<table>
<thead>
<tr>
<th>Agenda Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-10-1</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Sections 5.3.4.2.1, A.5.3.4.2.1 and A.5.3.4.2.1 (3) of the 2011 edition of NFPA 25, <em>Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems</em>, (TIA No. 1077).</td>
</tr>
<tr>
<td>12-10-1-a</td>
<td>Text of proposed TIA No. 1077. See Attachment 12-10-1-a</td>
</tr>
<tr>
<td>12-10-1-b</td>
<td>Ballot results of TIA No. 1077. <strong>Passed</strong> TC ballot on both technical merit and emergency nature. See Attachment 12-10-1-b</td>
</tr>
<tr>
<td>12-10-1-c</td>
<td>No public comments were received. No Attachment</td>
</tr>
<tr>
<td>12-10-1-d</td>
<td>Standards Council (SC) Decision #12-3 (SC Agenda Item 12-8-25, 26, 27, 28, 30, 31, 32, and 33) See SA 12-10-1-d ADDITION</td>
</tr>
<tr>
<td>12-10-2</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Table F.1(a) of the 2011 edition of NFPA 30B, <em>Code for the Manufacture and Storage of Aerosol Products</em>, (TIA No. 1059).</td>
</tr>
<tr>
<td>12-10-2-a</td>
<td>Text of proposed TIA No. 1059. See Attachment 12-10-2-a</td>
</tr>
<tr>
<td>12-10-2-b</td>
<td>Ballot results of TIA No. 1059. <strong>Passed</strong> TC ballot on both technical merit and emergency nature. See Attachment 12-10-2-b</td>
</tr>
<tr>
<td>12-10-2-c</td>
<td>No public comments received. No Attachment</td>
</tr>
<tr>
<td>12-10-3-a</td>
<td>Text of proposed TIA No. 1070. See Attachment 12-10-3-a</td>
</tr>
<tr>
<td>12-10-3-b</td>
<td>Ballot results of TIA No. 1070. <strong>Passed</strong> TC ballot on both technical merit and emergency nature. See Attachment 12-10-3-b</td>
</tr>
<tr>
<td>12-10-3-c</td>
<td>No public comments received. No Attachment</td>
</tr>
<tr>
<td>12-10-4</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Sections 15.3.9 and A.15.3.9 of the 2013 edition of NFPA 55, <em>Compressed Gases and Cryogenic Fluids Code</em>, (TIA No. 1071).</td>
</tr>
<tr>
<td>12-10-4-a</td>
<td>Text of proposed TIA No. 1071. See Attachment 12-10-4-a</td>
</tr>
<tr>
<td>12-10-4-b</td>
<td>Ballot results of TIA No. 1071. <strong>Passed</strong> TC ballot on both technical merit and emergency nature. See Attachment 12-10-4-b</td>
</tr>
<tr>
<td>12-10-4-c</td>
<td>No public comments received. No Attachment</td>
</tr>
<tr>
<td>12-10-5</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Sections 3.3.x Cleaning Media, Purging, 7.1.19, 8.14.1.2, 9.4.1.9, 10.2.3.3, 11.2.3.9, 12.3.2.8.5.7, 14.4.1.3, 14.4.3.1, 15.4.1.10.1.1, A.3.3.x, A.7.1.19.1.1(c), A.7.1.19.1.1.(d), A.7.1.19.1.3, A.7.1.19.1.3.1, A.7.1.19.1.5.3, A.7.1.19.2, A.7.1.19.2.2, A.7.1.19.3 and H.1.2.4 of the 2013 edition of NFPA 55,</td>
</tr>
<tr>
<td>12-10-5-a</td>
<td>Text of proposed TIA No. 1073. See Attachment 12-10-5-a</td>
</tr>
<tr>
<td>12-10-5-b</td>
<td>Ballot results of TIA No. 1073. Passed TC ballot on both technical merit and emergency nature. See Attachment 12-10-5-b</td>
</tr>
<tr>
<td>12-10-5-c</td>
<td>No public comments received. No Attachment</td>
</tr>
<tr>
<td><strong>12-10-6</strong></td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Sections 18.3.2.5.3 (11) – (13), and related 18.3.4 and 19.3.4 alarm system provisions and associated advisory annex of the 2012 edition of NFPA 101, <em>Life Safety Code</em>® (TIA No. 1075). Comment closing is October 4, 2012.</td>
</tr>
<tr>
<td>12-10-6-a</td>
<td>Text of proposed TIA No. 1075. See Attachment 12-10-6-a</td>
</tr>
<tr>
<td>12-10-6-b</td>
<td>Ballot results of TIA No. 1075. Passed CC ballot on both correlation and emergency nature. Passed TC ballot on both technical merit and emergency nature. See Attachment 12-10-6-b See SA 12-10-6-b</td>
</tr>
<tr>
<td>12-10-6-c</td>
<td>Two public comments have been received. See Attachment 12-10-6-c</td>
</tr>
<tr>
<td>12-10-7-a</td>
<td>Text of proposed TIA No. 1072. See Attachment 12-10-7-a</td>
</tr>
<tr>
<td>12-10-7-b</td>
<td>Ballot results of TIA No. 1072. Failed TC ballot on both technical merit and emergency nature. See Attachment 12-10-7-b</td>
</tr>
<tr>
<td>12-10-7-c</td>
<td>No public comments received. No Attachment</td>
</tr>
<tr>
<td><strong>12-10-8</strong></td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Section 5.14.4 of the 2013 edition of NFPA 1917, <em>Standard for Automotive Ambulances</em>, (TIA No. 1078).</td>
</tr>
<tr>
<td>12-10-8-a</td>
<td>Text of proposed TIA No. 1078. See Attachment 12-10-8-a</td>
</tr>
<tr>
<td>12-10-8-b</td>
<td>Ballot results of TIA No. 1078. Failed TC ballot on technical merit Passed on emergency nature. See Attachment 12-10-8-b</td>
</tr>
<tr>
<td>12-10-8-c</td>
<td>No public comments received. No Attachment</td>
</tr>
<tr>
<td><strong>12-10-9</strong></td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Table 4.4.1 and Sections 5.1.5.12, 5.2.10.6, 7.4.6.1, 7.5.6.1, 7.5.7.10, 7.6.3.9, 8.13.1.1, 7.6.3.12, 7.11.6, 7.11.6.2, 7.11.6.3(New), 7.15.1, 7.15.2, 7.17, 7.6.3.1.1, 7.11.7 (New), 8.15.5 and 8.15.6.1 of the 2012 edition of NFPA 1983, <em>Standard on Life Safety Rope and Equipment for Emergency Services</em>, (TIA No. 1076).</td>
</tr>
<tr>
<td>12-10-9-a</td>
<td>Text of proposed TIA No. 1076. See Attachment 12-10-9-a</td>
</tr>
<tr>
<td>12-10-9-b</td>
<td>Ballot results of TIA No. 1076. Passed CC ballot on both correlation and emergency nature. Passed TC ballot on both technical merit and emergency nature. See Attachment 12-10-9-b</td>
</tr>
<tr>
<td>12-10-9-c</td>
<td>No public comments received. No Attachment</td>
</tr>
<tr>
<td><strong>12-10-10</strong></td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Sections 4.2.1.1.2, 4.2.1.1.3, A.4.2.1.1.2 and A.4.2.1.1.3 of the 2012 edition of NFPA 2001, <em>Standard on Clean Agent Fire Extinguishing Systems</em>, (TIA No. 1069).</td>
</tr>
<tr>
<td>12-10-10-a</td>
<td>Text of proposed TIA No. 1069. See Attachment 12-10-10-a</td>
</tr>
<tr>
<td>12-10-10-b</td>
<td>Ballot results of TIA No. 1069. Passed TC ballot on both technical merit and emergency nature. See Attachment 12-10-10-b</td>
</tr>
<tr>
<td>12-10-10-c</td>
<td>No public comments received. No Attachment</td>
</tr>
<tr>
<td><strong>12-10-11</strong></td>
<td>Consider the appeal of J. Golinveaux of Tyco Fire Protection Products</td>
</tr>
<tr>
<td>APPEAL</td>
<td>requesting that the Standards Council reverse several recent actions taken by the Water Mist Fire Protection Systems Committee, during the First Draft committee meeting of NFPA 750, which Tyco believes is outside the scope of NFPA 750. See Attachment 12-10-11</td>
</tr>
<tr>
<td>12-10-11-a</td>
<td>Comment received on the appeal from L. Owen, Chair of the Water Mist Fire Protection Systems Committee. See Attachment 12-10-11-a</td>
</tr>
<tr>
<td>12-10-11-b</td>
<td>Comment received on the appeal on NFPA 750 regarding the TC operating outside their scope. See Attachment 12-10-11-b</td>
</tr>
<tr>
<td>12-10-11-c</td>
<td>Comment received from K. Linder, Chair of the Automatic Sprinkler Correlating Committee, on the appeal. See SA 12-10-11-c ADDITION</td>
</tr>
<tr>
<td>12-10-11-d</td>
<td>Committee ballot results of the First Draft of NFPA 750. See SA 12-10-11-d ADDITION</td>
</tr>
<tr>
<td>12-10-12</td>
<td>APPEAL Consider the appeal of J. Heckman of American Pyrotechnics Association requesting that the Standards Council modify Standards Council (SC) Decision #12-4 (SC Agenda Item 12-8-11) to extend the timeframe for processing the TIA as directed in the Decision. See Attachment 12-10-12 See SA 12-10-12</td>
</tr>
<tr>
<td>12-10-12-a</td>
<td>Comments received on the appeal on NFPA 1124 regarding a request to extend the timeframe for processing the TIA as directed in SC Decision#12-4. See Attachment 12-10-12-a See SA 12-10-12-a</td>
</tr>
<tr>
<td>12-10-13</td>
<td>Consider the request of M. Conroy of Brooks Equipment Company that NFPA establish a new document for the installation, signage, use, training, inspection, maintenance, and testing of automatic external defibrillators (AED). <strong>Proposed Scope:</strong> This document shall contain minimum requirements for the installation, signage, use, training, inspection, maintenance, and testing of automatic external defibrillators (AED). See Attachment 12-10-13</td>
</tr>
<tr>
<td>12-10-14</td>
<td>Consider the request of the Technical Committee (TC) on Hazardous Response Personnel to enter a new document NFPA 475, <em>Recommended Practices for Organizing and Managing a Hazardous Materials/WMD Emergency Response Program</em>, into the Fall 2016 revision cycle. The Council approved the establishment of this proposed document at the August 2012 Council Meeting. See Attachment 12-10-14</td>
</tr>
<tr>
<td>12-10-15</td>
<td>Consider the request of the Technical Committee (TC) on Fundamentals of Combustible Dusts to enter a new document NFPA 652, <em>Standard on Combustible Dusts</em>, into the Fall 2014 revision cycle. The Council approved the establishment of this proposed document at the March 2011 Council Meeting. See Attachment 12-10-15</td>
</tr>
<tr>
<td>12-10-16</td>
<td>Consider the request of the Technical Committee (TC) on Data Exchange for the Fire Service to enter a new document NFPA 951, <em>Guide to Building and Utilizing Digital Information</em>, into the Fall 2015 revision cycle. The Council approved the establishment of this proposed document at the March 2009 Council Meeting. See Attachment 12-10-16</td>
</tr>
</tbody>
</table>
| 12-10-17 | Consider the request of the Correlating Committee (CC) on Professional Qualifications and the Technical Committee (TC) on Hazardous Materials Response Personnel to enter a new document NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction emergency Response*
Personnel Professional Qualifications, into the Fall 2016 revision cycle. The Council approved the establishment of this proposed document at the August 2011 Council Meeting. See Attachment 12-10-17

Consider requests from NFPA Committees to change revision cycles for the following documents:

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1710</td>
<td>2010</td>
<td>A2014</td>
<td>A2014 to A2015</td>
<td>One Time Move</td>
<td>5 to 6 year cycle</td>
</tr>
<tr>
<td>1991</td>
<td>2005</td>
<td>F2014</td>
<td>F2014 to F2015</td>
<td>One Time Move</td>
<td>5 to 11 year cycle</td>
</tr>
</tbody>
</table>

(Doc was returned at A12 WSC)

See Attachment 12-10-18

12-10-19 Report of the Membership Task Group (K. Bell, Chair)

12-10-19-a Act on pending applications for Committee Members.

12-10-19-b Annual Reappointment of Committee Members.

12-10-19-c Act on correspondence received regarding membership on the Aircraft Rescue and Fire Fighting Committee.

12-10-20 Report of the Policy and Procedures Task Group (J. Milke, Chair) See SA 12-10-20

12-10-21 Review the Report of the High Rise Building Safety Advisory Committee. See Attachment 12-10-21


12-10-23 Hear a report on the Minutes of the August 2012 Standards Council Meeting. No Attachment

12-10-24 Review the dates and locations of upcoming Council Meetings, as follows:

March 6-7, 2013
(TG Meeting 8:00 AM on March 6) San Juan, PR

July 29-August 1, 2013 (REVISED)
(TG Meeting 12:00 PM on July 29) Quincy, MA

October 23-24, 2013
(TG Meeting 8:00 AM on October 23) TBD
1. Revise 5.3.4.2.1 as follows:

5.3.4.2.1* For systems installed prior to September 30, 2012, listed antifreeze solutions shall not be required until September 30, 2022 where all of the following conditions are met:

(1)* The concentration of the antifreeze solution shall be limited to 50% glycerin by volume or 40% propylene glycol by volume.
(2) Newly introduced solutions shall be factory premixed antifreeze solutions (chemically pure or United States Pharmacopeia 96.5%).
(3)*Antifreeze systems with concentrations in excess of 30% propylene glycol and 38% glycerine shall be permitted based upon an approved deterministic risk assessment prepared by a qualified person approved by the AHJ.

2. Revise A.5.3.4.2.1 as follows:

A.5.3.4.2.1 It is assumed that all antifreeze systems installed after September 30, 2012 will meet the minimum requirements of NFPA 13, 2013 Edition. For systems installed after September 30, 2012, that do not meet the requirements of the 2013 edition of NFPA 13, consideration should be given to applying 5.3.4.2.1.

3. Revise A.5.3.4.2.1 (3) as follows:

A.5.3.4.2.1(3) Antifreeze solutions with a maximum concentration of 38% glycerine or 30% propylene glycol do not require a deterministic hazard analysis. The risk assessment should be prepared by individual(s) who can demonstrate an ability to prepare a risk assessment by education and experience and who can demonstrate an understanding of the issues associated with antifreeze sprinkler systems, including the available related fire tests. For additional information regarding the risk assessment process, documentation to be submitted, and the AHJ’s role, refer to NFPA 551, Guide for the Evaluation of Fire Risk Assessments, and the SFPE Engineering Guide: Fire Risk Assessment.

Propylene glycol and glycerin antifreeze solutions discharged from sprinklers have the potential to ignite under certain conditions. Research testing has indicated that several variables may influence the potential for large-scale ignition of the antifreeze solution discharged from a sprinkler. These variables include, but are not limited to, the concentration of antifreeze solution, sprinkler discharge characteristics, inlet pressure at the sprinkler, ceiling height, and size of fire at the time of sprinkler discharge. All relevant data and information should be carefully reviewed and considered in the deterministic risk assessment.

As appropriate, the risk assessment should consider factors such as:

1. Occupancy use group per NFPA 13
2. Ceiling height
3. Antifreeze solution concentration and type
4. Maximum system pressure (normal static pressures)
5. Sprinkler type, including k Factor
6. Potential and actual fuel load (Christmas trees)
7. Type of structure (construction types)
8. Size of structure
9. Ability of the sprinkler system to control the fire
10. Occupied spaces -vs- unoccupied spaces (such as trash enclosures, dust collectors, etc)
    a) Adjacent occupancies (spaces adjacent to the area protected by antifreeze systems)
    b) Separation between areas protected with an antifreeze system and other areas
    c) Ventilation of areas protected with an antifreeze system to prevent damage to adjacent areas
    d) Duration of antifreeze discharge
Tests summarized in Table A.5.3.4.2.1(3) show that large-scale ignition of the sprinkler spray did not occur in tests with 50% glycerine and 40% propylene glycol antifreeze solutions discharging onto a fire having a nominal Heat Release Rate (HRR) of 1.4 MW. A deterministic risk assessment that demonstrates that the heat release rate for reasonably credible fire scenarios will be less than 1.4 MW at the time of sprinkler activation should be acceptable. The risk assessment should also address issues associated with management of change, such as change in occupancy and temporary fuel loads. A natural Christmas tree can result in a HRR well above 1.4 MW at the time of sprinkler activation.

