipe and/or flexible tubing connected to the foam supply.

3.3.22* **Pressure Foam Maker (High Back Pressure or Forcing Type).**
A foam maker utilizing the Venturi principle for aspirating air into a stream of foam solution forms foam under pressure.

3.3.23 **Proportioning.**
The continuous introduction of foam concentrate at the recommended ratio into the water stream to form foam solution.

3.3.23.1* **Balanced Pressure Pump-Type Proportioning.**
A foam proportioning system that utilizes a foam pump and valve(s) to balance foam and water pressures at a modified venturi-type proportioner located in the foam solution delivery piping; a foam concentrate metering orifice is fitted in the foam inlet section of the proportioner.

3.3.23.1.1* **In-Line Balanced Pressure Proportioning.**
A foam proportioning system utilizing a foam concentrate pump or a bladder tank in conjunction with a listed pressure reducing valve. At all design flow rates, the constant foam concentrate pressure is greater than the maximum water pressure at the inlet to the in-line balanced pressure proportioner. A pressure balancing valve integral to the in-line balanced pressure proportioner regulates the foam concentrate pressure to be balanced to incoming water pressure.

3.3.23.2* **Direct Injection Variable Pump Output Proportioning.**
A direct injection proportioning system that utilizes flowmeters for foam concentrate and water in conjunction with a variable output foam pump control system.

3.3.24 **Proportioning Methods for Foam Systems.**
The methods of proportioning used to create the correct solution of water and foam liquid concentrate.
3.3.25*  Pump Proportioner (Around-the-Pump Proportioner).
A system that uses a venturi eductor installed in a bypass line between the
discharge and suction side of a water pump and suitable variable or fixed orifices to
induct foam concentrate from a tank or container into the pump suction line.

3.3.26  Stream.
3.3.26.1  Foam Hose Stream.
A foam stream from a handline.
3.3.26.2  Foam Monitor Stream.
A large capacity foam stream from a nozzle that is supported in position and can be
directed by one person.

3.3.27  Tank.
3.3.27.1  Balanced Pressure Bladder Tank.
A foam concentrate tank fitted with an internal bladder that uses waterflow through
a modified venturi-type proportioner to control the foam concentrate injection rate
by displacing the foam concentrate within the bladder with water outside the
bladder.
3.3.27.2*  Pressure Proportioning Tank.
A foam concentrate tank with no bladder that uses waterflow through an orifice to
displace the foam concentrate in the tank with water to add foam concentrate
through an orifice into a water line at a specified rate. This device is only suitable
for foams having a specific gravity of at least 1.15.

Statement of Problem and Substantiation for Public Input

Submitter Information Verification

Submitter Full Name: fahrul reza reza
Organization: [ Not Specified ]
Submittal Date: Wed Sep 12 10:00:02 EDT 2012

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same legal force and effect as a handwritten signature.
3.3.3 Coupled Water-Motor Pump.
A correctly designed positive displacement pump in the water motor in the water supply line coupled to a second, smaller, positive displacement foam concentrate pump to provide proportioning.

Statement of Problem and Substantiation for Public Input

Remarks: The pressure relief valve for positive displacement foam concentrate pumps and the flushing line described in Sections 9.1.2 and 9.2.1 are added to the figure of the water motor coupled foam proportioning pump.

Annex D.2 describes the determination of the proportioning rate by the refractive index method and the conductivity method. Using a water motor foam proportioning pump offers a third realistic testing option. "Cycle the volumetric flow rate of the extinguishing water as well as the volumetric flow rate of the foam concentrate without mixing both liquids. Measure both flows and calculate the proportioning rate. By using an adjustable pressure relief valve at the positive displacement foam pump, the back pressure on that pump can be set to the same pressure level as the extinguishing water."

Especially regarding environmental impacts of the foam concentrates and costs for the end-user of the extinguishing system, the volumetric test method offer a great benefit and delivers realistic test results because all water flows can be tested with the actual foam concentrate installed in system. Even the influence of the viscosity of the foam concentrate can show during testing.

Submitter Information Verification

Submitter Full Name: Walter Barker
Organization: Fire Safe Services, LLC
Submittal Date: Thu Dec 06 13:58:55 EST 2012

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Origin (from sources other than the submitter)

Marc Zielinski - FireDos GmbH
Public Input No. 66-NFPA 11-2013 [ New Section after 3.3.5.3 ]

3.3.6 Self-expanding Foam Introduction Device (foam ring). A torus shape device permanently attached along the inner shell of a tank to introduce self-expanding foam in a predetermined pattern.

Statement of Problem and Substantiation for Public Input

A new device shall be introduced that releases self-expanding foam. This device has many advantages: a) capable to serve superintensive foam application rates, b) immediately starts to cool the inner tank shell, c) with the continuous, curtain-like foam flow from the first introduction point, the oxigen is excluded, d) there are not uncovered surfaces like between the points of foam generation devices, e) the foam loss (dehydration and deconsumption) compared to point-like introduction, arising from fires between the uncovered surfaces, is negligible, f) the foam blanket is closing in the center of the surface, forming a reignition safe thickness. According to the current edition of NFPA 11 A.5.2.6.1, "foam generation equipment (foam chamber) disruption often arises as a result of an initial tank explosion or the presence of fire surrounding the tank". Therefore different foam introduction device shall also be recommended. The self-expanding foam introduction device is attached to the inner shell of the cone roof tank on the whole circumference under the weak seam and in case of an explosion, which is considered as one of the most frequent sources of cone roof tank fires, it acts also like a support frame. The self-expanding foam introduction device directs foam to the tank shell and then the foam flows down on the whole surface of the inner tank shell cooling it very effectively. The one and only function of the self-expanding foam introduction device is to release foam, hence malfunction is excluded.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPOULOS
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Fri Jan 04 08:33:18 EST 2013

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3.3.10.2 Self-expanding Foam (SEF). A homogeneous foam produced in advance of a fire by the combination of water, foam concentrate, and carbon-dioxide or the gas mixture of carbon-dioxide and nitrogen under pressure, and stored in a location not exposed to the hazard.

Statement of Problem and Substantiation for Public Input

Self-expanding Foam (SEF) shall be introduced. SEF is the fire extinguishing media of the Self-Expanding Foam Systems (SEFS). The SEF is a ready-to-use homogenous foam, can be alcohol-resistant or non alcohol-resistant, can be frost proof and non frost proof too. The physical and the chemical features of the SEF can be adjusted to the stored material. SEF is perfectly produced well in advance of a fire, there is no preparation, foam solution mixing and foam generation time in case of a given fire, and of course the equipment required for doing these steps are not needed also, the only thing that has to do to introduce the required foam volume to put out the fire.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPoulos
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Fri Jan 04 09:02:40 EST 2013

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Public Input No. 7-NFPA 11-2012 [ New Section after 3.3.12.5 ]

Inductor (see educator 3.3.6)

Statement of Problem and Substantiation for Public Input

Although the two terms are used interchangeably, there are those that will look for the definition under the word "Inductor".

Submitter Information Verification

Submitter Full Name: John Chartier
Organization: Northeastern Regional Fire Cod
Submittal Date: Thu Aug 16 10:48:21 EDT 2012

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3.3.17.2 Self-expanding Foam System (SEFS). A system employing self-expanding foam introduction device or monitors attached to a piping system through which foam is transported from a pressure vessel. Introduction of self-expanding foam begins with automatic actuation of a detection system, or manual actuation that opens valves permitting self-expanding foam stored in the pressure vessel, to flow through a piping system and introduced over the surface or area served by the self-expanding foam introduction device or monitors.

Statement of Problem and Substantiation for Public Input

Self-Expanding Foam System has been brought to the market in Europe more than 10 years ago. The SEFS could not gained wide acceptance during these years because of the strict regulations coming from standard prescriptions that recommend 'flow-through' systems only. SEFS, a kind of improved CAF system, has a totally different arrangement compared to the flow-trough systems. SEFS is a fully pre-engineered 'one-shot' fixed system with semi-fixed supplementary protection devices. No external water, seawater, water tanks are required, it has automatic operation with manual option, the maintenance of the system is low-to-zero. The ready-to-use foam, the one-shot system arrangement, the foam introduction pattern makes the Self-Expanding Foam System capable to put out a 500m2 gasoline fire in less than one minute. There is no NFPA standard addressing these systems which are substantially different technically from the flow-trough systems, currently covered and recommended by NFPA 11. In order to enable Self-Expanding Foam System to be listed, approved and accepted, listing organizations, approval bodies, regulatory authorities and others require some form of recognition and acknowledgement of the SEFS in NFPA 11 standard. Without the recognition of SEFS within NFPA standards and codes, this technology and system could not enter to the marketplace as NFPA is the most recognized body and its standards are the most adopted worldwide in fire protection. SEF system complies with EN-13565:2, European Standard of Fixed firefighting systems — Foam systems. Part 2: Design, construction and maintenance.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPoulos
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Fri Jan 04 09:27:58 EST 2013
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3.3.23.3 description of the working principle of coupled water motor pumps:

"...a positive displacement foam concentrate proportioner pump with fixed plunger driven by a direct-coupled positive displacement water motor. The positive displacement pump draws the foam concentrate from an atmospheric storage tank and feeds it into the water flow which passes through the water motor. The ratio between the volumes transferred per rotation of the two devices determines the proportioning ratio. Variation of the system pressure, volumetric flow rate or viscosity of the foam concentrate will not affect the proportioning ratio because of the positive displacement character of the two devices..."  ...(Please see FM data sheet 4-12 at Section 3.2.5)

Statement of Problem and Substantiation for Public Input

Remarks: The pressure relief valve for positive displacement foam concentrate pumps and the flushing line described in Sections 9.1.2 and 9.2.1 are added to the figure of the water motor coupled foam proportioning pump.

Annex D.2 describes the determination of the proportioning rate by the refractive index method and the conductivity method. Using a water motor foam proportioning pump offers a third realistic testing option. "Cycle the volumetric flow rate of the extinguishing water as well as the volumetric flow rate of the foam concentrate without mixing both liquids. Measure both flows and calculate the proportioning rate. By using an adjustable pressure relief valve at the positive displacement foam pump, the back pressure on that pump can be set to the same pressure level as the extinguishing water."

Especially regarding environmental impacts of the foam concentrates and costs for the end-user of the extinguishing system, the volumetric test method offer a great benefit and delivers realistic test results because all water flows can be tested with the actual foam concentrate installed in system. Even the influence of the viscosity of the foam concentrate can show during testing.

Submitter Information Verification

Submitter Full Name: Walter Barker
Organization: Fire Safe Services, LLC
Submittal Date: Thu Dec 06 14:05:08 EST 2012
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Origin (from sources other than the submitter)

Marc Zielinski - FireDos GmbH
Public Input No. 23-NFPA 11-2012 [New Section after 3.3.27]

Construction type:
Definition of light or unprotected steel construction
Definition of heavy or protected or fire-resistive construction
(I don't have a good suggestion for this, but it would have been good if there was a definition for this)

Statement of Problem and Substantiation for Public Input
I miss a definition of construction type. (To state submerge time for high expansion)

Submitter Information Verification
Submitter Full Name: HENNING HAUGEN
Organization: JOTUN A/S
Submittal Date: Wed Oct 17 06:53:50 EDT 2012

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3.3.27.3 Self-expanding Foam Pressure Vessel. A self-expanding foam tank fitted with safety valve, pressure transmitter and pressure gauges that stores the self-expanding foam under pressure.

Statement of Problem and Substantiation for Public Input

With the recommendation of the Self-Expanding Foam System, new type of foam storage shall be introduced.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPOULOS
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Fri Jan 04 10:19:47 EST 2013

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Public Input No. 14-NFPA 11-2012 [ Section No. 4.2.1.5 [Excluding any Sub-Sections] ]

The water supply system shall be designed and installed in accordance with NFPA 24.

Statement of Problem and Substantiation for Public Input

Water supply system is the appropriate term.

Submitter Information Verification

Submitter Full Name: Bill Galloway
Organization: Southern Regional Fire Code De
Submittal Date: Tue Aug 28 15:44:28 EDT 2012

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4.3.2 Concentrate Storage.

We would like to add one point regarding the sediments occur by protein based foam concentrates. In FM data sheet 4 -12 for example there is this point mentioned at Chapter 2.3 6.4.3 "Determine the quantity of foam concentrate..." which describes a certain volume of the foam concentrate storage tank for sediments.

4.3.2.1 Storage Facilities.

4.3.2.1.1 Foam concentrates and equipment shall be stored in a location not exposed to the hazard they protect.

4.3.2.1.2 If housed, foam concentrates and equipment shall be in a noncombustible structure.

4.3.2.1.3 For outdoor nonautomatic systems, the AHJ shall be permitted to approve the storage of foam concentrate in a location off premises where these supplies are available at all times.

4.3.2.1.4 Loading and transportation facilities for foam concentrates shall be provided.

4.3.2.1.5 Off-premises supplies shall be of the type required for use in the systems of the given installation.

4.3.2.1.6 At the time of a fire, these off-premises supplies shall be accumulated in the required quantities, before the equipment is placed in operation, to ensure uninterrupted foam production at the design rate for the required period of time.

4.3.2.2* Quantity.

The amount of concentrate shall meet the discharge requirements for the largest single hazard protected or group of hazards that are to be protected simultaneously.

4.3.2.3 Foam Concentrate Storage Tanks.

4.3.2.3.1 Bulk liquid storage tanks shall be fabricated from or be lined with materials compatible with the concentrate.

4.3.2.3.2 The storage tank shall be designed to minimize evaporation of foam concentrate.

4.3.2.3.3* Proportioning systems shall have signage to provide instruction on the proper sequence of system shutdown to prevent accidental loss of foam concentrate and/or system damage.

4.3.2.4 Storage Conditions.

4.3.2.4.1* In order to ensure the correct operation of any foam-producing system, the chemical and physical characteristics of the materials comprising the system shall be taken into consideration in design.
4.3.2.4.2* Foam concentrates shall be stored within the listed temperature limitations.

4.3.2.4.3 Markings shall be provided on storage vessels to identify the type of concentrate and its intended concentration in solution.

4.3.2.5 Foam Concentrate Supply.

4.3.2.5.1 Foam Concentrate Consumption Rates. The consumption rates shall be based on the percentage concentrate used in the system design (e.g., 3 percent or 6 percent or other, if so listed or approved by the AHJ).

4.3.2.5.2 Reserve Supply of Foam Concentrate.

4.3.2.5.2.1 There shall be a reserve supply of foam concentrate to meet design requirements in order to put the system back into service after operation.

4.3.2.5.2.2 The reserve supply shall be in separate tanks or compartments, in drums or cans on the premises, or shall be able to be obtained from an approved outside source within 24 hours.

4.3.2.6 Auxiliary Supplies. Other equipment necessary to recommission the system, such as bottles of nitrogen or carbon dioxide for premixed systems, also shall be able to be secured.

Statement of Problem and Substantiation for Public Input

Remarks: The pressure relief valve for positive displacement foam concentrate pumps and the flushing line described in Sections 9.1.2 and 9.2.1 are added to the figure of the water motor coupled foam proportioning pump.

Annex D.2 describes the determination of the proportioning rate by the refractive index method and the conductivity method. Using a water motor foam proportioning pump offers a third realistic testing option. "Cycle the volumetric flow rate of the extinguishing water as well as the volumetric flow rate of the foam concentrate without mixing both liquids. Measure both flows and calculate the proportioning rate. By using an adjustable pressure relief valve at the positive displacement foam pump, the back pressure on that pump can be set to the same pressure level as the extinguishing water."

Especially regarding environmental impacts of the foam concentrates and costs for the end-user of the extinguishing system, the volumetric test method offer a great benefit and delivers realistic test results because all water flows can be tested with the actual foam concentrate installed in system. Even the influence of the viscosity of the foam concentrate can show during testing.

Submitter Information Verification

Submitter Full Name: Walter Barker
Organization: Fire Safe Services, LLC
Submittal Date: Thu Dec 06 14:06:41 EST 2012

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Origin (from sources other than the submitter)
Marc Zielinski - FireDos GmbH
4.3.2.2 Quantity.
The amount of concentrate shall meet the discharge requirements for the largest single hazard protected or group of hazards that are to be protected simultaneously.
(Calculated by the upper or lower limit of consumption of foam? Ref acceptance test: (1) Not less than the rated concentration. (2)*No more than 30 percent above the rated concentrate, or 1 percentage point above the rated concentrate (whichever is less))

Statement of Problem and Substantiation for Public Input
Have just inserted a question. I think there would have been good if there was a clear way to calculate the amount of foam. Shall we use the upper limit or the lower limit of foam consumption for the calculation of the amount of foam concentrate?

Submitter Information Verification
Submitter Full Name: HENNING HAUGEN
Organization: JOTUN A/S
Submittal Date: Wed Oct 17 07:06:27 EDT 2012

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4.7.2 Foam System Piping.

4.7.2.1* Galvanized pipe shall be used.