In addition to the variables identified above, the deterministic risk assessment should include the overall occupancy, quantity of solution, impact on life safety and potential increase in heat release rate.

The following is a list of research reports that have been issued by the Fire Protection Research Foundation related to the use of antifreeze in sprinkler systems that should be considered in the development of the deterministic risk assessment:


The following tables Table A.5.3.4.2.1(3) provides an overview of the testing:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope of Sprinklers Tested</td>
<td>The following sprinklers were used during the residential sprinkler research program described in the report dated December 2010: • Residential pendent style having nominal K-factors of 3.1, 4.9 and 7.4 gpm/psi • Residential concealed pendent style having a nominal K-factor of 4.9 gpm/psi 1/2 • Residential sidewall style having nominal K-factors of 4.2 and 5.5 gpm/psi 1/2. The following sprinklers were used during the spray sprinkler research program described in the report dated February 2012: 1/2 • Residential pendent style having a nominal K-factor of 3.1 gpm/psi • Standard spray pendant style having nominal K-factors of 2.8, 4.2, 5.6 and 8.0 gpm/psi 1/2 • Standard spray concealed pendant style having a nominal K-factor of 5.6 gpm/psi 1/2 • Standard spray upright style having a nominal K-factor of 5.6 gpm/psi 1/2 1/2 Standard spray extended coverage pendant style having a nominal K-factor of 5.6 gpm/psi 1/2 1/2</td>
</tr>
<tr>
<td>Antifreeze Solution Concentration</td>
<td>&lt;50% Glycerine and &lt;40% Propylene Glycol Antifreeze Solutions—Solutions were not tested. 50% Glycerine and 40% Propylene Glycol Antifreeze Solutions—Large scale ignition of the sprinkler spray did not occur in tests with sprinkler discharge onto a fire having a nominal Heat Release Rate (HRR) of 1.4 MW. Large scale ignition of the sprinkler spray occurred in multiple tests with sprinkler discharge onto a fire having a nominal HRR of 3.0 MW. 55% Glycerine and 45% Propylene Glycol Antifreeze Solutions – Large scale ignition of the sprinkler spray occurred in tests with sprinkler discharge onto a fire having a nominal HRR of 1.4 MW. &gt;55% Glycerine and &gt;45% Propylene Glycol Antifreeze Solutions – Large scale ignition of the sprinkler spray occurred in tests with sprinkler discharge onto a fire having a HRR of less than 500 kW. 70% Glycerine and 60% Propylene Glycol Antifreeze Solutions – Maximum antifreeze solution concentrations tested.</td>
</tr>
<tr>
<td>Sprinkler Inlet Pressure</td>
<td>Large scale ignition of the sprinkler discharge spray was not observed when the sprinkler inlet pressure was 50 psi or less for tests using 50% glycerine or 40% propylene glycol.</td>
</tr>
<tr>
<td>Ceiling Height</td>
<td>When discharging 50% glycerine and 40% propylene glycol antifreeze solutions onto fires having a HRR of 1.4 MW, no large scale ignition of the sprinkler spray was observed with ceiling heights up to 20 ft. When discharging 50% glycerine and 40% propylene glycol antifreeze solutions onto fires having a HRR of 3.0 MW, large scale ignition of the sprinkler spray was observed at a ceiling height of 20 ft.</td>
</tr>
<tr>
<td>Fire Control</td>
<td>The test results described in the test reports December 2010 and February 2012 indicated that discharging glycerine and propylene glycol antifreeze solutions onto a fire can temporarily increase the fire size until water is discharged. As a part of the residential sprinkler research described in report dated December 2010, tests were conducted to evaluate the effectiveness of residential sprinklers to control fires involving furniture and simulated furniture. The results of these tests indicated that 50% glycerine and 40% propylene glycol antifreeze solutions demonstrated the ability to control the furniture type fires in a manner similar to water. For standard spray type sprinklers, no tests were conducted to investigate the ability of these sprinklers to control the types and sizes of fires that these sprinklers are intended to protect.</td>
</tr>
</tbody>
</table>
Submitter’s Substantiation: In response to the Standards Council’s Final Decision on TIA 1068 (D #12-3), the above changes to that decision are being recommended by the NFPA 25 committee members. The Standards Council stated that there were two areas of concern that prevented them from issuing the TIA as written. The committee agreed to further discuss these concerns and address them more fully in their upcoming ROC meeting in Chicago. However, the committee did want to respond to two major points made by the Standards Council under the portion of the decision, “Conclusion and Further Directions”.

First, the Standards Council indicated that more guidance is needed regarding “how such a deterministic risk assessment should be conducted”. The committee understands why the Standards Council has chosen to eliminate certain absolute language regarding criteria that would have led to exemptions of the risk assessment. We also understand why the Council would seek further guidance regarding occupied and unoccupied spaces. However, we would emphatically state that the committee never contemplated any situation wherein any increased danger to occupants would be allowed. It has always been our intent to require evaluation in any case where this could be considered possible. The Committee proposes adding at least 10 items that should be taken into consideration during the risk assessment, including language that should limit the “occupied vs unoccupied” evaluation to those portions of buildings that would be completely unoccupied (“such as trash enclosures, dust collectors...etc”). The Committee has diligently attempted to include items that were discussed during the original development of the TIA and some items that have been recommended by the Council. We have included references to NFPA 551 and to the SFPE Engineering Guide for additional direction to the AHJ that will be required to allow and approve any risk evaluation that may be performed.

Second, the Standards Council indicated that more guidance is needed as to who may perform the work described in the “Risk Assessment Provision”. The committee has chosen the following language to describe the entity that is to perform this Assessment: “…prepared by a qualified person approved by the AHJ.” Currently, there is no single standard or qualification for entities that may be qualified to perform this assessment. Rather, many jurisdictions have different levels of minimum experience and knowledge required for these assessments. Therefore, the Committee feels that the AHJ should determine the acceptability of the entity that will be performing this evaluation. The Committee has added language to the Annex material for this section that will advise the AHJ regarding appropriate levels of knowledge, experience and reporting that should be required of these entities. This closely tracks with language currently found in NFPA 25, NFPA 3, NFPA 72 and other standards regarding qualifications. Additionally, many jurisdictions will have laws and regulations in place that govern the qualifications of these entities.

Emergency Nature: The Standards Council stated that “as written, this provision provides insufficient guidance on how such a deterministic risk assessment should be conducted and who should conduct it.” The NFPA 25 Committee feels that the actions proposed in this TIA will remedy much of this concern. It is important to have this minimal guidance released by the NFPA so that AHJ’s and Owners will understand the committee’s intention for existing water-based fire protection systems that may need evaluation or alteration to comply with a minimum level of safety regarding antifreeze solutions.
Agenda Item: TIA 25-2011

Document: NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

Reference: 5.3.4.2.1, A.5.3.4.2.1, and A.5.3.4.2.1(3)

(TIA Log 1077)

Comment Closing: 10/4/2012
0 Public Comments Received

TIA FINAL BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the final results show this TIA HAS achieved the necessary votes on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 23.

\[
[32 \text{ eligible to vote} - 2 \text{ not returned} - 0 \text{ abstentions} = 30 \times 0.75 = 22.5]
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
[32 \text{ eligible} \div 2 = 16 + 1 = 17 \text{ (this is the simple majority)}]
\]

32 Eligible to Vote
2 Not Returned (Garber, Popa)

TC FINAL Ballot results for Technical Merit are as follows:
26 Agree
4 Disagree (Leavitt, Ray, Sheppard, Underwood)
0 Abstentions

FINAL ACTION: PASSED

TC FINAL Ballot results for Emergency Nature are as follows:
30 Agree (Feld, Linder w/comment)
0 Disagree
0 Abstentions

FINAL ACTION: PASSED
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1077
To Revise Sections 5.3.4.2.1, A.5.3.4.2.1, and A.5.3.4.2.1 (3) of the 2011 Edition of NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Sections 5.3.4.2.1, A.5.3.4.2.1, and A.5.3.4.2.1 (3).

____________ AGREE          XX DISAGREE*          ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I have to concerns regarding TIA Log No. 1077:

1) The annex should include a sample finished risk analysis and/or examples of several analysis’s showing the range of various risks. Simply referring to NFPA 551 and having a list of variables is too open ended. The result will be risk analysis’s that have no consistency and place the owner in a position of not knowing what they are paying for along with the assurance that the results of the analysis and its associated costs are reasonable.

2) The annex material found in A.5.3.4.2.1 should be revised. To state that “It is assumed all antifreeze systems installed after September 30th, 2012 will meet the minimum requirements of the of NFPA 13 2013 Edition” is a bad assumption. The 2013 edition will not be adopted by most jurisdictions until well after the September 30 date. Rather than using the phrase in the second sentence “consideration should be given to applying 5.3.4.2.1.”, the standard should include language mandating that 5.3.4.2.1 shall be utilized for systems installed after the September 30 date because it will happen.

Question 2: I agree that the subject is of an EMERGENCY NATURE.

XX AGREE          ____________ DISAGREE*          ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

________________________________
Russell Leavitt
Signature

Name (Please Print)

________________________________
Date

Please return the ballot on or before **September 20, 2012**.
Supplemental Agenda October 29-30, 2012

October 24, 2012

TECHNICAL COMMITTEE LETTER REQUEST
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1077

To Revise Sections 5.3.4.2.1, A.5.3.4.2.1, and A.5.3.4.2.1 (3) of the 2011 Edition of NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Sections 5.3.4.2.1, A.5.3.4.2.1, and A.5.3.4.2.1 (3).

_______ AGREE ______XX____ DISAGREE* _________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a disagreement or abstaining position.

50% glycerine = +/- minus 15F; 38% glycerine = +/- 0F. Is it good fire protection to risk a fireball for an additional 15F of freeze protection? Wouldn’t the money spent on a risk assessment be better spent on fixing the system (converting it to dry pipe or preaction or conditioning/insulating the protected space)? The committee’s reliance on only encountering 1.4MW fires or smaller is unrealistic. NFPA should be focused on good FIRE protection, not good FREEZE protection. I would much rather have to explain to a customer why their system froze as opposed to why it created a fireball......

Question 2: I agree that the subject is of an EMERGENCY NATURE.

_______ XX____ AGREE ____________ DISAGREE* _________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a disagreement or abstaining position.

________________________
Signature

Richard M. Ray
Name (Please Print)

9/19/12
Date

Please return the ballot on or before September 20, 2012.

PLEASE RETURN TO:
Elena Carroll, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110 E-mail: ecarroll@nfpa.org
Elena, please record me as follows:

Technical Merit--No.

Substantiation--There should be an example of a completed analysis to go with the suggested conditions as contained in A.5.3.4.2.1(3). If an example is not provided, there may be confusion between the user, the author of the analysis, and the AHJs as to which issues in the paragraph are addressed and in what manner. Messrs. Bilbo and Huggins should be encouraged to include an example of the conclusions of the antifreeze analysis for guidance in this important issue.

Emergency Nature--Yes.

Thank you.

Bill

J William Sheppard, FSFPE
Sheppard & Associates, LLC
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1077
To Revise Sections 5.3.4.2.1, A.5.3.4.2.1, and A.5.3.4.2.1 (3) of the 2011 Edition of NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Sections 5.3.4.2.1, A.5.3.4.2.1, and A.5.3.4.2.1 (3).

__________ AGREE __________ DISAGREE* __________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I SHARE THE SAME COMMENTS AS THE STANDARDO

COUNCIL ABOUT THE NEED FOR SUPPORT

________________________

Question 2: I agree that the subject is of an EMERGENCY NATURE.

__________ AGREE __________ DISAGREE* __________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

________________________

Signature

DARRELL UNDERWOOD
Name (Please Print)

9-19-2012
Date

Please return the ballot on or before September 20, 2012.

PLEASE RETURN TO:
Elena Carroll, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7110
E-mail: ecarroll@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1077

To Revise Sections 5.3.4.2.1, A.5.3.4.2.1, and A.5.3.4.2.1 (3) of the 2011 Edition of NFPA 25,
Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Sections 5.3.4.2.1, A.5.3.4.2.1, and A.5.3.4.2.1 (3).

X AGREED  FIGURE DISAGREE*  ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

_________________________________________________________________________

Question 2: I agree that the subject is of an EMERGENCY NATURE.

X AGREED  FIGURE DISAGREE*  ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I am voting in the affirmative with the hope that the Fire Protection Research Foundation will continue with testing sprinklers (particularly K=5.6 and extended coverage sprinklers) in ceilings 8 to 10 feet in height considering commercial fires.

_________________________________________________________________________

Signature

James M. Feld
Name (Please Print)

9/13/12
Date

Please return the ballot on or before September 20, 2012.

PLEASE RETURN TO:
Elena Carroll, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110  E-mail: ecarroll@nfpa.org
Elena,

Please record my vote for TIA Log No 1077 as follows:

Technical Merit: Agree


While TIA 1068 as issued by the Standards Council could stand on its own, this revised version of the TIA is intended to clarify two concerns identified by the Council with that TIA. This would replace that TIA with more comprehensive language and as such I believe that it meets the Emergency Nature Criteria.

Let me know if you need anything else.

Regards,
Ken

At its meeting of August 7-9, 2012, the Standards Council considered eight proposed Tentative Interim Amendments (TIAs) regarding antifreeze in fire sprinkler installations and took the following actions:

NFPA 13, Standard for the Installation of Sprinkler Systems, 2013 Edition:
- TIA No. 1066 passed ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted to issue the TIA, concurrently with the issuance of the 2013 edition of NFPA 13.

- TIA No. 1065 passed ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted to issue the TIA, concurrently with the issuance of the 2013 edition of NFPA 13.
- TIA No. 1062 failed the ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted not to issue the TIA.

NFPA 13D, Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes, 2013 Edition:
- TIA No. 1067 passed ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted to issue the TIA, concurrently with the issuance of the 2013 edition of NFPA 13D.
- TIA No. 1061 failed the ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted not to issue the TIA.

NFPA 13D, Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes, 2010 Edition:
- TIA No. 1060 failed the ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted not to issue the TIA.

- TIA No. 1046 had originally passed ballot of the responsible Technical Committee (TC) but was superseded by the passage of TIA 1068 and the Council, therefore, voted not to issue the TIA.
- TIA No. 1068 passed ballot of the responsible Technical Committee (TC). The Council voted to issue the TIA with the following revisions displayed in legislative text as follows:

5.3.4.2.1*

....

(3)* Antifreeze systems with concentration in excess of 30% propylene glycol and 38% glycerine shall be permitted base upon an approved deterministic risk assessment except where explicitly permitted under 5.3.4.2.1(4).

(4) A risk assessment shall not be required for the following applications:

(a) Light hazard occupancies with ceiling heights not exceeding 20 ft (6.1 m) where Quick Response sprinklers are installed

(b) Dwelling Units where residential or other fast response sprinklers are installed

**

A.5.3.4.2.1 It is assumed that all antifreeze systems installed after September 30, 2012 will meet the minimum requirements of NFPA 13, 2013 Edition (or TIA XXX, 2010 Edition).

Subject to the approval of the AHJ, small installations in normally occupied areas such as dust collectors and similar spaces may utilize concentrations in excess of the limits established in 5.3.4.2.1. Where concentrations in excess of 5.3.4.2.1 are desired for larger systems, an equivalency should be approved by the AHJ.

As noted above, four of the processed TIAs either failed ballot (TIA No. 1062 on 13R, TIA No. 1061 on 13D, 2013 edition and TIA No. 1060 on 13D, 2010 edition) or, one case (TIA No. 1046 on NFPA 13R) was replaced by a superseding TIA (TIA No. 1068). By reason of their lack of committee support and in the absence of any appeals, the Council has voted not to issue these TIAs. The remainder of this decision, after providing a brief background, discusses the four TIAs that the responsible committees have passed and submitted to the Council for issuance. As detailed above, the Council has voted to issue three of the TIAs, as submitted, and to issue the remaining TIA, with the revisions set forth above.