4.7.2.2 Pipe carrying foam concentrate shall not be galvanized.

4.7.2.3 Piping in constant contact with foam concentrates shall be constructed of material compatible with and not affected by the concentrate.

4.7.2.4 Piping in constant contact with foam concentrate shall not have a detrimental effect on the foam concentrate.

4.7.2.5 For the purpose of computing friction loss in foam solution piping, the following C-values shall be used for the Hazen–Williams formula:

1. Galvanized steel pipe — 120
2. Other C-values for corrosion-resistant piping materials in accordance with NFPA 13

Sections 4.7.2.1 and 4.7.2.5 "Galvanized pipe (fittings) shall be used." This point is quite unclear for which application inside the foam system piping galvanized pipe shall be used.

According to our experience galvanized pipes are never sufficient either for foam-water-solution nor for foam concentrates. According to European standards the recommendation is stainless like SS304 or SS316 for the foam concentrates and carbon steel or stainless steel for the foam-water-solution.

Statement of Problem and Substantiation for Public Input

Remarks: The pressure relief valve for positive displacement foam concentrate pumps and the flushing line described in Sections 9.1.2 and 9.2.1 are added to the figure of the water motor coupled foam proportioning pump.

Annex D.2 describes the determination of the proportioning rate by the refractive index method and the conductivity method. Using a water motor foam proportioning pump offers a third realistic testing option. "Cycle the volumetric flow rate of the extinguishing water as well as the volumetric flow rate of the foam concentrate without mixing both liquids. Measure both flows and calculate the proportioning rate. By using an adjustable pressure relief valve at the positive displacement foam pump, the back pressure on that pump can be set to the same pressure level as the extinguishing water."

Especially regarding environmental impacts of the foam concentrates and costs for the end-user of the extinguishing system, the volumetric test method offer a great benefit and delivers realistic test results because all water flows can be tested with the actual foam concentrate installed in system. Even the influence of the viscosity of the foam concentrate can show during testing.
Submitter Information Verification

Submitter Full Name: Walter Barker
Organization: Fire Safe Services, LLC
Submittal Date: Thu Dec 06 14:07:59 EST 2012

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Origin (from sources other than the submitter)

Marc Zielinski - FireDos GmbH
Public Input No. 15-NFPA 11-2012 [Section No. 4.7.2.1]

4.7.2.1*
Galvanized pipe shall be used for threaded systems. Bare carbon steel pipe may be used in welded systems or systems larger than 2".

Additional Proposed Changes

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Statement of Problem and Substantiation for Public Input

Galvanized pipe is not readily available in sizes larger than 2". Systems for large petroleum storage tanks are typically constructed out of bare carbon steel pipe due to their size and that they are typically welded pipe. In order to galvanize the pipe, the system is fabricated first and then dismantled and galvanized. Smaller systems may benefit from using galvanized pipe as potential rust flakes may clog nozzles. However, storage tank foam chamber systems typically have larger orifices and are not affected by a small rust flake. Also, recent studies indicate that galvanized piping may not provide the corrosion protection that it is believed to provide.

Submitter Information Verification

Submitter Full Name: JIM DELUCA
Organization: SPEC Services, Inc
Submittal Date: Wed Sep 05 16:08:30 EDT 2012

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4.9.2.5.2

Where approved by the AHJ, Small systems for localized hazards shall be permitted to be unsupervised, subject to approval of the AHJ.

Statement of Problem and Substantiation for Public Input

As written some installations are commissioned based on no indication of any objection by the AHJ when in reality, the AHJ was never consulted. This wording mandates that a specific approval needs to be obtained before the exception is allowed.

Submitter Information Verification

Submitter Full Name: John Chartier
Organization: Northeastern Regional Fire Cod
Submittal Date: Thu Aug 16 10:50:10 EDT 2012

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Public Input No. 9-NFPA 11-2012 [ Section No. 4.9.2.7.1 ]

4.9.2.7.1
Automatic shutdown shall be subject to the approval of the AHJ, and the predetermined operating time shall be approved of the AHJ.

Statement of Problem and Substantiation for Public Input

As written some installations are commissioned based on no indication of any objection by the AHJ when in reality, the AHJ was never consulted. This wording mandates that a specific approval needs to be obtained in order to allow automatic shutdown and where it is approved, the minimum amount of operating time prior to the shutdown is acceptable to the AHJ.

Submitter Information Verification

Submitter Full Name: John Chartier
Organization: Northeastern Regional Fire Cod
Submittal Date: Thu Aug 16 10:51:42 EDT 2012

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The following methods for protecting exterior fixed-roof tanks shall be included within this section and shall not be considered to be in any order of preference:

1. Foam monitors and handlines
2. Surface application with fixed foam discharge outlets
3. Surface application with self-expanding foam introduction device shall be designed according to Chapter 8.
4. Subsurface application
5. Semisubsurface injection methods

Statement of Problem and Substantiation for Public Input

According to the current edition of NFPA 11 A.5.2.6.1, "foam generation equipment (foam chamber) disruption often arises as a result of an initial tank explosion or the presence of fire surrounding the tank". Therefore different foam introduction device is recommended. The self-expanding foam introduction device is attached to the inner shell of the cone roof tank on the whole circumference under the weak seam and in case of an explosion, which is considered as one of the most frequent sources of cone roof tank fires, it acts also like a support frame. The self-expanding foam introduction device directs foam to the tank shell and then the foam flows down on the whole surface of the inner tank shell cooling it very effectively. The one and only function of the self-expanding foam introduction device is to release foam, hence malfunction is excluded. NFPA 11 A.5.3.4.3 states: "Foam can fail to seal against the tank shell as a result of prolonged free burning to agent discharge". The recommended foam introduction device can eliminate this problem also.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPoulos
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Thu Jan 03 20:35:55 EST 2013

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5.3.3.3 Full Surface Area Protection. Full surface area protection with self-expanding foam introduction device shall be designed according to Chapter 8.

Statement of Problem and Substantiation for Public Input

Because of the limitations of the flow-through systems, the available foam solution application rate limited by the fire pumps, and the foam discharge device, and the point-like arrangement of foam introduction, fixed systems were not considered as an effective way of open-top floating roof tank full surface fire protection, therefore mobile protection became the applied strategy to fight against these fires. Mobile applications need preparation time. During this preparation which takes a lot of time, the whole tank is exposed to the heat and flames of the fire, the terminal is exposed to the risk of fire escalation and even to boilover scenario. According to NFPA 11 A.5.6 "The speed of system operation is always critical in minimizing life and property loss". Self-expanding Foam System is a perfectly pre-engineered fixed system which is capable to put out a large scale full surface fire in minutes. The huge catastrophes, fatalities and unacceptable environmental pollution that happened in the last decades can be avoided.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPOULOS
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Fri Jan 04 07:46:13 EST 2013

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5.3.4.1
The following methods for fire protection of seals in open-top floating roof tanks shall be as required in 5.3.5 through 5.3.7:

(1) Fixed discharge outlets
(2) Foam handlines
(3) Foam monitors
(4) **Self-expanding foam introduction device application shall be designed according to Chapter 8.**

**Statement of Problem and Substantiation for Public Input**

In case of a rim seal fire only, the curtain-like foam introduction of the Self-expanding Foam Introduction Device results in a very effective pattern of foam application. The design calculation shall be the same as for full suface fires. In case of a given fire, the released foam volume prevents escalation to full surface fire. The additional foam release method on the floating roof is an applied strategy in fire escalation prevention.

**Submitter Information Verification**

**Submitter Full Name:** CHRISTOS SIDEROPoulos
**Organization:** FOAMFATALE GREECE LTD.
**Submittal Date:** Fri Jan 04 07:40:34 EST 2013

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5.4.1 Requirements for tanks equipped with the following floating roof types shall not be covered in Section 5.4:

1. Roofs made from floating diaphragms
2. Roofs made from plastic blankets
3. Roofs made with plastic or other flotation material, even if encapsulated in metal or fiberglass
4. Roofs that rely on flotation device closures that are easily submerged if damaged
5. Pan roofs

Additional Proposed Changes

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Statement of Problem and Substantiation for Public Input

This wording is contradictory to Section 5.4.2, paragraph 3, as a metallic sandwich panel roof is defined as plastic or other flotation material encapsulated by metal. This type of roof is allowed.

Note: Supporting material is available for review at NFPA Headquarters.

Submitter Information Verification

Submitter Full Name: Michael Doxey
Organization: HMT Inc.
Submittal Date: Thu Dec 06 13:47:07 EST 2012

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Seal area protection systems shall be permitted for the following types of roof construction:

1. Steel double deck
2. Steel pontoon
3. Full liquid surface contact, metallic/composite sandwich panel, conforming to Appendix H, "Internal Floating Roofs," requirements of API 650

Additional Proposed Changes

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Statement of Problem and Substantiation for Public Input

The problem is that full surface foam protection is required when the roof is not constructed of steel or metallic sandwich panel. See supporting material for further explanation.

Submitter Information Verification

Submitter Full Name: Michael Doxey
Organization: HMT Inc.
Submittal Date: Thu Dec 06 13:50:29 EST 2012

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Public Input No. 10-NFPA 11-2012 [Section No. 6.15.6]

6.15.6* Training.
All personnel shall be properly trained in the operation of portable foam-generating equipment and in the necessary fire-fighting techniques.

Statement of Problem and Substantiation for Public Input

Text currently does not state portable foam-generating equipment but 6.15 refers to Portable Foam-Generating Devices. As stated, the Standard could be misinterpreted as addressing portable equipment that generates something other than foam; such as portable electric generating equipment or portable compressed air generating equipment, etc.

Submitter Information Verification

Submitter Full Name: John Chartier
Organization: Northeastern Regional Fire Cod
Submittal Date: Thu Aug 16 10:53:47 EDT 2012

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Public Input No. 70-NFPA 11-2013 [ New Section after 7.20 ]

Insertion of a new Chapter 8 according to the attached FFGR-PI-NFPA11-01 file and renumbering the following chapters

Additional Proposed Changes

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Statement of Problem and Substantiation for Public Input

Without the recognition of SEFS within NFPA standards and codes, this technology and system could not enter to the marketplace as NFPA is the most recognized body and its standards are the most adopted worldwide in fire protection. Listing and/or approval of the system or the components cannot be accomplished without NFPA recognition. Three cold foam tests and two 500m2 gasoline fire extinguishing tests have been carried out. Please see test results attached. A fire test has been witness tested by TUV Germany to certify system compliance to EN 13565-2 European Standard of Fixed firefighting systems — Foam systems. Part 2: Design, construction and maintenance. Please see system compliance document attached.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPOULOS
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Fri Jan 04 11:20:35 EST 2013

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8.1 Approval of Plans.

Plans shall be submitted to the AHJ for approval before installation.

Statement of Problem and Substantiation for Public Input

Text is not needed as the requirement is already covered in 8.3.2.

Submitter Information Verification

Submitter Full Name: John Chartier
Organization: Northeastern Regional Fire Cod
Submital Date: Thu Aug 16 10:55:10 EDT 2012

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8.2.3
The specifications shall include the specific tests required to meet the approval of the AHJ and shall indicate how testing costs are to be met.

Statement of Problem and Substantiation for Public Input

Indicating how the cost of testing will take place offers no additional fire protection purpose but it does provide good information and therefore should be included in the Annex for guidance.

Submitter Information Verification

Submitter Full Name: John Chartier
Organization: Northeastern Regional Fire Cod
Submittal Date: Thu Aug 16 10:56:23 EDT 2012

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8.3.4

The plans shall include or be accompanied by the following information, where applicable:

(1) Name of owner and occupant.
(2) Location, including street address.
(3) Point of compass.
(4) Full height cross section, or schematic diagram, including structural member information construction of dike and tank.
(5) Size of supply main and whether dead end or circulating; if dead end, direction and distance to nearest circulating main; and water flow test results and system elevation relative to test hydrant.
(6) Other sources of water supply, with pressure or elevation.
(7) Make, type, and model of discharge devices including model number.
(8) Pipe type and schedule of wall thickness.
(9) Nominal pipe size and cutting lengths of pipe (or center to-center dimensions).
(10) Type of fittings and joints and location of all welds and bends. The contractor shall specify on drawing any sections to be shop welded and the type of fittings or formations to be used.
(11) Type and locations of hangers, sleeves, braces, and methods of securing foam chambers or other discharge devices when applicable.
(12) All control valves, check valves, drain pipes, and test connections.
(13) Piping provisions for flushing.
(14) For hydraulically designed systems, the information on the hydraulic data nameplate.
(15) A graphic representation of the scale used on all plans.
(16) Name and address of contractor.
(17) Hydraulic reference points shown on the plan that correspond with comparable reference points on the hydraulic calculation sheets.
(18) Information about backflow preventers (manufacturer, size, type).
(19) Size and location of hydrants, showing size and number of outlets and if outlets are to be equipped with independent gate valves. Whether hose houses and equipment are to be provided, and by whom, shall be indicated. Static and residual hydrants that were used in flow tests shall be shown.
(20) Size, location, and piping arrangement of fire department connections.
(21) Physical details of the hazard, including the location, arrangement, and hazardous materials involved.
(22) Type and percentage of foam concentrate.
(23) Required solution application rate.
(24) Submergence volume calculations.
(25) Water requirements.
(26) Calculations specifying required amount of concentrate
(27) * Hydraulic calculations
(28) Calculation specifying required amount of air
(29) CAFS flow calculations report
(30) Identification and capacity of all equipment and devices
(31) Location of piping, detection devices, operating devices, generators, discharge outlets, and auxiliary equipment
(32) Schematic wiring diagram
(33) Explanation of any special features

Statement of Problem and Substantiation for Public Input

Provides a more detailed list of items that should appear on installation plans and is consistent with that of other installation standards such as NFPA 13 & 14. Previously, no guidance for the content of hydraulic calculations was provided. The proposed text for hydraulic calculations is consistent with that of NFPA 13 & 14.

Submitter Information Verification

Submitter Full Name: David Hague
Organization: Liberty Mutual Insurance
Submittal Date: Mon Sep 24 10:28:51 EDT 2012

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Origin (from sources other than the submitter)
NFPA 13 & 14.
8.3.4
The plans shall include or be accompanied by the following information, where applicable:

(1) Physical details of the hazard, including the location, arrangement, and hazardous materials involved
(2) Type and percentage of foam concentrate
(3) Required solution application rate
(4) Submergence volume calculations
(5) Water requirements
(6) Calculations specifying required amount of concentrate
(7) * Hydraulic calculations
(8) Calculation specifying required amount of air
(9) CAFS flow calculations report
(10) SEFS flow calculations report
(11) Self-expanding foam volume and foam blanket thickness calculations
(12) Identification and capacity of all equipment and devices
(13) Location of piping, detection devices, operating devices, generators, discharge outlets, and auxiliary equipment
(14) Schematic wiring diagram
(15) Explanation of any special features

Statement of Problem and Substantiation for Public Input
These calculations are necessary for the proper design of the Self-expanding Foam System (SEFS).

Submitter Information Verification
Submitter Full Name: CHRISTOS SIDEROPOULOS
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Fri Jan 04 07:34:33 EST 2013
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8.3.8 Hydraulic Calculations.

8.3.8.1 General. Hydraulic calculations shall be prepared on forms that include a summary sheet, detailed worksheets, and a graph sheet.

8.3.8.2 Summary Sheet. The summary sheet shall contain the following information, where applicable:

1. Date
2. Location
3. Name of owner and occupant
4. Building number or other identification
5. Description of hazard
6. Name and address of contractor or designer
7. Name of approving authority
8. System design requirements, as follows:
   a. Design area of foam application, ft² (m²)
   b. Minimum rate of foam
   c. Area per foam chamber or discharge device, ft² (m²)
9. Total foam requirements as calculated, including allowance for inside hose, outside hydrants, and exposure protection (such as dike area protection)

8.3.8.3 Detailed Worksheets. Detailed worksheets or computer printout sheets shall contain the following information:

1. Sheet number
2. Foam chamber or discharge device description and discharge constant (K)
3. Hydraulic reference points
4. Flow in gpm (L/min)
5. Pipe size
6. Pipe lengths, center-to-center of fittings
7. Equivalent pipe lengths for fittings and devices
8. Friction loss in psi/ft (bar/m) of pipe
9. Total friction loss between reference points
10. Elevation head in psi (bar) between reference points
11. Required pressure in psi (bar) at each reference point
12. Notes to indicate starting points or reference to other sheets or to clarify data shown

8.3.8.4 Graph Sheet. A graphic representation of the complete hydraulic calculation shall be plotted on semi-exponential graph paper (Q¹.85) and shall include the following:
(1) Water supply curve  
(2) Foam system demand  
(3) Hose allowance (where applicable)

Statement of Problem and Substantiation for Public Input

Provides a more detailed list of items that should appear on installation plans and is consistent with that of other installation standards such as NFPA 13 & 14. Previously, no guidance for the content of hydraulic calculations was provided. The proposed text for hydraulic calculations is consistent with that of NFPA 13 & 14.