**Background**

The development and consideration of the TIAs currently before the Council is part of ongoing activities within the NFPA standards development process relating to the use of antifreeze in automatic sprinkler systems to protect piping in unheated areas subject to freezing temperatures. The background relating to this subject can be accessed in greater detail in previous decisions of the Council. See Standards Council Decision #10-10 (SC Agenda Items #10-8-15 thru 10-8-20,
August 5, 2010); Standards Council Decision #11-5 (SC Agenda Items #11-3-3-e, 11-3-4-e and 11-3-5-d, March 1, 2011) and Standards Council Decision #12-2 (SC Agenda Item #12-3-8, March 6, 2012). See also SC Minute Items 10-10-21 (October 2010), 11-3-6 & 7 (March 2011), and 11-8-48 (August 2011). This and other information, including Research Foundation reports discussed in the Council decisions can be found at www nfpa.org/antifreeze.

Of these decisions, the most recent one, Decision #12-2 (March 2012), is most relevant to the current TIA development activities. That decision discussed newly available results of full scale fire tests with antifreeze in standard spray sprinklers. These results were reported in a February 2012 Fire Protection Research Foundation report, “Antifreeze Solutions Supplied through Spray Sprinklers: Interim Report” (hereafter Non-residential Report) authored by Steve Wolin, Code Consultants. While previous testing and standards development activities on antifreeze in sprinkler systems had focused on residential applications, the testing reported in the Non-residential Report related to standard spray sprinklers generally used in commercial, non-residential applications. The results of the testing were summarized in the Council Decision #12-2 as follows:

As documented in the Non-Residential Report, however, spray sprinklers did not perform well in many of the tests. In the earlier residential sprinkler tests using 50% glycerine, ignition of the spray pattern was not seen. In the Non-Residential Report, however, ignition of the spray pattern occurred in 4 of the 15 fire tests, and in many of the 15 tests substantial increases in heat release rates were recorded. For example, tests 2 and 15 experienced spray pattern ignition. See Non-Residential Report at pp. 6 and 8. In addition to the tests noted at 8 feet and 15 feet, tests at 20 feet experienced ignition of the solution and substantial increases in heat release rates, including increases as high as 8 MW and 22 MW. As the Non-Residential Report noted with respect to the 20 foot tests, “substantial ignition of the antifreeze spray and flames extending away from the ignition source were observed during two of the tests with the sprinkler positioned at 20 ft above the floor.” See Non-Residential Report at p. 6.

The Council stressed that its discussion of the Non-Residential Report was not meant to describe or analyze that report in depth or set forth all its results or areas of concern, but the discussion, in the Council’s view “does illustrate . . . that the Non-Residential Report raises serious concerns that need to be reviewed and addressed.” See Non-Residential Report at p. 10.

In conclusion, the Council directed the responsible TCs to review the Non-Residential Report and take necessary action through developing TIAs for submission to the Council by its August 2012 meeting. Specifically, the Council directed as follows:

The Council, therefore, is requesting that the responsible committees meet and review the Non-Residential Report (and any supplemental report, as it becomes available) as soon as possible.

The Automatic Sprinkler Project and the NFPA 25 TC should take one of the following steps. These technical committees should process Tentative Interim Amendments (TIAs) for submission to the Council no later than its August 2012 meeting. Should the Committees wish to act prior to the August 2012 Council
meeting, the Council will make every effort to expedite its consideration of the matter through a special meeting or letter ballot. If TIAs are not proposed, the committees should provide the Council with a full report detailing why the current antifreeze requirements do not require revision based on the findings of the Non-Residential Report (and any supplement), and why the findings of the Non-Residential Report do not present safety concerns requiring emergency action.

The sprinkler committees, thereafter, proceeded to review and act in accordance with the Standards Council Decision #12-2. The results, as indicated earlier in this decision, are four TIAs that have passed ballot and achieved consensus within the responsible committees and that now come to the Standards Council for consideration. The Council accords great respect and deference to the results yielded by the standards development process. Indeed, it is generally the responsibility of technical committees to assess the technical issues and available substantiation to arrive at consensus judgments about the content of NFPA standards, and absent exceptional circumstances, the Council will issue TIAs that have passed the ballot of the responsible technical committees. It is, moreover, particularly evident here that the responsible committees have made sustained efforts to grapple with the difficult technical issues associated with antifreeze and to rapidly incorporate new knowledge about antifreeze into the sprinkler standards in a way that addresses the safety issues while affording consideration to the problems of freeze protection, particularly in existing systems. The Council respects the difficulty of the tasks placed before the sprinkler committees and in large part has deferred to the judgment of the committees. In respect to portions of one TIA, however, the Council has found the exceptional circumstances in which it must take corrective action. As this decision now discusses, the Council is issuing three of the four TIAs as submitted. In the case of the fourth, it is issuing the TIA, but has found a clear and substantial basis to issue it with certain revisions.

**Issuance of TIAs 1065, 1066 and 1067, as submitted**

While the Council has reviewed and considered all the TIAs in their entirety, this decision does not attempt a full or complete description of the TIAs which should be consulted directly for a full understanding of their provisions. Generally speaking, TIA No. 1066 on NFPA 13 and TIA No. 1065 on NFPA 13R take the significant step of requiring that all antifreeze solutions used in new fire sprinkler installations must be listed. Similarly, TIA No. 1067 also requires the use of listed antifreeze in new NFPA 13D systems, but allows a limited exemption for Authority Having Jurisdiction (AHJ) approval for a non-listed solution in the case of antifreeze concentrations for premixed glycerine at or below 48% or premixed propylene glycol at or below 38% where documentation justifies the use of those concentrations for specific portions of the home. Apart from this limited exception, the TIAs, through the new listing requirement (hereafter, “the Listing Requirement”), effectively prohibit the use of antifreeze in new sprinkler systems unless and until antifreeze products are available that can achieve a third-party listing that “address[es] the inability for the specific antifreeze solution tested to ignite when discharged from specific sprinklers” (See NFPA 13, A.7.6.1, as amended by TIA No. 1066). These TIAs, moreover, apply to residential applications (13, 13R and 13D) as well as nonresidential 13 systems, so while the Council, in Decision #12-2, had asked the committees to focus on the nonresidential applications investigated in the Nonresidential Report, the committees went further and revised and strengthened their previous treatment of residential systems. In the Council’s view, these TIAs are based on reasonable judgments that have been reasonably substantiated. Having achieved the consensus of the responsible committees, the Council has voted to issue them.
**Issuance of TIA No. 1068, with revisions**

TIA No. 1068 on NFPA 25 proposes several revisions that expand upon or revise the committee’s previous antifreeze TIA (TIA #11-1; Log No. 1014, March 2011). The TIA will not be described in detail here and should be directly consulted for a full understanding of its provisions. The TIA, in principal part, sets in place a timetable for the maintenance of sprinkler systems that will phase in, over time for existing sprinkler systems, the Listing Requirement now being required for new sprinkler system installations, per the NFPA 13 and NFPA 13R TIA described above. The Council has found no basis on which to question most of the TIA, including the phase-in approach. After considering the entire record, however, the Council has found that, in two respects, the responsible technical committee has materially failed to sufficiently support its conclusions to such a degree that the Council is unwilling to issue the TIA as written.

**The Exemptions to the Risk Assessment Provision**

First, the TIA requires that, for systems installed prior to September 20, 2012, listed antifreeze solutions shall not be required until September 30, 2022, where certain conditions are met. See NFPA 25, at 5.3.4.2.1, as amended by TIA No. 1068. One of these conditions provides that antifreeze systems with concentrations in excess of 30% propylene glycol and 38% glycerine (but no higher than 50% glycerine or 40% propylene glycol per 5.3.4.2.1[1]) shall be permitted “based upon and approved deterministic risk assessment.” See 5.3.4.2.1(3) (“the Risk Assessment Provision”). This Risk Assessment Provision, however, goes on to exempt from any risk assessment certain light hazard occupancies and certain dwelling units. See 5.3.4.2.1(4). The Council has been unable to conclude that the exemptions from the Risk Assessment Provision are supported by reasonable substantiation.

As to the exemption for light hazard occupancies, there is insufficient data to deem that, in all situations, light hazard occupancies with ceiling heights not exceeding 20 ft (6.1 m) are safe with the higher concentrations of antifreeze set forth in 5.3.4.2.1(1). Second, the exemption for dwelling units where residential or other fast response sprinklers are installed is apparently based on the assumption that a credible fire scenario would never encounter a fire with a peak heat release rate greater than 1.4 MW. This assumption is flawed because there are realistic scenarios where the fire can exceed this intensity, such as a Christmas tree or clustered upholstered furniture fire. The test results reported in the Foundation Reports, particularly the Non-residential Report, simply do not merit so a high degree of confidence as to forego a risk assessment in the case of the stated exemptions. The exemptions are particularly concerning when it is considered that they would apply to a broad array of light hazard and dwelling units occupancies, including board and care facilities, nursing homes, and high-rise apartment buildings. Moreover, during the hearing before the Council, there was discussion about “DETACT” modeling of relevant scenarios that was not fully available to the TC during its consideration of the TIA. The discussion of the modeling and other factors raised serious doubts that the exemptions were appropriate. The Council concludes that, based on the record, the more conservative, case-by-case risk assessment approach required by the Risk Assessment Provision, should be applied without this exemption, and the Council has accordingly issued the TIA with the exemptions deleted.
The Unoccupied Spaced Exemption

Second, the Council has concluded that a provision contained in annex note A.5.3.4.2.1 has not been adequately supported. That provision instructs AHJs that it is appropriate to allow, in their discretion, small sprinkler installations in normally unoccupied areas to contain concentrations of antifreeze in excess of the maximum limits set in NFPA 25. Although this exemption is included as Annex material and is therefore guidance only, it is guidance that is inconsistent with the section of NFPA 25 to which it corresponds. More importantly, it fails to take into account how normally unoccupied spaces might impact adjacent occupied areas, and, more generally, it serves to minimize the potential dangers of antifreeze concentrations prohibited in NFPA 25. Allowing unlimited concentrations of antifreeze is inconsistent with the dangers confirmed through actual fire incidents and through Fire Protection Research Foundation fire testing data. Accordingly the Council has voted to issue the TIA as revised to delete the unoccupied space exemption portion of A.5.3.4.2.1

Conclusion and further Directions

The issuance of TIAs does not, as those who spoke at the hearing made clear, end the consideration of the issues concerning antifreeze. In particular with respect to TIA No. 1068 on NFPA 25, the Technical Committee on Inspection, Testing, and Maintenance of Water-Based Systems (TC) is still in its revision cycle, and its members have indicated that the TC plans to continue to refine the work reflected in TIA No. 1068 as the TC continues its review during the Comment stage of the revision cycle. As it does so, the Council wishes the TC to address a final concern of the Council regarding TIA No. 1068. As described above, the Risk Assessment Provision in the TIA at 5.3.4.2.1(3), requires that, for systems installed prior to September 30, 2012, an exemption from the listing requirement may be obtained in certain circumstances provided that it is “based upon an approved deterministic risk assessment.” As written, this provision provides insufficient guidance on how such a deterministic risk assessment should be conducted and who should conduct it. Should the TC retain this exemption during its current revision cycle, it should work on making the Risk Assessment Provision more robust by including greater specificity as to matters such as the method, interpretation and evaluation of results leading to the assessment as well as the qualifications or competencies of those who may conduct and submit the assessment for AHJ approval.

Council Member Roland Huggins recused himself during the hearings, deliberations and vote on the issue.
Item 12-10-2
1. Revise the Footnotes in Table F.1(a) as follows:

Replace the effective date of Footnote c with 12/31/2012.
Replace the effective date of Footnote d with 1/1/2013.

Submitter's Substantiation: The revision of Table F.1a footnote c removing the exemption for materials having a flash point greater than 500 degrees F was based on results of a burn study by FM Global. This study was with a vegetable oil-based aerosol product. Many of these types of aerosol products contain a very high level of material with flashpoints exceeding 500 degrees F. The study showed that this product was not equivalent to a Level 1 aerosol. At the time the Committee was considering revision of Footnote c, it was also shown a test video of a fire test with a vegetable oil-based aerosol product using protection for Group A plastics. The video showed improvement over the first test, however, the results were not conclusive enough to support a recommendation that oil cooking sprays could be protected as Group A plastic.

The revision of the Footnote leaves the exact level of fire protection for vegetable oil-based aerosol products unanswered. The differences in fire protection required by Level 1 vs Level 2 or Level 3 are substantial. In the absence of more definitive data on these products, manufacturers and warehouse operators might be forced to provide the highest level of protection. In many cases, this could involve warehouse investment, at considerable cost, expand and upgrade existing storage facilities to accommodate segregation requirements, install new fire suppression equipment and other upgrades.

Emergency Nature: The revision of F.1(a) Footnote c to Footnote d leaves ambiguity to the level of protection needed for vegetable oil-based aerosol products. Burn tests submitted previously to the Committee provided evidence that these products do not behave like Level 1 aerosols, however, insufficient data is available to ascertain the actual level of protection required (e.g. Group A plastic, Level 2 aerosol or Level 3 aerosol). This uncertainty may unnecessarily force extensive and costly warehouse remodeling and upgrades to comply with the highest level of protection. It is conceivable that some warehouses may not have the resources, space, etc. to ensure these upgrades. The requested action will allow time for more comprehensive burn analysis of vegetable oil-based aerosol products to determine more precisely the appropriate level of protection needed for these products. This work is underway between manufacturers of vegetable oil-based aerosol products and FM Global.
According to 5.4 in the NFPA (RGCP), the final results show this TIA **HAS** achieved the necessary votes on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is **15**.

$$24 \text{ (eligible to vote)} - 4 \text{ (not returned)} - 0 \text{ (abstentions)} = 20 \times 0.75 = 15$$

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

$$24 \text{ eligible} \div 2 = 12 + 1 = 13$$ (this is the simple majority)

**TC FINAL** Ballot results for **Technical Merit** are as follows:

- 19 Agree
- 1 Disagree (Willse)
- 0 Abstentions

**FINAL ACTION: PASSED**

**TC FINAL** Ballot results for **Emergency Nature** are as follows:

- 19 Agree
- 1 Disagree (Willse)
- 0 Abstentions

**FINAL ACTION: PASSED**
Joanne,

Please record my vote as negative for technical merit and emergency nature.

Reason: TM: From the video and information presented during the last cycle, the product is NOT a Class III commodity. I don't believe we should be endorsing a position where we know it is not the correct hazard. EN: The companies can still conduct the 12 pallet test to determine the level.

Pete

Peter J. Gore Willse, P.E., FSFPE  
Vice President - Director of Research  
Global Asset Protection Services  
XL Group  
100 Constitution Plaza, 12th Floor  
Hartford, CT 06103. USA  
Phone: +1 860 293-7900, Mobile: +1 860 460-1965 
Mail to: peter.willse@xlgroup.com 
www.xlgaps.com  
Follow us on Twitter at www.twitter.com/xlgaps

Please consider the environment before printing this e-mail

---

From: Goyette, Joanne [mailto:jgoyette@NFPA.org]  
Sent: Tuesday, July 31, 2012 11:02 AM  
To: Goyette, Joanne  
Cc: Curtis, Martha; Walker, Nancy; Foley, Patrick; Klaus, Matthew  
Subject: REMINDER--NFPA 30B Proposed TIA #1059 - Due Tuesday, August 7, 2012

Dear Committee Members:

This is a brief note to remind you that your NFPA 30B TIA #1059 Ballot is due on Tuesday, August 7, 2012. Please review the attached ballot and return it to me either by email to: jgoyette@nfpa.org or by fax to the following number: 617-984-7110.

Thank you,  
Joanne Goyette

---

From: Goyette, Joanne  
Sent: Tuesday, July 17, 2012 12:42 PM  
To: Goyette, Joanne  
Cc: Curtis, Martha; Walker, Nancy; Baio, Debbie; Foley, Patrick; Klaus, Matthew  
Subject: NFPA 30B Proposed TIA #1059 - Due Tuesday, August 7, 2012
Item 12-10-3
1. Revise Section 10.10 as follows:

10.10 MATS Fire Protection.

10.10.1 Fire protection requirements for MATS shall apply to discharging stations located indoors or outdoors.

10.10.1.1 A deluge sprinkler or water spray fixed system shall be provided for MATS fire areas used as indoor and outdoor charging or discharging stations.