Submitter Information Verification

Submitter Full Name: David Hague  
Organization: Liberty Mutual Insurance  
Submittal Date: Mon Sep 24 10:33:22 EDT 2012

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Origin (from sources other than the submitter)

NFPA 13 & 14.
11.2.5.3 All self-expanding foam system piping interiors shall be carefully visually examined and, if necessary, cleaned during installation of the pipe.

11.2.5.4 Self-expanding foam system piping shall be flushed after installation. The foam flow cannot face any obstacle in the piping system.

Statement of Problem and Substantiation for Public Input

The way of the foam flow shall be unobstructed by the residues of the installation.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPOULOS
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Fri Jan 04 07:30:26 EST 2013

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11.5 Operating Tests.

11.5.1
Before approval acceptance, all operating devices and equipment shall be tested for function.

11.5.2
Tests for total flooding systems shall establish that all automatic closing devices for doors, windows, and conveyor openings, and automatic equipment interlocks, as well as automatic opening of heat and smoke vents or ventilators, will function upon system operation.

11.5.3
Tests shall include a complete check of electrical control circuits and supervisory systems to ensure operation and supervision in the event of failure.

11.5.4
Operating Tests

4.1 The main drain valve shall be opened and remain open until the system pressure stabilizes.

11.5.4.1.1 The static and residual pressures shall be recorded on the contractor’s material and test certificate.

11.5.5 Operating Test for Control Valves. All control valves shall be fully closed and opened under system water pressure to ensure proper operation.

11.5.6
Operating instructions provided by the supplier and device identification shall be verified.

Statement of Problem and Substantiation for Public Input

Inserts the word “acceptance” since this is an acceptance test and plans and calculations should already be approved. Adds the main drain test and valve operating test and is consistent with NFPA 13. The main drain test results should be recorded as is the case for acceptance tests of other water based systems to provide for future evaluation of the water supply condition. This test also verifies that the water supply control valves are open. Closed water supply valves are a significant contributor to system failures including new systems. The operating test for control valves verifies that valves will properly seat following operation.

Submitter Information Verification

Submitter Full Name: David Hague
Organization: Liberty Mutual Insurance
Submittal Date: Mon Sep 24 10:34:50 EDT 2012
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Origin (from sources other than the submitter)
NFPA 13.
11.6.2.2 For self-expanding foam systems, the following data shall be recorded as part of any foam test:

(1) Self-expanding foam pressure vessel pressure
(2) System pressure at the control valve
(3) Self-expanding foam concentration

Statement of Problem and Substantiation for Public Input

These data are necessary to collect ensuring proper system operation.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPOULOS
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Fri Jan 04 07:22:51 EST 2013

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Public Input No. 33-NFPA 11-2012 [ New Section after 11.6.4 ]

11.6.5 .....If a realistic test using water and foam concentrate could be done with the proportioning device like a coupled water motor driven proportioning pump without feeding the foam concentrate into water flow this test method should be preferred to avoid any environmental impact caused by the foam concentrates.

Statement of Problem and Substantiation for Public Input

Remarks: The pressure relief valve for positive displacement foam concentrate pumps and the flushing line described in Sections 9.1.2 and 9.2.1 are added to the figure of the water motor coupled foam proportioning pump.

Annex D.2 describes the determination of the proportioning rate by the refractive index method and the conductivity method. Using a water motor foam proportioning pump offers a third realistic testing option. "Cycle the volumetric flow rate of the extinguishing water as well as the volumetric flow rate of the foam concentrate without mixing both liquids. Measure both flows and calculate the proportioning rate. By using an adjustable pressure relief valve at the positive displacement foam pump, the back pressure on that pump can be set to the same pressure level as the extinguishing water."

Especially regarding environmental impacts of the foam concentrates and costs for the end-user of the extinguishing system, the volumetric test method offer a great benefit and delivers realistic test results because all water flows can be tested with the actual foam concentrate installed in system. Even the influence of the viscosity of the foam concentrate can show during testing.

Submitter Information Verification

Submitter Full Name: Walter Barker
Organization: Fire Safe Services, LLC
Submittal Date: Thu Dec 06 14:10:30 EST 2012

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Origin (from sources other than the submitter)
Marc Zielinski - FireDos GmbH
11.6.4
Foam concentration shall have one of the following proportions:
- Not less than the rated concentration
- No more than 30 percent above the rated concentration, or 1 percentage point above the rated concentration (whichever is less)

The foam concentrate induction rate of a proportioner, expressed as a percentage of the foam solution flow (water plus foam concentrate), shall be within minus 0 percent to plus 30 percent of the manufacturer's listed concentration, or plus 1 percentage point, whichever is less. (For information on tests for physical properties of foam, see Annex D.)

Statement of Problem and Substantiation for Public Input

The revision will provide clarity to the criteria for acceptance by identifying the specific tolerance range for the concentration. This range for acceptance is based upon the type of concentration being inducted. The current wording is confusing such that it can be inferred there are discrete allowable set points for acceptance that varies based upon the type of proportioning.

EMERGENCY NATURE: This change must be added since it has come to the attention of the committee that the current wording is confusing and would permit an Authority Having Jurisdiction (AHJ) to accept a foam system that inducts or proportions foam concentrate at a concentration that would violate the listing.

Submitter Information Verification

Submitter Full Name: Robert Kasiski
Organization: FM Global
Submittal Date: Thu Jan 10 06:41:55 EST 2013

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Public Input No. 17-NFPA 11-2012 [ New Section after 11.7 ]

Insert new Figure 11.7 Contractors Material and Test Certificate.

Additional Proposed Changes

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<td>Contractors Materials &amp; Test Certificate</td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Input

A test form is needed to document the acceptance test results.

Submitter Information Verification

Submitter Full Name: David Hague  
Organization: Liberty Mutual Insurance  
Submittal Date: Mon Sep 24 10:25:54 EDT 2012

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Origin (from sources other than the submitter)

NFPA 13.
12.7 Self-Expanding Foam Inspection

12.7.1 At least annually, an inspection shall be made of self-expanding foam and its pressure vessels for evidence of excessive sludging or deterioration.

12.7.2 Samples of self-expanding foam shall be taken for quality condition testing.

12.7.3 Quantity of self-expanding foam in pressure vessel shall meet design requirements.

Statement of Problem and Substantiation for Public Input

Regular inspection of the self-expanding foam shall be carried out in order to ensure that the extinguishing foam is in ready-to-use condition.

Submitter Information Verification

Submitter Full Name: CHRISTOS SIDEROPOULOS
Organization: FOAMFATALE GREECE LTD.
Submittal Date: Thu Jan 03 21:48:19 EST 2013

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Public Input No. 25-NFPA 11-2012 [ New Section after 12.8.2 ]

TITLE OF NEW CONTENT
Type your content here ...
Insert new Chapter 13 from attached file

Statement of Problem and Substantiation for Public Input

Dry Foam is a new technology that performs very similar to traditional water based foam as it creates a vapor barrier between the flammable liquid and air space above. It has demonstrated results and particularly where it is applied in-situ as a floating vapor barrier where it suppresses vapors ~99% as well as prevents fires. The problem of traditional foams is where water is scarce or where extremely low temperatures e.g. the arctic preclude the storage of large volumes of water plus the complexity necessary with water based foams to avoid freezing. Dry foam solves this problem since it does not require water and if applied in-situ it will prevent a flammable liquid fire in the most extreme conditions. It is inert and does not contain hazardous materials and can remain in place for years suppressing vapors. The same formulation can be used on multiple fuels including both polar and non-polar flammable liquids. It also has applications on cryogenic liquids e.g. LNG.

The passive nature if applied in-situ and the simplicity of operation makes it ideal where water based foams prove difficult or unworkable.

Submitter Information Verification

Submitter Full Name: Joe Riordan
Organization: Alyeska Pipeline aka The Trans-Alaska Pipeline
Submittal Date: Sat Nov 24 14:38:13 EST 2012

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Chapter 1
1.1.1 This standard covers the design, installation, operation, testing, and maintenance of low-, medium-, and high-expansion and compressed air foam systems for fire protection and dry foam systems for fire hazard mitigation.