10.10.1.2 Deluge sprinkler or water spray fixed systems shall provide a minimum design density of 0.3 gpm per square foot in accordance with the design documents for the MATS fire area being protected.

10.10.1.3 The deluge or water spray fixed system shall be able to be activated automatically by a fast acting fire detection system and also by manual actuator.

10.10.1.3.1 Manual activation controls shall be identified and marked with a sign and shall be positioned for use in an emergency.

10.10.1.3.2 Fire protection equipment and manual activation controls serving the MATS fire protection system shall not be blocked or obstructed.

10.10.1.4 Existing acetylene discharging stations shall be protected by an automatic deluge sprinkler or water spray fixed system in accordance with 10.10.1 not later than January 1, 2015. See also Section 1.4.

10.10.1.4.1 The requirements of 10.10.1.1 shall not apply to existing indoor or outdoor facilities, equipment, structures, or other installations where MATS are discharged that existed or were approved for construction or installation prior to the effective date of this standard providing the MATS are protected with an automatic sprinkler system with a minimum design density of not less than 0.25 gpm per square foot (10.1 L/min per square meter).

10.10.1.5 At least one listed portable fire extinguisher rated in accordance with NFPA 10, Standard for Portable Fire Extinguishers, at not less than 20 B:C shall be mounted on the mobile acetylene trailer.

10.10.1.6 Fire protection equipment shall be identified and located so that it is visible and accessible in an emergency.

A.10.10.1 The system should be designed to provide water as a means of cooling the containers located on the trailer that are potentially exposed to fire and not as a means to extinguish the fire. To extinguish a gas fire, the flow of gas must be shut off at the source.

A.10.10.1.2 For additional information on mobile acetylene trailer systems, see CGA G-1.6, Standard for Mobile Acetylene Trailer Systems.

Submitter’s Substantiation: This TIA is being presented with the purpose of coordinating the approved revision text for the 2013 edition of NFPA 51, Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes with TIA#1036 on NFPA 51A, Standard for Acetylene Cylinder Charging Plants, 2012 Edition which was issued by the Standards Council with an effective date of March 26, 2012.

NFPA 51 has just completed the Annual 2012 Code Revision Cycle and will be issued on May 29, 2012 having been placed on the consent agenda for Standards Council following the completion of the ROC phase of the revision process. The Industrial & Medical Gases (IMG-AAA) Technical Committee developed a new Section for the use of Mobile
Acetylene Trailer Systems (MATS) in discharge stations which has been added to NFPA 51, Compressed Gases and Cryogenic Fluids Code and which integrates the requirements for acetylene cylinder discharge stations currently found in NFPA 51A, Standard for Acetylene Cylinder Charging Plants 2012 Edition. It is the expressed intent of the IMG TC to withdraw the NFPA 51A publication when NFPA 51A goes back into cycle and the ongoing evolution of requirements for acetylene charging facilities will be located in NFPA 55, Compressed Gases and Cryogens Fluids Code.

Provisions for fire protection systems to be utilized for fire protection systems for Mobile Acetylene Trailer Systems (MATS) were the subject of TIA#1036 issued on NFPA 51A. Coordination is now needed to carry the provisions of the TIA relative to the fire protection systems for discharge stations into NFPA 51 in order to eliminate a potential conflict between NFPA 51, 51A and 55 and to establish a proposal that will be subject to all of the procedures of the standards-making process.

REASONS WHY OPEN HEAD FIRE PROTECTION SYSTEMS SHOULD BE REQUIRED
Closed head fire protection systems do not provide the same level of protection as a deluge or water spray fixed system. During a fire inside a building, the ceiling forces the hot combustion products to travel outward ahead of the fire. These hot combustion products activate closed head sprinklers allowing sprinklers not directly above the fire to activate and help keep the adjacent areas cool helping to prevent the spread of the fire.

Acetylene cylinders have a thermally activated fusible metal plug located near the valve or on the top of the cylinder that melts at approximately 212°F. The plug is designed to release the gas as it expands in order to prevent rupture of the container. When this plug melts acetylene vents directly to atmosphere in effect making a large torch (with temperatures greater than 5700°F). On a Mobile Acetylene Trailer (MAT) the cylinders are nested closely together with the typical cylinder diameters generally 12 inches or less. The result is that the fusible metal plugs are typically only 10 to 12 inches apart. (See Figure 1 below) In the event of a fire if adjacent cylinders are not quickly cooled, the fusible metal plugs will continue to melt allowing the fire to quickly spread from cylinder to cylinder throughout the array. (See Figure 2).

![Figure 1. Distance between cylinder fusible metal plugs that are located on the head of the cylinder near the base of the cylinder shutoff valve](attachment:12-10-3-a.png)
Acetylene Specific Hazards

Acetylene (stabilized) is a flammable gas and also an unstable reactive gas that can decompose and generate heat in the absence of oxygen. Cylinders on a trailer are connected through a common manifold that allows the gas to be transported into or out of the containers in the process of being charged or discharged (See Figure 2). In a fire acetylene can decompose inside the piping system which can lead to further decomposition of acetylene inside of cylinders as heat is transmitted through the manifold. The heat from the decomposition of acetylene is sufficient to melt the fusible metal plugs installed to prevent cylinder rupture. If cylinders are not cooled immediately the release of gas from melted fusible metal plugs will likely result in initiating a fire at a different location on the trailer, or even on adjacent trailers. Immediate cooling of all cylinders on the trailer reduces the possibility of a flashover fire and prevents a decomposition reaction and potential mass release of gas thereby limiting the size of the incident accordingly.

In the absence of fire it is also possible, based on the increased pressures (greater than 15 psig), for decomposition to occur inside the piping due to mechanical shock or adiabatic compression with insufficient heat to initially melt a fusible metal plug. Until a fire occurs there will be no external heat available that would activate a closed head sprinkler system. In that particular situation the operator will most likely identify the event when it occurs by either an audible or visual cue before a fire occurs. Having a deluge or water spray fixed system available that can be manually activated provides the operator with a system that can be used to cool the cylinders and piping before an external fire, mass release from multiple fusible metal plugs, or potential cylinder rupture occurs.

Activation

Outdoors deluge or water spray fixed systems can either be activated manually from a remote point or by automatic means using optical flame detectors such as UV/IR or other approved early warning detection systems. Indoors deluge or water spray fixed systems can also be activated manually or activated by automatic means by using optical flame detection or a high sensitivity smoke detection system. Flame detectors have the advantage of being used to detect small flames where open headed deluge or water spray fixed systems can quickly be effective. By contrast there is no way to manually or automatically activate a closed head system.

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Acetylene trailers vary in size. Typical trailers are approximately 8 feet wide ranging in length from 15 to 50 feet although longer and shorter trailers may exist. The maximum trailer dimensions allowed under DOT regulations are 8.5 ft. wide by 65 ft. long. The 1984 Edition of NFPA 51A contained the first reference to MATS in Section 8-6.1, requiring that the MATS be in compliance with the 1981 Edition of CGA Pamphlet G-1.6. The 1981 Edition of G-1.6 required fire protection to be provided in the form of fire hoses or fixed spray systems. In 1996 the requirements for MATS in 51A Section 8-6 were deleted as an “editorial change”...“to make the standard more useable, adoptable and enforceable.” A reference to CGA G-1.6 was included as an informational note. Within the
regulatory scheme described by NFPA 51A the need for fire protection systems was to be determined by an analysis of local conditions of hazard within the plant, exposure to other properties, water supplies and the probable effectiveness of plant fire brigades to include the time of response and probable effectiveness of fire departments. Where automatic water spray systems were installed NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection were installed water coverage was to be not less than a minimum of 0.25 gpm per sq. ft. of floor area directly wetted by the stream. An NFPA 13 extra hazard open or closed head sprinkler system was allowed to be used as an acceptable alternate; however, the provisions were general requirements for fire protection including general use and the use of MATS was not mentioned. There is a concern that limited water supplies may prevent being able to deluge a large area. In these instances it is possible to reduce the total water flow required by constructing fire barrier walls to divide the trailers into groups or compartments. Each area so divided can be equipped with separately controlled deluge or water spray fixed systems provided for each area bounded by the fire barriers. Alternatively, an increased separation distance between MAT systems can be provided to limit the exposure accordingly.

OTHER CONCERNS

Applicability to Cylinder Charging or Discharging Facilities
The valves on cylinders in storage are closed as compared to valves on a MAT system which are normally open when the MAT is being charged or discharged. Cylinders on a MAT are manifolded together as compared with typical cylinders in storage. Stored cylinders are less likely to be involved in an event where heat can spread internally from cylinder to cylinder through a common manifold system. This primary difference requires that a distinction be made between the fire protection systems provided for a MAT system versus the typical arrangement where cylinders are simply stored.

Freezing Conditions
Due to the possibility of freezing (< 40°F) ambient conditions in outdoor locations a wet pipe closed head sprinkler system is not acceptable in many locations. A dry pipe closed head system can be used but it will be much slower to react.

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When closed head fire sprinkler systems are used NFPA 13 7.7.1.3.1.3 requires the use of intermediate or high temperature-rated sprinklers when the water temperature of the fire protection water being used exceeds 100°F. This is not an uncommon occurrence in areas of the southwestern United States where fire protection water is stored in aboveground tanks and day time temperatures exceed 100°F. NFPA 13: Table 6.2.5.1 lists the following temperature ratings or operating ranges.

- Ordinary temperature-rated sprinklers operate between 135 and 170°F.
- Intermediate temperature-rated sprinklers operate between 175 and 225°F.
- High temperature-rated sprinklers operate between 250 and 300°F.

During the winter season the length of time it takes to achieve a temperature above 175°F at the sprinkler head could allow a fire to become larger than what might otherwise occur in a system protected by an open head deluge or water spray fixed system.

Emergency Nature:

- The document contains an error or an omission that was overlooked during a regular revision process.
- The proposed TIA intends to correct a previously unknown existing hazard.
- The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

When the IMG-AAA TC considered this issue in the NFPA 51A code revision cycle the unstable nature of acetylene, particularly when Mobile Acetylene Trailer Systems (MATS) were being charged or discharged was not the focus of the group. In recognition of the need to address the specific hazards of flammability and unstable nature of this material TIA #1036 was prepared and accepted by the IMG-AAA TC. It was then submitted for consideration by an inter-committee consisting of three members each from the NFPA 13, 15 and 55 Technical Committees including the Staff Liaisons from each of these three committees. The recommended position of the inter-committee was accepted with the recognition that the provisions would again be subject to review in the next code revision cycle for NFPA 55.

Concurrently, CGA’s G-1.6, Standard for Mobile Acetylene Trailer Systems was revised in the fall of 2011, with contributions from a joint task group that was formed between CGA’s technical committee and principal members (fire protection engineers) of NFPA’s IMG-AAA TC to determine a protection strategy suitable for systems of this nature recognizing the need for fire protection for these systems whether used indoors or outdoors. Past editions of NFPA 51A were reviewed and the specialized needs of MATS systems were recognized. The revisions made to CGA G-1.6 represent...
a reduction of risk to the public and are in keeping with the recommendations of the National Transportation Safety Board (NTSB) and the Department of Transportation.

The document contains a conflict within the document or with another NFPA document. A new Chapter 15 of the 2013 Edition of NFPA 55 now contains the requirements of NFPA 51A as they existed prior to the acceptance of TIA#1036. The requirements of TIA#1036 must now be carried forward to NFPA 51 and NFPA 55 in order to eliminate the conflict between these documents and NFPA 51A by coordinating requirements. A separate TIA has been submitted for consideration to coordinate NFPA 55 with NFPA 51A. Acceptance of this TIA to NFPA 51 will resolve the conflict between NFPA 51A and 51 thereby coordinating the requirements between these two documents.
TIA FINAL BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the final results show this TIA HAS achieved the necessary votes on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 18.

\[ 29 \text{ (eligible to vote)} - 6 \text{ (not returned)} - 0 \text{ (abstentions)} = 23 \times 0.75 = 17.25 \]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[ 29 \text{ eligible} \div 2 = 14.5 = 15 \text{ (this is the simple majority)} \]

29  Eligible to Vote
6  Not Returned (Barnes, Ginn, Gonzalez, Mills, Viscomi, Zeman)

TC FINAL Ballot results for Technical Merit are as follows:
21  Agree
2  Disagree (Barlen, Mahnken)
0  Abstentions

FINAL ACTION: PASSED

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 17.

\[ 29 \text{ (eligible to vote)} - 6 \text{ (not returned)} - 1 \text{ (abstention)} = 22 \times 0.75 = 16.5 \]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[ 29 \text{ eligible} \div 2 = 14.5 = 15 \text{ (this is the simple majority)} \]

TC FINAL Ballot results for Emergency Nature are as follows:
22  Agree
0  Disagree
1  Abstention (Nii)

FINAL ACTION: PASSED
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1070
To Revise Section 10.10 Proposed 2013 Edition of NFPA 51,
Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting and Allied Processes

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise section 10.10

[ ] AGREE [x] DISAGREE* [ ] ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

[Agree with words suggested by Glen Mahlen (attached)]

Question 2: I agree that the subject is of an EMERGENCY NATURE.

[x] AGREE [ ] DISAGREE* [ ] ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

[Signature]

[William Boden]

Name (Please Print)

[Aug 16, 2012]

Date

Please return the ballot on or before Wednesday, August 8, 2012.

PLEASE RETURN TO:
Joanne Goyette, Assistant Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7110 E-mail: jgoyette@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
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_____ AGREE  ____ DISAGREE*  ____ ABSTAIN*

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SEE ATTACHED

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EXPLANATION OF VOTE - Please type or print your comments:

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__________________________
Signature

__________________________
Name (Please Print)

__________/
Date

August 8, 2012

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PLEASE RETURN TO:
Joanne Goyette, Assistant Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7110  E-mail: jgoyette@nfpa.org
Glenn Mahnken  
August 8, 2012

Reason for Disagreement on TIA Ballot for LOG NO. 1070 (NFPA 51)

I agree with adding water spray as an option. However, in my opinion, the rest of paragraph 10.10.1.2 should not be issued in the current or the TIA wording:

10.10.1.2 Deluge sprinkler or water spray fixed systems shall provide a minimum design density of 0.30 gpm per square foot over in accordance with the design documents for the MATS fire area being protected.

A.10.10.1.2 For additional information on mobile acetylene trailer systems, see CGA G-1.6, Standard for Mobile Acetylene Trailer Systems.

The problems I have with this paragraph are as follows:

1. Deleting the specific design density (0.30 gpm/sqft) is a mistake.

As proposed, the design density must be in accordance with an undefined “design document”, which might be CGA G-1.6 per the annex note. But the CGA G-1.6 density is the same as the one we are deleting! Why make users go to an outside (non NFPA) standard just to find the same minimum density we are deleting? This makes no sense to me.

2. The new reference to “the design documents” is very ambiguous.

The implication of the new reference seems to be that there must be a “design document”, but what is the scope of such document? There is no other requirement in the code for a design document. So does it only cover the minimum density for MATS? If we only want to adopt the minimum design density in CGA G-1.6, we already have it (0.30 gpm/sqft). If the TC’s intent is the adopt CGA G-1.6 as “the design document” for MATS installations, we should state so in the code.

3. It fails to address the deluge operating area for MATS separated by “line of sight” fire barriers.

“Line of sight” fire barriers will be useless unless the “line of sight” is defined based on flame height, which it isn’t. The current height requirement for the barrier is simply to interrupt the line of sight between two trailers so that an “eye” on top of one trailer cannot see the next trailer. Flames on the first burning trailer will over-top these barriers and radiate heat to adjacent trailers, potentially setting up a cascading fire scenario. Adequate cooling can only be provided by a water supply and deluge (or water spray) system designed for simultaneous discharge over the adjacent trailers, if such line of sight fire barriers are used. Otherwise the water supply will be quickly over-taxing, cooling will be ineffective and fire will propagate to adjacent trailers. This important design issue is not addressed by the “MATS fire area being protected” as defined in NFPA 55, 51 and 51A or CGA G-1.6.