Chapter 3
3.3.10 Foam. A stable aggregation of bubbles of lower density than oil or water
3.3.10.2 Dry foam. A stable aggregation of spheres not composed of any liquid and of lower density than oil or water, and having the attributes of:
   (1) the spheres are noncombustible
   (2) the sizes of the spheres are sufficiently small to form a vapor barrier when applied to a flammable liquid surface at a sufficient thickness
   (3) the blanket formed by the agglomeration of spheres can tolerate flame temperatures without losing the vapor suppressing characteristics

Add new sections to existing Chapter 11 Testing and Acceptance and Chapter 12 Maintenance:
X.1 Scope.
X.1.1 This chapter shall apply to low-, medium-, and high-expansion and compressed air foam systems.
X.1.2 This chapter shall not apply to in situ dry foam. (See 13.8)

Chapter 13 In Situ Dry Foam Systems
13.1 General.
13.1.1 This chapter shall provide requirements for the correct use of dry foam as applied on a flammable liquid surface in-situ for the purpose of fire hazard mitigation.
13.1.2 All products shall be listed for their intended use except where listings for products or components do not exist; they shall be approved by the AHJ.
13.1.3 Dry foam shall be compatible with water-based foams that may be applied separately.
13.1.4 Where approved by the AHJ, the use of dry foam shall not preclude the use of other fire protection systems.

13.2 Dry Foam Properties
13.2.1 Quality.
13.2.1.1 Dry foam shall be manufactured of materials compatible with the flammable liquid
13.2.1.2 The dry foam spheres shall have a specific gravity between 0.05 and 0.25.
13.2.1.2.1 The diameter of dry foam spheres shall be in the range of 1/8” – 3/8” (3mm – 9mm) and demonstrate by NRTL that vapor suppression of flammable liquids is achieved to prevent a flammable liquid fire when tested to Annex Chapter 13 test method
13.2.1.2.2 The exterior coating of each dry foam sphere shall protect the sphere and not degrade more than 5% when immersed in the specified fuel for a minimum of 12 months.

13.2.2 Quantity.
The minimum thickness of the dry foam layer shall be determined in accordance with the test standard Annex 13- Modified UL 162.

13.2.3 Usage Conditions.
Dry foam shall be tested to provide effective mitigation at all temperatures and conditions expected of the stored fuel.

13.2.4 Compatibility of Dry Foam.
Different types of dry foam shall not be mixed unless listed or tested as a blend.

13.5 Limitations.
Dry foam systems shall be designed and installed in accordance for the specific hazards and protection objectives specified.

13.6 Plans and Specifications. Plans and specifications shall be in accordance with Chapter 8.

13.7 Installation.
13.7.1 Dry foam should be installed when the vessel is out of service and safe for entry. The manufacturer shall be consulted for all other applications.
13.7.2 Once installed the depth of dry foam shall be measured and recorded at multiple locations to assure minimum depth and distribution throughout.
13.7.3 The date of installation and the dry foam depth and location of thickness measurement shall be recorded and filed for documentation per 13.XX
13.7.4 The installation method and design shall assure that dry foam does not block or obstruct appurtenances or instrumentation necessary for the operation of the vessel or equipment. The design shall also assure that dry foam is not lost to process piping.

13.8 Nameplate. A nameplate shall be provided in an obvious location.
13.8.1 The nameplate shall identify that an in situ dry foam system is in use.
13.8.2 The nameplate shall be marked with the following information:
   (a) Dry foam manufacturer
   (b) name/type of dry foam in use
   (c) Minimum dry foam layer thickness
   (d) Stored flammable liquid

13.9 Approval of Installations. Testing and acceptance shall include certification that the installation was installed per 13.7 and that the documentation per 13.10 is complete.

13.10 Documentation. The following documentation shall be provided to the owner and maintained on file for the life of the dry foam system:
   (a) Owner’s manual.
   (b) Material Safety Data Sheet (MSDS) for the dry foam.

13.11 Maintenance. Maintenance shall include inspections on a monthly basis to measure dry foam thickness to assure that sufficient thickness and distribution of dry foam is maintained. An annual maintenance report shall be developed per the annex

13.12 Personnel.
13.12.1 Persons performing maintenance on dry foam systems shall be trained and certified by the dry foam manufacturer.
13.12.2 Persons performing maintenance on dry foam systems shall have the manufacturer’s maintenance manual

13.13 Procedures.
13.13.1 Layer Thickness. The thickness of the dry foam layer shall be measured.
13.13.2 If the thickness of the dry foam layer is less than the minimum required thickness, additional dry foam shall be applied until the minimum required thickness is achieved.
13.13.3 If the reserve supply is used to maintain the thickness of the in situ dry foam, the reserve supply shall be replenished within 48 hours.
13.13.4 Periodic Replacement. In situ dry foam shall be completely replaced as recommended by the manufacturer for the specified fuel.
13.13.5 Additional Procedures. Any additional procedures required by the manufacturer’s maintenance manual shall be followed.

13.14 Records.
13.14.1 A maintenance report shall be developed that includes the documentation per Maintenance annex.
13.14.2 The owner shall maintain these reports on file for the life of the system.
ANNEX:

A.13.14.1 As a minimum, the maintenance report should include the following:
(a) Name of agency contracted to perform the work
(b) Name of person performing the work
(c) Date of maintenance
(d) Storage tank identification
(e) Dry foam quality report
(f) Initial and final dry foam layer thickness
(g) Initial and final quantity of reserve supply
(h) Corrective actions taken
(i) Additional recommendations
Public Input No. 34-NFPA 11-2012 [ New Section after A.3.2.2 ]

See also Annex A figure A.3.3.23.2(c).

******Insert Figure A.3.3.23.2(c) Here******

Additional Proposed Changes

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Statement of Problem and Substantiation for Public Input

Remarks: The pressure relief valve for positive displacement foam concentrate pumps and the flushing line described in Sections 9.1.2 and 9.2.1 are added to the figure of the water motor coupled foam proportioning pump.

Annex D.2 describes the determination of the proportioning rate by the refractive index method and the conductivity method. Using a water motor foam proportioning pump offers a third realistic testing option. "Cycle the volumetric flow rate of the extinguishing water as well as the volumetric flow rate of the foam concentrate without mixing both liquids. Measure both flows and calculate the proportioning rate. By using an adjustable pressure relief valve at the positive displacement foam pump, the back pressure on that pump can be set to the same pressure level as the extinguishing water."

Especially regarding environmental impacts of the foam concentrates and costs for the end-user of the extinguishing system, the volumetric test method offer a great benefit and delivers realistic test results because all water flows can be tested with the actual foam concentrate installed in system. Even the influence of the viscosity of the foam concentrate can show during testing.

Submitter Information Verification

Submitter Full Name: Walter Barker
Organization: Fire Safe Services, LLC
Submittal Date: Thu Dec 06 14:12:00 EST 2012
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Origin (from sources other than the submitter)

Marc Zielinski - FireDos GmbH
A.8.2.3 The specifications required to meet the approval of the AHJ should indicate how testing costs are to be met.

Statement of Problem and Substantiation for Public Input

Indicating how the cost of testing will take place offers no additional fire protection purpose but it does provide good information and therefore should be included in the Annex for guidance.

Related Public Inputs for This Document

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Submitter Information Verification

Submitter Full Name: John Chartier
Organizations: Northeastern Regional Fire Code
Submittal Date: Thu Aug 16 10:57:49 EDT 2012

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A.11.6.4 The rate of concentrate flow can be measured by timing a given displacement from the storage tank. Solution concentration can be measured by either refractometric or conductivity means (see Section D.2), or it can be calculated from solution and concentrate flow rates. Solution flow rates can be calculated by utilizing recorded inlet or end-of-system operating pressures or both.

Statement of Problem and Substantiation for Public Input

Note: This Public Input originates from Tentative Interim Amendment 11-10-1 (TIA 973) issued by the Standards Council on March 3, 2010. The revision will provide clarity to the criteria for acceptance by identifying the specific tolerance range for the concentration. This range for acceptance is based upon the type of concentration being inducted. The current wording is confusing such that it can be inferred there are discrete allowable set points for acceptance that varies based upon the type of proportioning. EMERGENCY NATURE: This change must be added since it has come to the attention of the committee that the current wording is confusing and would permit an Authority Having Jurisdiction (AHJ) to accept a foam system that inducts or proportions foam concentrate at a concentration that would violate the listing.

Submitter Information Verification

Submitter Full Name: Robert Kasiski
Organization: FM Global
Submittal Date: Fri Dec 07 09:11:19 EST 2012

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F.2 Scope.
The information provided in this section covers foams for Class B combustible and flammable liquid fuel fires. Foams for this purpose include protein foam, fluoroprotein foam, film-forming fluoroprotein foam (FFFP), and synthetic foams such as aqueous film-forming foam (AFFF).

This section is primarily concerned with the discharge of foam solutions to wastewater treatment facilities and to the environment. The discharge of foam concentrates, while a related subject, is a much less common occurrence. All manufacturers of foam concentrate deal with clean-up and disposal of spilled concentrate in their MSDS sheets and product literature. Disposal of foam concentrates is also addressed in F.9.5.

Statement of Problem and Substantiation for Public Input

The change would direct the reader to more information on the disposal of foam concentrates.