These issues should be cleared up before we mandate fire protection on MATS.
Glenn Mahnken  
August 8, 2012  

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   “Line of sight” fire barriers will be useless unless the “line of sight” is defined based on flame height, which isn’t. The current height requirement for the barrier is simply to interrupt the line of sight between two trailers so that an “eye” on top of one trailer cannot see the next trailer. Flames on the first burning trailer will over-top these barriers and radiate heat to adjacent trailers, potentially setting up a cascading fire scenario. Adequate cooling can only be provided by a water supply and deluge (or water spray) system designed for simultaneous discharge over the adjacent trailers, if such line of sight fire barriers are used. Otherwise the water supply will be quickly over-taxed, cooling will be ineffective and fire will propagate to adjacent trailers. This important design issue is not addressed by the “MATS fire area being protected” as defined in NFPA 55, 51 and 51A or CGA G-1.6.  

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[Signature]

[Robert R. [Name] (Please Print)]

[8/7/12]

Date

Please return the ballot on or before Wednesday, August 8, 2012.

PLEASE RETURN TO:
Joanne Goyette, Assistant Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7110
E-mail: jgoyette@nfpa.org
1. Revise 15.3.9 as follows:

15.3.9 Fire Protection.

15.3.9.1 MATS. Fire protection requirements for MATS shall apply to charging or discharging stations located indoors or outdoors.

15.3.9.1.1* A deluge sprinkler or water spray fixed system shall be provided for MATS fire areas used as indoor and outdoor charging and discharging stations.

15.3.9.1.2* Deluge sprinkler or water spray fixed systems shall provide a minimum design density of 0.3 gpm per square foot in accordance with the design documents for the MATS fire area being protected.

15.3.9.1.3 The deluge or water spray fixed system shall be able to be activated automatically by a fast acting fire detection system and also by manual actuator.

15.3.9.1.3.1 Manual activation controls shall be identified and marked with a sign and shall be positioned for use in an emergency.

15.3.9.1.3.2 Fire protection equipment and manual activation controls serving the MATS fire protection system shall not be blocked or obstructed.

15.3.9.1.4 Existing acetylene charging and discharging stations shall be protected by an automatic deluge sprinkler or water spray fixed system in accordance with 15.3.9.1 not later than January 1, 2015. See also Section 1.4.

15.3.9.1.4.1 The requirements of 15.3.9.1.1 shall not apply to existing indoor or outdoor facilities, equipment, structures, or other installations where MATS are charged or discharged that existed or were approved for construction or installation prior to the effective date of this code providing the MATS are protected with an automatic sprinkler system with a minimum design density of not less than 0.25 gpm per square foot (10.1 L/min per square meter).

15.3.9.1.5 At least one UL-listed portable fire extinguisher rated in accordance with NFPA 10, Standard for Portable Fire Extinguishers, at not less than 20 B:C shall be mounted on the mobile acetylene trailer.

15.3.9.2 Indoor Areas. Buildings or portions thereof required to comply with Protection Level controls serving or using containers other than those regulated by 15.3.9.1 shall be protected by an approved automatic sprinkler system in accordance with Section 6.10.

15.3.9.2.1* Automatic sprinkler systems shall be prohibited in rooms or areas used exclusively for:

(1) calcium carbide storage
(2) calcium carbide transfer operations
(3) acetylene generation

15.3.9.2.2 Fire protection equipment shall be identified and located so that it is visible and accessible in an emergency.

A.15.3.9.1.2 For additional information on mobile acetylene trailer systems, see CGA G-1.6, Standard for Mobile Acetylene Trailer Systems.
**Submitter’s Substantiation:** This TIA is being presented with the purpose of coordinating the approved revision text for the 2013 edition of NFPA 55 with TIA#1036 on NFPA 51A, *Standard for Acetylene Cylinder Charging Plants*, 2012 Edition which was issued by the Standards Council with an effective date of March 26, 2012.

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![Fusible metal plug inserted into the top head of the cylinder.](image1.png)

![Fusible metal plug showing just under the edge of the valve handle.](image2.png)

**Figure 1.** Distance between cylinder fusible metal plugs that are located on the head of the cylinder near the base of the cylinder shutoff valve.
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local conditions of hazard within the plant, exposure to other properties, water supplies and the probable effectiveness of plant fire brigades to include the time of response and probable effectiveness of fire departments. Where automatic water spray systems were installed NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection* were installed water coverage was to be not less than a minimum of 0.25 gpm per sq ft of floor area directly wetted by the stream. An NFPA 13 extra hazard open or closed head sprinkler system was allowed to be used as an acceptable alternate; however, the provisions were general requirements for fire protection including general use and the use of MATS was not mentioned.

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- The document contains an error or an omission that was overlooked during a regular revision process.
- The proposed TIA intends to correct a previously unknown existing hazard.
- The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

When the IMG-AAA TC considered this issue in the NFPA 51A code revision cycle the unstable nature of acetylene, particularly when Mobile Acetylene Trailer Systems (MATS) were being charged or discharged was not the focus of the group. In recognition of the need to address the specific hazards of flammability and unstable nature of this material TIA #1036 was prepared and accepted by the IMG-AAA TC. It was then submitted for consideration by an inter-committee consisting of three members each from the NFPA 13, 15 and 55 Technical Committees including the Staff Liaisons from each of these three committees. The recommended position of the inter-committee was accepted with the recognition that the provisions would again be subject to review in the next code revision cycle for NFPA 55.

Concurrently, CGA’s G-1.6, *Standard for Mobile Acetylene Trailer Systems* was revised in the fall of 2011, with contributions from a joint task group that was formed between CGA’s technical committee and principal members (fire protection engineers) of NFPA’s IMG-AAA TC to determine a protection strategy suitable for systems of this nature recognizing the need for fire protection for these systems whether used indoors or outdoors. Past editions of NFPA 51A were reviewed and the specialized needs of MATS systems were recognized. The revisions made to CGA G-1.6 represent
a reduction of risk to the public and are in keeping with the recommendations of the National Transportation Safety Board (NTSB) and the Department of Transportation.

The document contains a conflict within the document or with another NFPA document. A new Chapter 15 of the 2013 Edition of NFPA 55 now contains the requirements of NFPA 51A as they existed prior to the acceptance of TIA#1036. The requirements of TIA#1036 must now be carried forward to NFPA 55 in order to eliminate the conflict between NFPA 55 and NFPA 51A by coordinating requirements. Acceptance of this proposed TIA will resolve the conflict and coordinate the documents.
TIA FINAL BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the final results show this TIA HAS achieved the necessary votes on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 19.

\[29 \text{ eligible to vote} - 4 \text{ (not returned)} - 0 \text{ (abstentions)} = 25 \times 0.75 = 18.75\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[29 \text{ eligible} \div 2 = 14.5 = 15\text{ (this is the simple majority)}\]

29 Eligible to Vote
4 Not Returned (Barnes, Gonzalez, Mills, Zeman)

TC FINAL Ballot results for Technical Merit are as follows:

24 Agree
1 Disagree (Mahnken)
0 Abstentions

FINAL ACTION: PASSED

TC FINAL Ballot results for Emergency Nature are as follows:

25 Agree
0 Disagree
0 Abstention

FINAL ACTION: PASSED
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1071
Revise 15.3.9 of the Proposed 2013 Edition of NFPA 55,
Standard for Compressed Gases and Cryogenic Fluids Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 15.3.9

[ ] AGREE [X] DISAGREE* [ ] ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

[ ] An explanation must accompany a disagreement or abstaining position.

[ ] see attachment

Question 2: I agree that the subject is of an EMERGENCY NATURE.

[ ] AGREE [X] DISAGREE* [ ] ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

[ ] An explanation must accompany a disagreement or abstaining position.

[ ]

Signature

Glenn Mahnken

Name (Please Print)

August 8, 2012

Date

Please return the ballot on or before Wednesday, August 8, 2012.

PLEASE RETURN TO:
Joanne Goyette, Assistant Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110 E-mail: jgoyette@nfpa.org
Glenn Mahnken  
August 8, 2012

Reason for Disagreement on TIA Ballot for LOG NO. 1071 (NFPA 55)

I agree with adding water spray as an option. However, in my opinion, the rest of paragraph 15.3.9.1.2 should not be issued in the current or the TIA wording:

15.3.9.1.2* Deluge sprinkler or water spray fixed systems shall provide a minimum design density of 0.30 gpm/sqft over in accordance with the design documents for the MATS fire area being protected.

A.15.3.9.1.2 For additional information on mobile acetylene trailer systems, see CGA G-1.6, Standard for Mobile Acetylene Trailer Systems.

The problems I have with this paragraph are as follows:

1. Deleting the specific design density (0.30 gpm/sqft) is a mistake.

As proposed, the design density must be in accordance with an undefined “design document”, which might be CGA G-1.6 per the annex note. But the CGA G-1.6 density is the same as the one we are deleting! Why make users go to an outside (non NFPA) standard just to find the same minimum density we are deleting? This makes no sense to me.

2. The new reference to “the design documents” is very ambiguous.

The implication of the new reference seems to be that there must be a “design document”, but what is the scope of such document? There is no other requirement in the code for a design document. So does it only cover the minimum density for MATS? If we only want to adopt the minimum design density in CGA G-1.6, we already have it (0.30 gpm/sqft). If the TC’s intent is the adopt CGA G-1.6 as “the design document” for MATS installations, we should so state in the code.

3. It fails to address the deluge operating area for MATS separated by “line of sight” fire barriers.

“Line of sight” fire barriers will be useless unless the “line of sight” is defined based on flame height, which it isn’t. The current height requirement for the barrier is simply to interrupt the line of sight between two trailers so that an “eye” on top of one trailer cannot see the next trailer. Flames on the first burning trailer will over-top these barriers and radiate heat to adjacent trailers, potentially setting up a cascading fire scenario. Adequate cooling can only be provided by a water supply and deluge (or water spray) system designed for simultaneous discharge over the adjacent trailers, if such line of sight fire barriers are used. Otherwise the water supply will be quickly over-taxed, cooling will be ineffective and fire will propagate to adjacent trailers. This important design issue is not addressed by the “MATS fire area being protected” as defined in NFPA 55, 51 and 51A or CGA G-1.6.

These issues should be cleared up before we mandate fire protection on MATS.
Item 12-10-5
1. Add the following new definitions to Chapter 3, Definitions:

3.3.xx* **Cleaning Media.** Materials used to clean piping systems.

A.3.3.xx **Cleaning Media.** Cleaning methods that incorporate chemical washing techniques can include the use of chemical substances, usually liquid, capable of dissolving or dispersing a foreign substance or contaminants and can include techniques such as rinsing, heating, steaming, or vacuum with such techniques applied either individually or in combination with others. Air, inert gas, steam and water are acceptable cleaning media.

3.3.xx **Purging.** A method used to free the internal volume of a piping system of unwanted contents that results in the existing contents being removed or replaced.

2. Add the following new sections to Chapter 7, Compressed Gases:

7.1.19  **Cleaning and Purging of Gas Piping Systems.**

7.1.19.1 **General.**

7.1.19.1.1 Piping systems shall be cleaned and purged in accordance with the requirements of 7.1.19 when one or more of the following conditions exist:

(a) When the system is installed and prior to being placed into service.

(b) When there is a change in service.

(c)* When there are alterations or repair of the system involving the replacement of parts or addition to the piping system and prior to returning the system to service.

(d)* Where specified by the design standards or written procedures.

7.1.19.1.2 Cleaning and purging of the internal surfaces of piping systems shall be conducted by qualified individuals trained in cleaning and purging operations and procedures, including the recognition of potential hazards associated with cleaning and purging.

7.1.19.1.3* A written cleaning or purging procedure shall be provided to establish the requirements for the cleaning and purging operations to be conducted.

7.1.19.1.3.1* An independent or third-party review of the written procedure shall be conducted after the procedure has been written and shall:
(1) evaluate hazards, errors, and malfunctions related to each step in the procedure
(2) review the measures prescribed in the procedure for applicability
(3) make recommendations for additional hazard mitigation measures if deemed to be necessary.

7.1.19.1.3.2 The completed written procedure shall be:
(1) maintained on site by the facility owner/operator
(2) provided to operating personnel engaged in cleaning or purging operations
(3) made available to the AHJ upon request.
7.1.19.1.3.3 Where generic cleaning or purging procedures have been established, a job-specific operating procedure shall not be required.

7.1.19.1.3.4 Generic procedures shall be reviewed when originally published or when the procedure or operation is changed.

7.1.19.1.4 Written procedures to manage a change in process materials, technology, equipment, procedures, and facilities shall be established by the facility owner/operator.

7.1.19.1.4.1 The management-of-change procedures shall ensure that the following topics are addressed prior to any change in the configuration or design of the piping system:
(1) The technical basis for the proposed change.
(2) The safety and health implications.
(3) Whether the change is permanent or temporary.
(4) Whether modifications to the cleaning and purging procedures are required as a result of the changes identified.

7.1.19.1.4.2 When modifications to the cleaning and purging procedures are required, the written procedure shall be updated to incorporate any elements identified by the management-of-change procedures.

7.1.19.1.5 Prior to cleaning or purging, piping systems shall be inspected and tested to determine that the installation, including the materials of construction, and method of fabrication, comply with the requirements of the design standard used and the intended application for which the system was designed.

7.1.19.1.5.1 Inspection and testing of piping systems shall not be required to remove a system from service.

7.1.19.1.5.2 Purging of piping systems shall not be required for systems that are utilized for operations designated by written operating procedures when systems are utilized in accordance with the requirements of the cleaning or purging procedure specified in 7.1.19.1.1.

7.1.19.1.5.3* Personnel in the affected area(s), as determined by the cleaning or purging procedure, shall be informed of the hazards associated with the operational activity and notified prior to the initiation of any such activity.

7.1.19.2* Cleaning. Piping system designs shall be documented to specify the requirements for the internal cleaning of the piping system prior to installation and initial use.

7.1.19.2.1 The internal surfaces of gas piping systems shall be cleaned to ensure that the required standard of cleanliness specified by the design is met prior to placing the gas piping system into service.

7.1.19.2.2* When piping systems are cleaned in stages during installation or assembly, the interior of the cleaned piping shall be protected against the infiltration of unwanted contaminants.

7.1.19.3* Purging. Piping systems used to contain gases with a physical or health hazard in any of the categories specified by Section 5.1 shall be purged prior to being placed into service for initial use.

7.1.19.3.1 Piping systems shall be purged to remove the internal contents preceding the following activities or operations to:
(1) activate or place a piping system into service
(2) deactivate or remove a piping system from service
(3) change the service of a piping system from one gas to another, except when such gas is supplied to a manifold or piping system designed for the purpose of filling or otherwise processing cylinders, containers, or tanks in a process with established procedures
(4) perform service, maintenance or modifications on a system where personnel or designated areas will potentially be exposed to the internal contents of the piping system
(5) perform hot work including but not limited to welding, cutting or brazing on the piping system.
7.1.19.3.2 The termination point for the release of purged gases shall be in accordance with Section 6.15.

7.1.19.3.2.1 The release of purged gases or mixtures containing any quantity of corrosive, toxic, or highly toxic gases shall be through a treatment system in accordance with the applicable requirements of Section 7.5.3.4 or 7.9.3.

7.1.19.3.2.2 The termination point for the release of purged gases resultant from the purging of piping systems out of service, other than those in accordance with Section 7.1.19.3.2.1, shall not be required to be in accordance with Section 6.15 where the contained volume of the piping system when released to indoor areas does not result in a concentration in the room or area that exceeds any of the following limits or that will reduce the oxygen concentration in the room or area below a level of 19.5%:

- (1) Ceiling Limit
- (2) Permissible Exposure Limit
- (3) Short Term Exposure Limit
- (4) 25% of the Lower Flammable Limit

A.7.1.19.1.1(c) The replacement of parts in a system to repair leaks, the addition of gaskets, and similar routine maintenance is not intended to establish the need for cleaning of the entire piping system. Conversely, when a piping system is extended, or when the system needs to be rendered safe for maintenance purposes, purging the system before disassembly will likely be required as will internal cleaning if new piping or materials of construction are introduced.

A.7.1.19.1.1(d) Cleaning and purging of piping systems can be conducted as individual functions, i.e., just cleaning or just purging, or in combination as required to satisfy the requirements of the procedures.

A.7.1.19.1.3 It is not intended that a new written procedure be required each time the activity occurs within a facility.

A.7.1.19.1.3.1 The review of the written procedures should not be performed solely by the same person or persons responsible for developing the procedures. It can be performed by an independent person or group within the company or department or by a third-party consultant.