Submitter Information Verification

Submitter Full Name: TOM CORTINA
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Affiliation: Fire Fighting Foam Coalition
Submittal Date: Thu Jan 03 12:36:46 EST 2013

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F.3 Discharge Scenarios.
A discharge of foam water solution is most likely to be the result of one of four scenarios:

1. Manual fire-fighting or fuel-blanketing operations
2. Training
3. Foam equipment system and vehicle tests
4. Fixed system releases

These four scenarios include events occurring at such places as aircraft facilities, fire fighter training facilities, and special hazards facilities (such as flammable/hazardous warehouses, bulk flammable liquid storage facilities, and hazardous waste storage facilities). Each scenario is considered separately in F.3.1 through F.3.4.

F.3.1 Fire-Fighting Operations.
Fires occur in many types of locations and under many different circumstances. In some cases, it is possible to collect the foam solution used; and in others, such as in marine fire fighting, it is not. These types of incidents include aircraft rescue and fire-fighting operations, vehicular fires (i.e., cars, boats, train cars), structural fires with hazardous materials, and flammable liquid fires. Foam water solution that has been used in fire-fighting operations will probably be heavily contaminated with the fuel or fuels involved in the fire. It is also likely to have been diluted with water discharged for cooling purposes.

In some cases, the foam solution used during fire department operations can be collected. However, it is not always possible to control or contain the foam. This can be a consequence of the location of the incident or the circumstances surrounding it.

Event-initiated manual containment measures are the operations usually executed by the responding fire department to contain the flow of foam water solution when conditions and manpower permit. Those operations include the following measures:

1. Blocking sewer drains: this is a common practice used to prevent contaminated foam water solution from entering the sewer system unchecked. It is then diverted to an area suitable for containment.
2. Portable dikes: these are generally used for land-based operations. They can be set up by the fire department personnel during or after extinguishment to collect run-off.
3. Portable booms: these are used for marine-based operations, which are set up to contain foam in a defined area. These generally involve the use of floating booms within a natural body of water.

F.3.2 Training.
Training is normally conducted under circumstances conducive to the collection of spent foam. Some fire training facilities have had elaborate systems designed and constructed to collect foam solution, separate it from the fuel, treat it, and — in some cases — re-use the treated water. At a minimum, most fire training facilities collect the foam solution for discharge to a wastewater treatment facility.

Training can include the use of special training foams or actual fire-fighting foams. Training facility design should include a containment system.

The wastewater treatment facility should first be notified and should give permission for the agent to be released at a prescribed rate.

F.3.3 System Tests.
Testing primarily involves engineered, fixed foam fire-extinguishing systems. Two types of tests are conducted on foam systems: acceptance tests, conducted pursuant to installation of the system; and maintenance tests, usually conducted annually to ensure the operability of the system. These tests can be arranged to pose no hazard to the environment. It is possible to test some systems using water or other nonfoaming, environmentally acceptable liquids in the place of foam concentrates if the AHJ permits such substitutions.

In the execution of both acceptance and maintenance tests, only a small amount of foam concentrate should be discharged to verify the correct concentration of foam in the foam water solution. Designated foam water test ports can be designed into the piping system so that the discharge of foam water solution can be directed to a controlled location. The controlled location can consist of a portable tank that would be transported to an approved disposal site by a licensed contractor. The remainder of the acceptance test and maintenance test should be conducted using water. Containment, transportation, and disposal of the foam solution as well as foam concentrate replacement can be costly. Portions of the acceptance and ongoing maintenance testing do not require the proportioning system to operate and those parts can be accomplished by discharging water.

F.3.4 Fixed System Releases.
This type of release is generally uncontrolled, whether the result of a fire incident or a malfunction in the system. The foam solution discharge in this type of scenario can be dealt with by event-initiated operations or by engineered containment systems. Event-initiated operations encompass the same temporary measures that would be taken during fire department operations: portable dikes, floating booms, and so forth. Engineered containment would be based mainly on the location and type of facility, and would consist of holding tanks or areas where the contaminated foam water solution would be collected, treated, and sent to a wastewater treatment facility at a prescribed rate.
Expand the discharge scenarios to include vehicle tests. Promote the use of non-fluorosurfactant training foams in order to reduce discharges of AFFF.

Submitter Information Verification

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Affiliation: Fire Fighting Foam Coalition
Submittal Date: Thu Jan 03 12:39:56 EST 2013

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Title of New Content
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Additional Proposed Changes

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<td>New section F.3.3.1</td>
<td></td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Input
Add additional information and promote the use of alternative fluids for foam testing in order to reduce discharges of foam to the environment.

Submitter Information Verification

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F.3.3.2 Water Equivalency Method

In some cases water can be used as a surrogate liquid in place of foam. This is generally called the “water equivalency method” since a correction factor (to account for viscosity differences between foam and water) is applied to the water flow rate to make it equivalent to the foam concentrate flow rate. When using this method, flow meter measurements on the water and foam concentrate sides of the system are compared to determine the injection rate. The simulated foam concentrate (using water in place of foam) flow rate is multiplied by a correction factor to account for the flow rate difference between foam concentrate and water. This corrected flow rate is divided by the total system flow rate to determine the foam injection rate percentage. While this practice may work on some systems, water does not replicate the viscosity characteristics of most AR-AFFF foam concentrates. These foams are non-Newtonian type liquids (do not behave like water) that exhibit pseudo plastic or thixotropic behavior. These terms refer to liquids whose viscosity changes dramatically depending on flow rate through a given sized pipe.

F.3.4 Vehicle Tests

ARFF and municipal fire fighting vehicles are required to go through periodic foam nozzle discharge tests to ensure proper function of their foam proportioning system. Traditionally, these tests have been done by discharging foam solution with all of the associated issues involved in containment and disposal. New technology is now available to enable testing these vehicles using water or a water based surrogate liquid containing an environmentally benign biodegradable dye. The dye in the surrogate test liquid can be detected in the proportioned solution stream by means of colorimeter instrumentation. When water is used as the surrogate test liquid a flow meter system measures the water injection rate.

Statement of Problem and Substantiation for Public Input

Same as 43.

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F.4.1 Facilities Without Engineered Containment.

Given the absence of any past requirements to provide containment, many existing facilities simply allow the foam water solution to flow out of the building and evaporate into the atmosphere or percolate into the ground. The choices for containment of foam water solution at such facilities fall into two categories: event-initiated manual containment measures and installation of engineered containment systems.

Selection of the appropriate choice is dependent on the location of the facility, the risk to the environment, the risk of an automatic system discharge, the frequency of automatic system discharges, and any applicable rules or regulations.

"Event-initiated manual containment measures" will be the most likely course of action for existing facilities without engineered containment systems. This can fall under the responsibility of the responding fire department and include such measures as blocking storm sewers, constructing temporary dikes, and deploying floating booms. The degree of such measures will primarily be dictated by location as well as available resources and manpower.

The "installation of " engineered containment systems" is a possible choice for existing facilities. Retrofitting an engineered containment system is costly and can adversely affect facility operations. There are special cases, however, that can warrant the design and installation of such systems. Such action is a consideration where an existing facility is immediately adjacent to a natural body of water and has a high frequency of activation.

Statement of Problem and Substantiation for Public Input

Editorial correction.

Submitter Information Verification

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Federal (U.S.), state, and local environmental jurisdictions have certain chemical reporting requirements that apply to chemical constituents within foam concentrates. In addition, there are also requirements that apply to the flammable liquids to which the foams are being applied. For example, according to the U.S. Environmental Protection Agency (EPA), the guidelines in F.8.1 through F.8.4 must be adhered to followed.

Statement of Problem and Substantiation for Public Input

Editorial correction.

Submitter Information Verification

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F.8.1
Releases of ethylene glycol in excess of 5000 lb are reportable under Sections 102(b) and 103(a) of U.S. EPA Comprehensive Environmental Response Compensation & Liability Act (CERCLA). Ethylene glycol is generally commonly used as a freeze-point suppressant in many foam concentrates.

Statement of Problem and Substantiation for Public Input
Editorial correction.

Submitter Information Verification

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F.9 Environmental Properties of Hydrocarbon Surfactants and Fluorochemical Surfactants.

Fire-fighting foam agents contain surfactants. Surfactants or surface active agents are compounds that reduce the surface tension of water. They have both a strongly “water-loving” portion and a strongly “water-avoiding” portion.

Dish soaps, laundry detergents, and personal health care products such as shampoos are common household products that contain hydrocarbon surfactants.