A.7.1.19.1.5.3 The notification is given to warn personnel that such procedures are about to occur so that they will be out of zones potentially affected by the cleaning or purging procedure. The intended notification is to be commensurate with the operation to be conducted and the timing of the notification should be relevant to the activity conducted so that personnel in the area can respond in a timely manner. Notification could consist of sounding of an audible and/or visible alarm, or it could consist of an announcement over a public address system, private network, radio, or similar and reliable means of electronic transmission.

Verbal notification can be used in operations where the piping system is limited to the area occupied by those that will be conducting the cleaning or purging procedures and related operating personnel. These areas are frequently found in occupancies where the gas used to charge the piping system is supplied from portable containers, as well as those areas where the piping system is primarily located in the occupied work area.

A.7.1.19.2 Cleaning. For additional information on cleaning techniques used for stainless steel parts and equipment, see ASTM A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems:

A.7.1.19.2.2 During construction, visual inspection should be performed on sections of pipe as the piping system is assembled to ensure that no gross contamination is left in the pipe. When the standard of cleanliness is high, fabrication techniques should be utilized that do not introduce contamination into the pipe. Examples of these techniques can include, but are not limited to, constant inert gas purging, or assembly in a particulate controlled environment. The use of piping and components with a high quality interior surface finish, and materials of construction—all have an effect on the ability to maintain a high degree of cleanliness.

Cleaning after construction can typically be accomplished by applying one or more of the following methods:

1. pigging
2. mechanical scraping
3. Add the following new subsection to Chapter 8, Cryogenic Fluids:

8.14.1.2 Cleaning and Purging of Gas Piping Systems. Cleaning and purging of piping systems shall be in accordance with Section 7.1.19.

4. Add the following new subsections to Chapter 9, Bulk Oxygen Systems:

9.4.1.9 Cleaning and Purging of Gas Piping Systems. Cleaning and purging of piping systems shall be in accordance with Section 7.1.19.

9.4.1.9.1 Cleaning of oxygen systems used in medical gas service shall be in accordance with NFPA 99, Health Care Facilities Code. See also 9.4.3.1.

5. Add the following new subsection to Chapter 10, Gaseous Hydrogen Systems:

10.2.3.3 Cleaning and purging of piping systems shall be in accordance with Section 7.1.19.

6. Add the following new subsection to Chapter 11, Liquid Hydrogen Systems:

11.2.3.9 Cleaning and purging of piping systems shall be in accordance with Section 7.1.19.

7. Revise Chapter 12 Gas Generation Systems as follows:

12.3.2.8.5.7 Process Purging and Venting. Process purging and vents shall conform to the following:

(1) Pressure equipment and piping intended to be purged, pressure regulators, relief valves, and other potential sources of combustible gas shall be vented to the outside of the building in accordance with the applicable requirements of Section 6.15 or 7.1.19.

(2) The vent shall be designed to prevent entry of water or foreign objects.

(3) The vent gas shall be directed so as to not create additional hazards to the building openings, such as windows, doors, or HVAC intakes.

8. Revise Chapter 14 Storage, Handling, and Use of Ethylene Oxide for Sterilization and Fumigation as follows:

14.4.1.3 Cleaning and Purging of Gas Piping Systems. Cleaning and purging of piping systems shall be in accordance with Section 7.1.19.

14.4.3.1 Any piping and valves that have been used to transport ethylene oxide to or from a sterilizer to the emission control or release point shall be drained and purged in accordance with Section 7.1.19 prior to dismantling.

9. Revise Chapter 15 Acetylene Cylinder Charging Plants as follows:

15.4.1.10.1.1 Cleaning and purging of piping systems shall be in accordance with Section 7.1.19.
10. Add the following to H.1.2.4:

**ASTM A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.**

**Submitter's Substantiation:** The provisions integral to this TIA have been summarized in the following table. References found in the column titled “basis” provide the reader a reference to either the published edition (NFPA 56PS 2012 Edition) or the modifications as currently identified in the ROP which was completed in April of 2012. The “comment” column is provided to further explain the rationale behind including each of the sections identified within the TIA proper.

<table>
<thead>
<tr>
<th>NFPA 55 Section</th>
<th>Basis</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3.xx Cleaning Media</td>
<td>NFPA 56ROP:3.3.xx Cleaning Media</td>
<td>The definition for “cleaning media” has been extracted from the ROP version of NFPA 56.</td>
</tr>
<tr>
<td>A.3.3.xx Cleaning Media</td>
<td>NFPA 56ROP:A.3.3.xx Cleaning Media in concept</td>
<td>NFPA 56:ROP Annex information has been based in part with the annex note included in the ROP annex for NFPA 56 PS. It was modified for added clarity</td>
</tr>
<tr>
<td>3.3.xx Purging</td>
<td>56:3.3.9 defines the term “purge” as it was developed and used by NFPA 54 Fuel Gas Code.</td>
<td>The new language is intended to be of a generic nature rather than bent toward the use of the term as recognized in the Fuel Gas Code.</td>
</tr>
<tr>
<td>7.1.19 Cleaning and Purging of Gas Piping Systems</td>
<td>N/A</td>
<td>Title only</td>
</tr>
<tr>
<td>7.1.19.1</td>
<td>N/A</td>
<td>Subsection Title only</td>
</tr>
<tr>
<td>7.1.19.1.1 (a) (b) (c)* (d)*</td>
<td>N/A</td>
<td>Establishes the base requirements for when cleaning and/or purging are required. The list of items in (a) through (d) describe the minimum conditions where cleaning and/or purging are required. The requirements are further established by the design or written procedures.</td>
</tr>
<tr>
<td>A.7.1.19.1.1(c)</td>
<td>None</td>
<td>Provides an informational statement to address requirements as they may be applied to routine maintenance, repairs or modifications to the system.</td>
</tr>
<tr>
<td>A.7.1.19.1.1(d)</td>
<td>56:4.3 limited to when identified by the procedures</td>
<td>The requirements for cleaning and purging may be included in the standards of design or installation for the piping system. In other cases, the requirements for cleaning and purging are established by written procedures required by 7.1.19.1.3.</td>
</tr>
<tr>
<td>7.1.19.1.2</td>
<td>56:A.4.3.1</td>
<td>General Requirements. The opening statement clarifies that cleaning and purging apply solely to the internals of piping systems. The requirements for trained personnel are to be in the body of the code, and not included in the Annex. NFPA 56 has a similar statement, however, it is located in an Annex note (56:A.4.3.1).</td>
</tr>
<tr>
<td>7.1.19.1.3*</td>
<td>56:4.3 with the statement limited to the establishment of a written procedure. Administration of the procedure will be determined by the procedure itself.</td>
<td>Basic requirement for the establishment of written cleaning or purging procedures.</td>
</tr>
<tr>
<td>A.7.1.19.1.3</td>
<td>Similar to 56ROP:A.4.4.3</td>
<td>The annex note is focused on clarification that new written procedures are not required to be written each time cleaning and purging operations are conducted.</td>
</tr>
<tr>
<td>7.1.19.1.3.1*</td>
<td>56ROP:A.4.4.1</td>
<td>The required review is used to confirm the appropriateness of and to authorize the use of the procedure.</td>
</tr>
<tr>
<td>A.7.1.19.1.3.1</td>
<td>56ROP:A.4.4.1</td>
<td>The required review is used to confirm the appropriateness of and to authorize the use of the procedure. NFPA 56 uses the term “safety validation.” The use of the term safety validation is not needed if the focus of the review is on the procedures themselves.</td>
</tr>
<tr>
<td>7.1.19.1.3.2</td>
<td>56:4.6.1</td>
<td>Availability has been improved by requiring that the procedures also be provided to operating personnel engaged in cleaning or purging operations and made available to the AHJ upon</td>
</tr>
<tr>
<td>NFPA 55 Section</td>
<td>Basis</td>
<td>Comment</td>
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</tr>
<tr>
<td>7.1.19.1.3.3</td>
<td>56ROP:A.4.4.3 in part</td>
<td>Requirements for generic procedures have been developed to be placed into the body of the code.</td>
</tr>
<tr>
<td>7.1.19.1.3.4</td>
<td>new</td>
<td>Generic procedures need only be reviewed when originally published or when changes occur either in procedure or the systems affected.</td>
</tr>
<tr>
<td>7.1.19.1.4</td>
<td>56:4.5 with modifications</td>
<td>The responsibility to develop written procedures for management of change is assigned to the facility owner/operator. NFPA 56 does not assign responsibility it simply requires that procedures be established.</td>
</tr>
<tr>
<td>7.1.19.1.4.1</td>
<td>56:4.5.1 with modifications</td>
<td>The modifications are intended to clarify that the management of change procedures be focused on changes to the configuration or design of the piping system. Employee training requirements and authorization for the proposed change are included in 7.1.19.1.2.</td>
</tr>
<tr>
<td>7.1.19.1.4.2</td>
<td>56:4.5.3</td>
<td>Similar to 56:4.5.3, but limited to those elements identified.</td>
</tr>
<tr>
<td>7.1.19.1.5</td>
<td>56:4.14 prior to ROP modifications which created a new Section 4.1.1 to address certain elements of the construction by making reference to several specific design standards</td>
<td>Sections 4.1 and 4.1.1 of NFPA 56 are limited in scope to flammable gases. Section 7.1.19.1.5 has been made more generic in nature by referring to the design standards used for construction and application.</td>
</tr>
<tr>
<td>7.1.19.1.5.1</td>
<td>None</td>
<td>Provides an exemption from the requirements for testing and inspection as required by the design standards for piping systems to be removed from service.</td>
</tr>
<tr>
<td>7.1.19.1.5.2</td>
<td>None</td>
<td>Provides an exemption for piping systems that are identified by operating procedures and such systems are addressed by the written cleaning or purging procedures.</td>
</tr>
<tr>
<td>7.1.19.1.5.3*</td>
<td>56ROP:6.1.1.2</td>
<td>The notification of occupants in an area potentially affected by a cleaning or purging procedure as documented in the procedures is mandatory.</td>
</tr>
<tr>
<td>A.7.1.19.1.5.3</td>
<td>None</td>
<td>Explanatory information is provide to inform the code user as to the intent of the notification whether such notification is by audible, visual, or other means.</td>
</tr>
<tr>
<td>7.1.19.2* Cleaning</td>
<td>56:ROP:1.3 Coordination is required between the design and construction requirements and the implementation of cleaning and purging procedures.</td>
<td>Establishes a base requirement for piping system designs requiring that the design documents specify cleaning procedures prior to installation and initial use.</td>
</tr>
<tr>
<td>A.7.1.19.2 Cleaning</td>
<td>None</td>
<td>Establishes an informational reference for the cleaning of stainless steel parts and equipment.</td>
</tr>
<tr>
<td>7.1.19.2.1</td>
<td>None</td>
<td>Establishes a requirement that the internal surfaces of gas piping systems be cleaned as specified by the design before placing the gas piping system into service.</td>
</tr>
<tr>
<td>7.1.19.2.2*</td>
<td>None</td>
<td>Requires the protection of the interior of the piping system during installation to protect the system from the infiltration of unwanted contaminants.</td>
</tr>
<tr>
<td>A.7.1.19.2.2</td>
<td>None</td>
<td>Provides an informational note regarding inspection of piping systems for cleanliness of piping systems under construction.</td>
</tr>
<tr>
<td>7.1.19.3* Purging</td>
<td>56:7.1.1 requires that air contained in piping systems have the air displaced before placing the system into flammable gas service.</td>
<td>Requires that piping systems used to contain gases with the following hazards be purged prior to being placed into service for initial use.</td>
</tr>
<tr>
<td></td>
<td>56:7.2.2.5 addresses the case where inert gas rather than air is present.</td>
<td>Physical hazards, which shall include the following:</td>
</tr>
<tr>
<td></td>
<td>All purging assumes that the gas contained in the piping system is to be used in a combustion process with limits established such that combustion can occur. Process operations that do not involve combustion</td>
<td>(a) Flammable gas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(b) Flammable cryogenic fluid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(c) Oxidizing gas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(d) Oxidizing cryogenic fluid</td>
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<tr>
<td></td>
<td></td>
<td>(e) Pyrophoric gas</td>
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<tr>
<td></td>
<td></td>
<td>(f) Unstable reactive (detonable) gas, Class 3 or Class 4</td>
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<tr>
<td></td>
<td></td>
<td>(g) Unstable reactive (nondetonable) gas, Class 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(h) Unstable reactive gas, Class 1 or Class 2</td>
</tr>
<tr>
<td>NFPA 55 Section</td>
<td>Basis</td>
<td>Comment</td>
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<tr>
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</tr>
<tr>
<td>A.7.19.3 Purging</td>
<td>None</td>
<td>Informational statements are provided to describe purging methods commonly employed for general gas consumption including automated methods, pulse or cycle purging etc.</td>
</tr>
</tbody>
</table>
| 7.1.19.3.1 | 56:4.3.1(2) Hot work precautions, but not on system itself. Assume that the condition will be addressed in the procedures to be developed. 56:8.2 purging out of service | Expands the requirements for purging to include:  
- activation of a system (initial service)  
- deactivation of a system  
- change in service  
- maintenance or modification  
- hot work conducted on the system itself |
| 7.1.19.3.2 | 56ROP:7.2.1 requires discharge to a specified location designated by the procedures. 56ROP:8.3.2 replaces “safe” location to one that is specified by the procedures with recognition that some gases can be other than just flammable. | Requires conformance with the requirements of NFPA 55 for the termination point for any gas being released. Section 55:6.15 appears to be focused on the thermal aspects of release; however, contact with personnel is included. |
| 7.1.19.3.2.1 | 56ROP:7.2.1 and 8.3.2 modifications. | Requires that corrosive, toxic or highly toxic gases be discharged through a treatment system and directs the user to requirements for same within NFPA 55. |
| 7.1.19.3.2.2 | None | Establishes and exemption for purged gases from the requirements of 55:6.15 under conditions where health or flammability hazards are less than those specified. |
| 8.14.1.4.2 | None | A cross reference is added for piping used for cryogenic fluid systems to require compliance with 7.1.19. |
| 9.4.1.9 Cleaning and Purging of Gas Piping Systems | N/A | A cross reference is added for bulk oxygen systems requiring compliance with 7.1.19. |
| 9.4.1.9.1 | N/A | An exception is provided for systems that are cleaned for service in accordance with the requirements of NFPA 99, Health Care Facilities Code |
| 10.2.3.3 | 56:1.1.2 hydrogen systems regulated by NFPA 2 are exempted from the requirements of NFPA 56. | A cross reference is added for bulk gaseous hydrogen systems regulated by chapter 10 to require compliance with 7.1.19. |
| 11.2.3.9 | 56:1.1.2 hydrogen systems regulated by NFPA 2 are exempted from the requirements of NFPA 56. | A cross reference is added for bulk liquid hydrogen systems regulated by chapter 10 to require compliance with 7.1.19. |
| 12.3.2.8.5.7 | 56:1.1.2 hydrogen systems regulated by NFPA 2 are exempted from the requirements of NFPA 56. | Process Purging and Venting requirements for purging and venting of catalytic reformers used in a hydrogen generation process. |
| 14.4.1.3 Cleaning and Purging of Gas Piping Systems | N/A | A cross reference is added for ethylene oxide piping systems requiring compliance with 7.1.19. |
| 14.4.3.1 | N/A | Establishes a cross reference for purging of ethylene oxide systems when being removed from service. |
| 15.4.1.10.1.1 | None | A cross reference is added for acetylene piping systems as regulated in acetylene charging plants requiring compliance with 7.1.19. |
| Annex H Section 1.2.4 | N/A | Adds ASTM A380 as an informational reference for the cleaning of stainless steel parts is added. |

**Emergency Nature:** NFPA regulations for committee projects lists six situations any one of which can that justify issuing a TIA. Below is that list along with specific details:
(a) The document contains an error or an omission that was overlooked during a regular revision process.

- NFPA 55, *Compressed Gas and Cryogenic Fluids Code* contains the fundamentals for the regulation of compressed gases and cryogenic fluids as promulgated in the NFPA regulatory scheme of controls. The recent publication of a *Provisional Standard, NFPA 56PS, Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems* has revealed a shortcoming in the control strategy integral to NFPA 55 as it may pertain to gases of any nature, whether they are simply flammable, or whether these gases have other properties including those with either health hazards or physical hazards other than flammability.