Fluorochemical surfactants are similar in composition to hydrocarbon surfactants; however, a portion of the hydrogen atoms have been replaced by fluorine atoms. Unlike chlorofluorocarbons (CFCs) and some other volatile fluorocarbons, fluorochemical surfactants are not ozone depleting and are not restricted by the Montreal Protocol or related regulations. Fluorochemical surfactants also have no effect on global warming or climate change. AFFF, fluoroprotein foam, and FFFP are foam liquid concentrates that contain fluorochemical surfactants.

There are environmental concerns with use of surfactants that should be kept in mind when these products are used for extinguishing fires or for fire training. These concerns are as follows:

1. All surfactants have a certain level of aquatic toxicity.
2. Surfactants used in fire-fighting foams cause foaming.
3. Surfactants used in fire-fighting foams can be persistent. (This is especially true of the fluorine-containing portion of fluorochemical surfactants.)
4. Surfactants can be mobile in the environment. They can move with water in aquatic ecosystems and leach through soil in terrestrial ecosystems.

F.9.1 through F.9.5 explain what each of these properties mean and what the properties mean in terms of how these compounds should be handled.

F.9.1 Toxicity of Surfactants.

Fire-fighting agents, used responsibly and following Material Safety Data Sheet instructions, pose little toxicity risk to people. However, some toxicity does exist. The toxicity of the surfactants in fire-fighting foams, including the fluorochemical surfactants, is a reason to prevent unnecessary exposure to people and to the environment. It is a reason to contain and treat all fire-fighting foam wastes whenever feasible. One should always make plans to contain wastes from training exercises and to treat them following the suppliers’ disposal recommendations as well as the requirements of local authorities.

Water that foams when shaken due to contamination from fire-fighting foam should not be ingested. Even when foaming is not present, it is prudent to evaluate the likelihood of drinking water supply contamination and to use alternate water sources until one is certain that surfactant concentrations of concern no longer exist. Suppliers of fire-fighting foams should be able to assist in evaluating the hazard and in recommending laboratories that can do appropriate analysis when necessary.
F.9.2 Surfactants and Foaming.

Many surfactants can cause foaming at very low concentrations. This can cause aesthetic problems in rivers and streams, and both aesthetic and operational problems in sewers and wastewater treatment systems. When too much fire-fighting foam is discharged at one time to a wastewater treatment system, serious foaming can occur. The bubbles of foam that form in the treatment system can trap and bring flocks of the activated sludge that treat the water in the treatment system to the surface. If the foam blows off the surface of the treatment system, it leaves a black or brown sludge residue where the foam lands and breaks down.

If too much of the activated sludge is physically removed from the treatment system in foam, the operation of the treatment system can be impaired. Other waste passing through the system will then be incompletely treated until the activated sludge concentration again accumulates. For this reason, the rate of fire-fighting foam solution discharged to a treatment system has to be controlled. Somewhat higher discharge rates can be possible when antifoaming or defoaming agents are used. Foam concentrate suppliers can be contacted for guidance on discharge rates and effective antifoaming or defoaming agents.

F.9.3 Persistence of Surfactants.

Surfactants can biodegrade slowly and/or only partially biodegrade. The fluorochemical surfactants are known to be very resistant to chemical and biochemical degradation. This means that, while the non-fluorochemical portion of these surfactants can break down, the fluorine-containing portion can likely remain. This means that after fire-fighting foam wastes are fully treated, the residual waste could still form some foam when shaken. It could also still have some toxicity to aquatic organisms if not sufficiently diluted.

F.9.4 Mobility of Surfactants.

Tests and experience have shown that some surfactants or their residues can leach through at least some soil types. The resistance of some surfactants to biodegradation makes the mobility of such surfactants a potential concern. While a readily degradable compound is likely to degrade as it leaches through soil, this will not happen to all surfactants. Thus, if allowed to soak into the ground, surfactants that don't become bound do not bind to soil components can eventually reach groundwater or flow out of the ground into surface water. If adequate dilution has not occurred, surfactants can cause foaming or concerns about toxicity. Therefore, it is inappropriate to allow training waste to continually seep into soil, especially in areas where water resources could be contaminated.

F.9.5 Environmental Regulation of Fluorochemical Surfactants.

Fluorochemical surfactants and related fluorochemical polymers are used in many applications besides fire-fighting foams, including paper and packaging, textiles, leather and carpet treatment, and coatings. Some of these fluorochemicals and/or their persistent degradation products have been found in living organisms, which has drawn the concern of environmental authorities worldwide and led to both regulatory and nonregulatory actions to reduce emissions. The focus of these actions has been on fluorochemicals that contain eight carbons (C8) or more, such as PFOS (perfluorooctane sulfonate) and PFOA (perfluorooctanoic acid).
3M used a unique process to manufacture the fluorochemical surfactants contained in its fire-fighting foams. This process is called electrochemical fluorination (ECF), and fluorochemicals produced by this process both contain and degrade into PFOS. 3M stopped the manufacture of PFOS-based foams in 2002, and regulations in the United States (U.S.), Canada, and the European Union (EU) act as a ban on new production. EPA regulations do not restrict the use of old stocks of PFOS foam in the U.S. Regulations in the EU and Canada require old stocks of PFOS foam to be removed from service in 2011 and 2013, respectively. Excess stocks of PFOS foam concentrate can be destroyed by high-temperature incineration at any approved hazardous waste destruction facility.

All current manufacturers use a process called telomerization to produce the fluorochemical surfactants contained in their fire-fighting foams. Chemicals produced by this process are generally referred to as telomers. Telomer-based foams do not contain or degrade into PFOS. They are not made with PFOA but can contain trace levels as a contaminant of the manufacturing process.

Rather than regulate emissions of PFOA, EPA developed a global stewardship program where fluorochemical manufacturers have voluntarily agreed to reduce 95 percent by year-end 2010 and work to eliminate by year-end 2015 emissions of PFOA, PFOA precursors, and higher homologue chemicals. As a result, telomer-based fluorochemicals that are used in fire-fighting foams after 2015 are likely to contain only six carbons (C6) or less in order to comply with the EPA program. This will require some reformulation and likely some type of re-approval. Reformulation and re-approvals (where needed) of most current foam products between 2010 and 2015 is ongoing by foam manufacturers in order to meet the 2015 target date.

Regulatory authorities will continue to evaluate the environmental impacts of fluorochemicals, and it is possible that regulations could change in the future.

F.9.6 Minimizing Emissions of Fluorochemical Surfactants.

Because of their persistent nature, emissions of fluorochemical surfactants to the environment should be minimized whenever possible using the following techniques:

(1) Use training foams that do not contain fluorochemical surfactants.

(2) Use surrogate liquid test methods for testing fixed system and vehicle foam proportioning systems.

(3) Provide for containment, treatment, and proper disposal of foam discharges.

(4) Develop plans for dealing with unplanned releases of foam concentrate or foam solution so as to minimize the environmental impact.

(5) Follow applicable industry standards on the design, installation, and maintenance of foam systems and extinguishers.

(6) Minimize false discharges from fixed foam systems by using approved detection, actuation, and control systems as required by industry standards.

(7) Where appropriate, consider treating collected wastewater with granular activated carbon (GAC) or a membrane process such as reverse osmosis to remove the fluorochemical surfactants prior to disposal.

Statement of Problem and Substantiation for Public Input
Editorial corrections. Update the status of the reformulation of foam concentrates in response to the EPA PFOA Stewardship Program. Promote the use of training foams and alternative testing fluids as a way to reduce discharges of foam to the environment.

Submitter Information Verification

Submitter Full Name: TOM CORTINA
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Submittal Date: Thu Jan 03 13:02:30 EST 2013

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Public Input No. 51-NFPA 11-2013 [ New Section after I.3 ]

Annex J - Dry Foam Fire Testing
See attached new Annex that is to complement the new Chapter 13 for Dry Foam. The annex is modeled after existing UL 162 tests and designed to create a standard for testing in-situ applied dry foam.

Additional Proposed Changes

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<td>Annex J - Dry Foam Fire Testing See attached new Annex that is to complement the new Chapter 13 for Dry Foam. The annex is modeled after existing UL 162 tests and designed to create a standard for testing in-situ applied dry foam. The placement within the Annex section is at the discretion of NFPA if accepted.</td>
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Statement of Problem and Substantiation for Public Input

A new Chapter 13 is proposed to include in-situ applied dry foam and the annex is provided as a standard to test dry foam in that application. The annex is modeled after the similar UL 162 test method and adjusted for the in-situ application and longer duration once applied to the flammable liquid and prior to conducting the candle tests and the stovepipe test.

Related Public Inputs for This Document

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Submitter Full Name: Joe Riordan
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Submittal Date: Thu Jan 03 20:13:10 EST 2013

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