NFPA 56PS, *Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems* provides a list of exceptions for certain *material specific* gases with a long history of regulation including fuel gases as specified in NFPA 54, National Fuel Gas Code, liquefied petroleum gases as specified in NFPA 58, *Liquefied Petroleum Gas Code* and liquefied natural gas as specified in NFPA 59A, *Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)*. Other gases such as hydrogen as embodied in NFPA 2, *Hydrogen Technologies Code* use the extract process to extract fundamental provisions for compressed and liquefied forms of hydrogen from NFPA 55. *Use Specific* controls such as those applied in *use specific occupancies* such as laboratories, health care, semiconductor manufacturing, etc. are under the purview of the *use specific* codes and standards, e.g., NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals; 99, Health Care Facilities Code* and NFPA 318, *Standard for the Protection of Semiconductor Fabrication Facilities* respectively.

- The emergency development of NFPA 56PS brought to light the need to establish fundamental requirements for cleaning and purging relevant to all gases. The TIA provides a set of fundamental requirements that is applicable across the spectrum of gases regulated by NFPA 55.

(b) The document contains a conflict within the document or with another NFPA document.

By usurping control for provisions affecting all flammable gases other than those specifically exempted by design, the publication of NFPA 56PS has created a conflict with NFPA 55.

The scope statements established for the Industrial and Medical Gases (IMG-AAA) technical committee, responsible for NFPA 55 is as follows:

This Committee shall have primary responsibility for documents on the storage, transfer, and use of industrial gases. Included are the storage and handling of such gases in their gaseous or liquid phases; the installation of associated storage, piping, and distribution equipment; and operating practices. The Committee also has a technical responsibility for contributions in the same areas for medical gases and clean rooms.

It is important to note that the IMG TC is responsible for the fundamental provisions for all industrial gases, with the exception of LP Gas regulated by NFPA 58, Liquefied Natural Gas regulated by NFPA 59A, and Fuel Gas as regulated by NFPA 54. NFPA 55 establishes the fundamental provisions for hydrogen that are promulgated in NFPA 2, *Hydrogen Technologies Code* which has been exempted from regulation by NFPA 56PS as specifically indicated in the scope statement for the Gas Process Safety Committee.

The scope statement for the Gas Process Safety Committee (GPS-AAA) technical committee responsible for NFPA 56PS is as follows:

This committee shall have primary responsibility for documents on the commissioning and maintenance of flammable gas piping systems in commercial, industrial, and power plant applications, extending from the point of delivery to the equipment isolation or shutoff valve except for those already covered by the NFPA National Fuel Gas Code Technical Committee and/or the NFPA Hydrogen Technologies Technical Committee.

- The apparent conflict in scope statements between NFPA 55 and 56 appears to grant authority to each committee over the regulation of flammable gas piping systems and ultimately will lead to further unintended conflict in provisions. NFPA 56PS addresses cleaning and purging of gas piping systems used to contain flammable gases but does not cover the other fundamental requirements for compressed gas piping systems which users should expect to find that are contained within the scope of NFPA 55. The TIA serves to resolve the problem by establishing a fundamental set of requirements for the systems that are regulated.

- NFPA 56PS contains cleaning and purging techniques which are understandably limited in scope as the document was developed as the outfall of tragic events that occurred with the release of large quantities of fuel gas from piping systems that were in the process of being constructed and/or repaired. On the other hand NFPA 56PS does not contain specific provisions to address cleaning and purging of gas piping systems used for gases that are other than flammable, including but not limited to those that are either have the characteristics or are classified as pyrophoric, toxic, highly toxic, unstable-reactive, oxidizing and various other hazards.
The TIA does not replace NFPA 56PS, rather it expands the concept to address the need for cleaning and purging of all gas piping systems under a broad set of conditions.

(c) The proposed TIA intends to correct a previously unknown existing hazard.
- The TIA recognizes the need to provide requirements for all portions of the piping system, and not just those from the point of delivery to the point of use. The NFPA 55 technical committee recognizes the need to add this issue to the scope of NFPA 55. By contrast NFPA 56PS TC addresses the issue of cleaning and purging of pipelines from the point of delivery to the point of use but not those within the bulk supply system itself.

(d) The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.
- NFPA 55 is the core document for compressed gas systems other than those traditionally used for fuel gas such as NFPA 54, 58, and 59A. The requirements for cleaning and purging of piping systems should be constructed to address piping systems regardless of gaseous content. The inadvertent loss of control of gases with physical hazards other than flammability or health hazards is just as critical to public safety as is the loss of control and release of those with the hazard of flammability. A consolidated document with the fundamental requirements for cleaning and purging of compressed piping systems, including piping to the point of use, provides the user with one document thereby minimizing the chance to overlook requirements.

(e) The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.
- The TIA provides an advance in the art of safeguarding through the use of automated purge systems. Informational notes have been added to the Annex to describe other methods of purging commonly used including the use of vacuum, pulse and, cycle purging.

(f) The proposed TIA intends to correct a circumstance in which the revised document has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process, or was without adequate technical (safety) justification for the action.
- The TIA represents a starting point to provide fundamental safeguards that can be used for cleaning and purging operations on any piping system. NFPA 56PS does not address in any detail compressed gas hazards other than flammability when the materials of concern have multiple hazards.
- The lack of procedures to address the commissioning of piping systems from the point of delivery to the point of use has left a void that must be filled. The work to develop NFPA 56PS points to the need for a broad approach to the problem.
- The primary focus of NFPA 56PS is that of flammability and is most pertinent to the requirements surrounding the use of fuel gas. This TIA has been created to provide fundamental safeguards to address the general need for cleaning and purging of piping systems as they are being designed and installed for the broad array of gases found in use across a wide spectrum of occupancies today. The provisions developed in NFPA 56PS can be used as a basis for consideration as the evolution of fundamental code provisions evolve. Acceptance of the TIA will eliminate conflicts in the short term while allowing the IMG-AAA technical committee to further develop and enhance the technical provisions across the spectrum of gases regulated by NFPA 55.
Agenda Item: TIA 55-2013
Document: NFPA 55, Compressed Gases and Cryogenic Fluids Code
Reference: 3.3.x Cleaning Media, Purging, 7.1.19, 8.14.1.2, 9.4.1.9, 10.2.3.3, 11.2.3.9, 12.3.2.8.5.7, 14.4.1.3, 14.4.3.1, 15.4.1.10.1.1, A.3.3.x, A.7.1.19.1.1(c), A.7.1.19.1.1(d), A.7.1.19.1.3, A.7.1.19.1.3.1, A.7.1.19.1.5.3, A.7.1.19.2, A.7.1.19.2.2, A.7.1.19.3, and H.1.2.4
(TIA Log 1073)

Comment Closing: 9/14/2012
0 Public Comments Received

TIA FINAL BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the final results show this TIA **HAS** achieved the necessary votes on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is **18**.

\[29 \text{ (eligible to vote)} - 4 \text{ (not returned)} - 0 \text{ (abstentions)} = 25 \times 0.75 = 18.75\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[29 \text{ eligible} \div 2 = 14.5 = 15 \text{ (this is the simple majority)}\]

<table>
<thead>
<tr>
<th>29</th>
<th>Eligible to Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Not Returned (Barnes, Mills, Younis, Zeman)</td>
</tr>
</tbody>
</table>

TC FINAL Ballot results for Technical Merit are as follows:
25 Agree
0 Disagree
0 Abstentions

**FINAL ACTION: PASSED**

TC FINAL Ballot results for Emergency Nature are as follows:
24 Agree
1 Disagree (Viscomi)
0 Abstentions

**FINAL ACTION: PASSED**
TECHNICAL COMMITTEE LETTER BALLOT
REVISED--PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1073
To Add the following: 3.3.x Cleaning Media, Purging, 7.1.19, 8.14.1.2, 9.4.1.9, 10.2.3.3, 11.2.3.9, 12.3.2.8.5.7, 14.4.1.3, 14.4.3.1, 15.4.1.10.1.1, A.3.3.x, A.7.1.19.1.1(c), A.7.1.19.1.1(d), A.7.1.19.1.3, A.7.1.19.1.3.1, A.7.1.19.1.5.3, A.7.1.19.2, A.7.1.19.2.2, A.7.1.19.3, and H.1.2.4 of the Proposed 2013 Edition of NFPA 55
Compressed Gases and Cryogenic Fluids Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to Add the following: 3.3.x Cleaning Media, Purging, 7.1.19, 8.14.1.2, 9.4.1.9, 10.2.3.3, 11.2.3.9, 12.3.2.8.5.7, 14.4.1.3, 14.4.3.1, 15.4.1.10.1.1, A.3.3.x, A.7.1.19.1.1(c), A.7.1.19.1.1(d), A.7.1.19.1.3, A.7.1.19.1.3.1, A.7.1.19.1.5.3, A.7.1.19.2, A.7.1.19.2.2, A.7.1.19.3, and H.1.2.4

X AGREE   DISAGREE*   ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

Question 2: I agree that the subject is of an EMERGENCY NATURE.

AGREE   DISAGREE*   ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I am just commenting on Chapter 14, we have not had a need for the additions from the start when NFPA 560 was a stand alone document. The process of gas blowing is not done with small diameter EO lines. Nitrogen or air is used. I still disagree for the need for the additional materials but i will not disagree and vote in the affirmative with the rest of the IMG committee.

Signature
Randy Viscomi
Name (Please Print)
August 3, 2012
Date

Please return this ballot on or before Wednesday, August 15, 2012.

PLEASE RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7110
E-mail: jgoyette@nfpa.org
Item 12-10-6
Chapter 18 New Health Care Occupancies

### 18.3.2.5.3* Within a smoke compartment, where residential or commercial cooking equipment is used to prepare meals for 30 or fewer persons, one cooking facility shall be permitted to be open to the corridor, provided that all of the following conditions are met:

1. The portion of the health care facility served by the cooking facility is limited to 30 beds and is separated from other portions of the health care facility by a smoke barrier constructed in accordance with 18.3.7.3, 18.3.7.6, and 18.3.7.8.

2. The cooktop or range is equipped with a range hood of a width at least equal to the width of the cooking surface, with grease baffles or other grease-collecting and clean-out capability.

3. The hood systems have a minimum airflow of 500 cfm (14,000 L/min).

4. The hood systems that are not ducted to the exterior additionally have a charcoal filter to remove smoke and odor.

5. The cooktop or range complies with all of the following:
   a. The cooktop or range is protected with a fire suppression system listed in accordance with UL 300, Standard for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment, or is tested and meets all requirements of UL 300A, Extinguishing System Units for Residential Range Top Cooking Surfaces, in accordance with the applicable testing document's scope.
   b. A manual release of the extinguishing system is provided in accordance with NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, Section 10.5.
   c. An interlock is provided to turn off all sources of fuel and electrical power to the cooktop or range when the suppression system is activated.
   
6. The use of solid fuel for cooking is prohibited.

7. Deep-fat frying is prohibited.

8. Portable fire extinguishers in accordance with NFPA 96 are located in all kitchen areas.

9. A switch meeting all of the following is provided:
   a. A locked switch, or a switch located in a restricted location, is provided within the cooking facility that deactivates the cooktop or range.
   b. The switch is used to deactivate the cooktop or range whenever the kitchen is not under staff supervision.

Chapter 19 Existing Health Care Occupancies

### 19.3.2.5.3* Within a smoke compartment, where residential or commercial cooking equipment is used to prepare meals for 30 or fewer persons, one cooking facility shall be permitted to be open to the corridor, provided that all of the following conditions are met:

1. The portion of the health care facility served by the cooking facility is limited to 30 beds and is separated from other portions of the health care facility by a smoke barrier constructed in accordance with 19.3.7.3, 19.3.7.6, and 19.3.7.8.

2. The cooktop or range is equipped with a range hood of a width at least equal to the width of the cooking surface, with grease baffles or other grease-collecting and clean-out capability.

3. The hood systems have a minimum airflow of 500 cfm (14,000 L/min).

4. The hood systems that are not ducted to the exterior additionally have a charcoal filter to remove smoke and odor.

5. The cooktop or range complies with all of the following:
   a. The cooktop or range is protected with a fire suppression system listed in accordance with UL 300, Standard for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment, or is tested and meets all requirements of UL 300A, Extinguishing System Units for Residential Range Top Cooking Surfaces, in accordance with the applicable testing document's scope.
   b. A manual release of the extinguishing system is provided in accordance with NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, Section 10.5.
   c. An interlock is provided to turn off all sources of fuel and electrical power to the cooktop or range when the suppression system is activated.
   
6. The use of solid fuel for cooking is prohibited.

7. Deep-fat frying is prohibited.

8. Portable fire extinguishers in accordance with NFPA 96 are located in all kitchen areas.

9. A switch meeting all of the following is provided:
   a. A locked switch, or a switch located in a restricted location, is provided within the cooking facility that deactivates the cooktop or range.
   b. The switch is used to deactivate the cooktop or range whenever the kitchen is not under staff supervision.
accordance with 9.6.2.10.3, and
(c) The local audible signal initiated by the detector is
permitted to be silenced and reset by a button on the
detector or by a switch installed within 10 ft (3.0 m) of
the system smoke detector.

18.3.4.2.1 Initiation of the required fire alarm systems
shall be by manual means in accordance with 9.6.2 and
by means of any required sprinkler system workflow
alarms, detection devices, or detection systems, unless
otherwise permitted by 18.3.4.2.2 and 18.3.4.2.3.

18.3.4.2.3 The system smoke detector installed in
accordance with 18.3.2.5.3(13) shall not be required to
initiate the fire alarm system.

19.3.4.2.1 Initiation of the required fire alarm systems
shall be by manual means in accordance with 9.6.2 and
by means of any required sprinkler system workflow
alarms, detection devices, or detection systems, unless
otherwise permitted by 19.3.4.2.2 through 19.3.4.2.4
19.3.4.2.5.

19.3.4.2.3 The system smoke detector installed in
accordance with 19.3.2.5.3(13) shall not be required to
initiate the fire alarm system.

19.3.4.2.4 Fixed extinguishing systems
protecting commercial cooking equipment in kitchens
that are protected by a complete automatic sprinkler
system shall not be required to initiate the fire alarm
system.
18.3.4.3.1 Occupant Notification. Occupant notification shall be accomplished automatically in accordance with 9.6.3, unless otherwise modified by the following:
(1) Paragraph 9.6.3.2.3 shall not be permitted to be used.
(2)*In lieu of audible alarm signals, visible alarm-indicating appliances shall be permitted to be used in critical care areas.
(3) The provision of 18.3.2.5.3(13)(c) shall be permitted to be used.

18.3.4.3.2.1 Fire department—Emergency forces notification shall be accomplished in accordance with 9.6.4, except that the provision of 18.3.2.5.3(13)(d) shall be permitted to be used.

A.18.3.2.5.3 The intent of 18.3.2.5.3 is to limit the number of persons for whom meals are routinely prepared to not more than 30. Staff and feeding assistants are not included in this number.

A.18.3.2.5.3(3) The minimum airflow of 500 cfm (14,000 L/m) is intended to require the use of residential hood equipment at the higher end of equipment capacities. It is also intended to draw a sufficient amount of the cooking vapors into the grease baffle and filter system to reduce migration beyond the hood.

A.18.3.2.5.3(6) The intent of this provision is to limit cooking fuel to gas or electricity. The prohibition of solid fuels for cooking is not intended to prohibit charcoal grilling on grills located outside the facility.

A.18.3.2.5.3(7) Deep-fat frying is defined as a cooking method that involves fully immersing food in hot oil.

A.18.3.2.5.3(9) The intent of this requirement is that the fuel source for the cooktop or range is to be turned on only when staff is present or aware that the kitchen is being used. The timer function is meant to provide an additional safeguard if the staff forgets to deactivate the cooktop or range. If a cooking activity lasts longer than 120 minutes, the timer would be required to be manually reset.

A.18.3.2.5.3(11) Protection of the cooktop or range is accomplished by the sprinklers that are required in the space and the required cooktop hood fire suppression system. The smoke alarms are intended to notify staff who might not be in the immediate area. The intent of requiring smoke alarms instead of smoke detectors is to prevent false alarms from initiating the building fire alarm system and notifying the fire department. Smoke alarms should be maintained a minimum of 20 ft (6.1 m) away from the cooktop or range as studies have shown this distance to be the threshold for significantly
Reducing false nuisance alarms caused by cooking. The intent of the interconnected smoke alarms, with silence feature, is that while the devices would alert staff members to a potential problem, if it is a false nuisance alarm, the staff members can use the silence feature instead of disabling the alarm. The referenced study indicates that nuisance alarms are reduced with photoelectric smoke alarms. Providing two, interconnected alarms provides a safety factor since they are not electrically supervised by the fire alarm system. (Smoke Alarms – Pilot Study of Nuisance Alarms Associated with Cooking) A.18.3.2.5.3(12) The provision of 18.3.2.5.3(12) recognizes that it is more important to maintain the 20-ft (6.1-m) minimum spacing criterion between the smoke alarm and the cooktop or range, to minimize nuisance alarms, than to assure that the smoke alarm is located within the kitchen area itself.

A.18.3.2.5.3(13) The requirements of 18.3.2.5.3(13) are intended to allow the local staff to silence and reset the system smoke detector without the assistance of the engineering or maintenance personnel. This provision is not intended to require the system smoke detector to initiate a building-wide occupant alarm signal or to notify the emergency forces.

Submitter’s Substantiation: The new language clarifies the requirements related to the use of smoke alarms as well as system smoke detectors. The original language contained a requirement to install smoke alarms a minimum of 20 feet away from the cooktop or range, but there was no limit on the maximum distance the smoke alarms could be located from the cooktop or range. The new language clarifies that the smoke alarms are to be installed at a distance not less than 20 feet and not more than 25 feet from the cooktop or range. It also clarifies that the smoke alarms are permitted to be located outside of the kitchen area to meet the 20 foot minimum distance criterion. The optional use of a single system smoke detector to satisfy the requirement for two smoke alarms is permitted since supervision is provided for the system detector, and not necessarily for the smoke alarms.

The provision of 18/19.3.2.5.3(12) recognizes that it is more important to maintain the 20-ft (6.1-m) minimum distance criterion between the smoke alarm and the cooktop or range, to minimize nuisance alarms, than to assure that the smoke alarm is located within the kitchen area itself. The smoke alarms are intended to notify staff who might not be in the immediate area. The use of smoke alarms, instead of system smoke detectors, is intended to reduce the number of nuisance alarms that would initiate the building fire alarm system and notify the fire department.

The new language also clarifies that smoke alarms are to be located closer to the cooktop or range than system smoke detectors when system smoke detectors are installed. The provision of 18/19.3.2.5.3(13) clarifies that there is a minimum distance criterion of 25 feet that applies to all system smoke detectors. In addition, the Annex clarifies that it is not the intent to impose the 25 foot minimum distance on system smoke detectors located in a space that is separated from the cooktop or range by walls and a door (i.e., located in a different room).

Emergency Nature: The Centers for Medicare & Medicaid Services (CMS) has issued a policy (S & C Letter 12-21-LSC Dated March 9, 2012) immediately considering waivers to permit the use of certain requirements of the 2012 edition of the Life Safety Code (LSC). One of 2012 LSC requirements that has been waived is the open kitchen to the corridor. This is an interim step by CMS to allow the construction of “household units” prior to the adoption of the 2012 LSC by CMS. CMS is in the process of adopting the 2012 Life Safety Code and the estimate for final adoption is the end of 2013 or beginning of 2014.

The changes in the proposed TIA are needed to implement CMS’s policy to immediately allow open kitchens that comply with the 2012 LSC. The TIA puts back in the 2012 LSC the language the Technical Committee developed and approved for the 2012 LSC at the comment period that brings attention to the fact that the 20 foot clearance requirement for smoke alarms from cooktops or ranges is permitted to fall outside the kitchen area. This necessary guidance to designers and AHJ’s was lost when the LSC was amended due to the acceptance of a NITMAM that was not intended to cause the loss of the item. The publication of this TIA would allow CMS to include the needed modified language into the federal rule making process for the adoption of the 2012 LSC.
TIA CC PRELIMINARY BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the preliminary results show this TIA HAS achieved the necessary votes on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 8.

\[
[11 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 10 \times 0.75 = 7.5]
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
[11 \text{ eligible to vote} ÷ 2 = 5.5 = 6 \text{ (this is the simple majority)}]
\]

11 Eligible to Vote
1 Not Returned (Collins)

CC PRELIMINARY Ballot results for Technical Merit are as follows:
10 Agree (Koffel w/comment)
0 Disagree
0 Abstentions

PRELIMINARY ACTION: PASSED

CC PRELIMINARY Ballot results for Emergency Nature are as follows:
10 Agree
0 Disagree
0 Abstentions

PRELIMINARY ACTION: PASSED

Final SAF-HEA continues on next page
According to 5.4 in the NFPA (RGCP), the preliminary results show this TIA **HAS** achieved the necessary votes on both Question 1 (**Technical Merit**) and Question 2 (**Emergency Nature**).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is **19**.

\[29 \text{ (eligible to vote)} - 4 \text{ (not returned)} - 0 \text{ (abstentions)} = 25 \times 0.75 = 18.75\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[29 \text{ eligible} ÷ 2 = 14.5 = 15\] (this is the simple majority)

---

**TC PRELIMINARY** Ballot results for **Technical Merit** are as follows:

- 25 Agree
- 0 Disagree
- 0 Abstentions

**PRELIMINARY ACTION: PASSED**

The number of affirmative votes needed to obtain a recommendation to issue the TIA is **18**.

\[29 \text{ (eligible to vote)} - 4 \text{ (not returned)} - 1 \text{ (abstention)} = 24 \times 0.75 = 18\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[29 \text{ eligible} ÷ 2 = 14.5 = 15\] (this is the simple majority)

---

**TC PRELIMINARY** Ballot results for **Emergency Nature** are as follows:

- 23 Agree
- 1 Disagree (Dannaway)
- 1 Abstention (Rickard)

**PRELIMINARY ACTION: PASSED**
Question 1: I agree that there are no correlation issues in accordance with 3.4.2 and 3.4.3 (copy enclosed) of the NFPA Regs.

____ X _______ AGREE _______ DISAGREE* _______ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position. If disagreeing, cite relevant section(s)/paragraph(s) of the correlation issue and describe.

There are several instances in the Annex notes (specifically A18/A19.3.2.5.3(11)) where the word false is being replaced with nuisance. The word “false” is shown as being deleted but the word “nuisance” is not underlined. A cleaner way to accomplish the intent regarding occupant notification and emergency forces notification would be to say that the smoke detector shall be permitted to initiate a supervisory alarm condition. This would better clarify the intent of 18/19.3.2.5.3(11)(c) and (d) by giving specific criteria covered by NFPA 72, result in significantly less verbiage, and eliminate the need to add text to 18/19.3.4.3.1 and 18/19.3.4.3.2.1.

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________ 

Question 2: I agree that the subject of this TIA is of an EMERGENCY NATURE.

____ X _______ AGREE _______ DISAGREE* _______ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a negative/disagreement or abstaining position.

______________________________
Signature  
William Koffel  
Name (Please Print) 

9/24/2012  
Date 

Please return the ballot on or before **September 26, 2012**.
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1075
To Revise 18.3.2.5.3 (11) – (12), 19.3.2.5.3 (11) – (13), related 18.3.4 and 19.3.4 alarm system provisions, and associated advisory annex of the 2012 Edition of NFPA 101, 
*Life Safety Code®*

Question 1: I agree with the **TECHNICAL MERITS** of the Proposed TIA to revise 18.3.2.5.3 (11) – (12), 19.3.2.5.3 (11) – (13), related 18.3.4 and 19.3.4 alarm system provisions, and associated advisory annex.

_______X______ AGREE ___________ DISAGREE* ____________ ABSTAIN*

**EXPLANATION OF VOTE** - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

__________________________________________________________

Question 2: I agree that the subject is of an **EMERGENCY NATURE**.

_________ AGREE ____X____ DISAGREE* ____________ ABSTAIN*

**EXPLANATION OF VOTE** - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

__________________________________________________________

_It appears to me that CMS can implement this policy without a TIA and the justification for emergency nature does not meet any of the evaluation factors._

Signature

Samuel S. Dannaway, PE
Name (Please Print)

13 September 2012
Date

Please return the ballot on or before **September 14, 2012**.

**PLEASE RETURN TO:**
Elena Carroll, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7110
E-mail: ecarroll@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1075
To Revise 18.3.2.5.3 (11) – (12), 19.3.2.5.3 (11) – (13), related 18.3.4 and 19.3.4 alarm system provisions, and associated advisory annex of the 2012 Edition of NFPA 101,
Life Safety Code®

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 18.3.2.5.3 (11) – (12), 19.3.2.5.3 (11) – (13), related 18.3.4 and 19.3.4 alarm system provisions, and associated advisory annex.

______X____ AGREE  __________ DISAGREE*  __________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Question 2: I agree that the subject is of an EMERGENCY NATURE.

________ AGREE  ________ DISAGREE*  ________X__ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.
The only reason for not waiting for the next cycle to implement this change appears to be the concern that CMS will adopt the 2012 edition but not later editions of NFPA 101. I am conflicted as to whether this is an appropriate reason for issuing a TIA and hope Standards Council will address this issue in their deliberations.

[Signature]

John A. Rickard
Name (Please Print)

09/18/12
Date

Please return the ballot on or before September 14, 2012.

PLEASE RETURN TO:
Elena Carroll, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110  
E-mail: ecarroll@nfpa.org

October 24, 2012  
Supplemental Agenda October 29-30, 2012  
Page 68 of 951
TIA CC FINAL BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the preliminary results show this TIA HAS achieved the necessary votes on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 8.

\[11 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 10 \times 0.75 = 7.5\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[11 \text{ eligible} \div 2 = 5.5 = 6 \text{ (this is the simple majority)}\]

11 Eligible to Vote
1 Not Returned (Collins)

CC FINAL Ballot results for Technical Merit are as follows:
10 Agree (Koffel w/comment)
0 Disagree
0 Abstentions

FINAL ACTION: PASS

CC FINAL Ballot results for Emergency Nature are as follows:
10 Agree
0 Disagree
0 Abstentions

FINAL ACTION: PASS

Final SAF-HEA continues on next page
According to 5.4 in the NFPA (RGCP), the preliminary results show this TIA **HAS** achieved the necessary votes on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 19.

\[
29 \text{ (eligible to vote) – 4 (not returned) – 0 (abstentions)} = 25 \times 0.75 = 18.75
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
29 \text{ eligible} \div 2 = 14.5 = 15 \text{ (this is the simple majority)}
\]

---

TC FINAL Ballot results for **Technical Merit** are as follows:

- 25 Agree
- 0 Disagree
- 0 Abstentions

**FINAL ACTION: PASS**

---

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 18.

\[
29 \text{ (eligible to vote) – 4 (not returned) – 1 (abstention)} = 24 \times 0.75 = 18
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
29 \text{ eligible} \div 2 = 14.5 = 15 \text{ (this is the simple majority)}
\]

---

TC FINAL Ballot results for **Emergency Nature** are as follows:

- 23 Agree
- 1 Disagree (Dannaway)
- 1 Abstention (Rickard)

**FINAL ACTION: PASS**
Walker, Nancy

From: James A Comegys [JAC25@health.state.ny.us]
Sent: Monday, September 10, 2012 11:30 AM
To: TIA
Subject: Comment on Proposed TIA 1075

This ongoing assault on the protection of Nursing Home Residents fly's in the face of all evidence that NFPA has posted on the topic.

Regardless of the current political climate, it is the job of NFPA to protect people from harm in the event of a fire. When 49% of fires in healthcare facilities and 54% of fires in Nursing Homes originate in the kitchen, how can we, as life safety professionals, abrogate our responsibilities by allowing this threat of fire to now be open to the path of egress? While historically the larger number of fire related deaths has been from fires that originate in resident rooms, this will result in a significant shift in that statistic.

The current failure rate for is 14%³ cooking hood suppression systems and 8% ⁴ for sprinkler systems. Now the writer wants to remove the notification element from the smoke detection system?

Is the upsurge in sales of the 2012 NFPA 101 worth the increased risk to life that it results in?

I do not support this TIA, and I do not subscribe to the reduction in safety that has been promulgated by your 2012 reference document.

1) http://www.nfpa.org/catalog/services/customer/downloadmemberonlypdf.asp?downloadmemberonlypdf=true&source=NFPA
2) http://www.nfpa.org/itemDetail.asp?categoryID=2655&itemID=58206&URL=Research/Statistical%20reports/Occupancies/
3) Conversation with CaptiveAire Representative October 2011.
4) http://www.nfpa.org/itemDetail.asp?categoryID=2466&itemID=55726&URL=Research/Statistical%20reports/Fire%20protection%20systems/

Member 2881387

James Comegys, RA, CEO, LEED AP BD+C
Team Leader, BAEFP
518.402.0904

NYS Department of Health
Division of Health Facility Planning - Bureau of Architecture and Engineering Facility Planning
Corning Tower, Room 1861
Empire State Plaza
Albany, NY 12237

Be Green and save green - don't print this email!
To whom it may concern:
Comment on Proposed TIA 1075 - NFPA 101

I have noted the submission by Thomas Jaeger regarding the location of smoke alarms/smoke detectors for instances where there is an increased risk of false alarms (due to cooking).

My comment is this:
Is the committee aware of how the issue of false alarms (primarily due to cooking) is handled in New Zealand?

In New Zealand this is dealt with by a combined smoke & heat detection system (commonly known as a "Type 5" system) whereby the smoke detectors are only on localised sounders, with a hush button facility. If the hush button is not used then the alarm goes building-wide. In addition the heat detector component is automatically building-wide.


"Type 5 – Automatic fire alarm system with modified smoke detection and manual call points

1.2.5 Type 5 is a variation of the Type 4 and Type 7 alarm systems requiring part of the smoke detection component to comprise only a local alarm. The local alarm system, activated by the presence of smoke, shall have audible alerting devices to warn only the firecell occupants and the building management, where such management exists.

Comment:
Examples of management situations are motels, hotels or multi-unit residential accommodation in retirement villages.

The local alarm component of a Type 5 system:
a) Shall be restricted to single firecells containing sleeping accommodation, being household units or individual suites in risk group SM. The local alarm system shall not be extended to other areas such as exitways or common spaces. These shall retain a Type 4 smoke detection system, and
b) Shall have the facility to be silenced (muted) by a ‘hush’ switch located at a level readily able to be reached in accordance with Acceptable Solution D1/AS1. The hush switch shall mute the alarm for a time not exceeding 2 minutes, and
c) Shall be permitted only where an automatic fire detection and alarm system activated by heat detectors (part of the main alarm system) is also installed in sleeping firecells which do not already have an automatic fire sprinkler system.

Where a Type 5 system is installed, mechanical ventilation in accordance with Acceptable Solution G4/AS1 shall be provided in the kitchen area of the household unit or suite.
1.2.6 In exitways and common spaces the required Type 4 or Type 7 system shall not be modified. The system installation for Type 3 and Type 4 components shall comply with NZS 4512.
1.2.7 The system installation for the local smoke alarm component shall also comply with NZS 4512."

Regards

Peter Reddin
Senior Fire Engineer
CPEng, MIPENZ, MSFPE
ME(Fire), GIFireE, NDipFireTech

OnFire Consulting Ltd
477 Alexandra Street
PO Box 226
Te Awamutu 3840
Tel: 07 870 6411
Mobile: 027 459 4251
Item 12-10-7
1. Revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3 according to Table F.1 (Typical Organic Peroxide Formulations). These changes need to be made based upon information contained in Table F.1. Table F.1 lists all organic peroxides by name and the other tables list them by Class I through V on respective tables.

Modifications consist of changing the “Class” for 28 listings and deleting one listing, a product in a container size no longer permitted for transport. Container size was also changed for one chemical from 55 gallons to 16 gallons since the larger container size is no longer permitted for transport. The changes to Class are shown in the attached table which includes several additional columns from the current F.1 for identification purposes. Unlisted columns in the current table are unchanged.

### Table of Organic Peroxides (Annex F-1) Changes

<table>
<thead>
<tr>
<th>Organic Peroxide</th>
<th>Concentration</th>
<th>Diluent</th>
<th>Current Class</th>
<th>New Class</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-Amyl peroxy-2-ethylhexanoate</td>
<td>96</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>55 gal-16 gal</td>
</tr>
<tr>
<td>t-Amyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Amyl peroxyxypivalate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butyl cumyl peroxide</td>
<td>95</td>
<td>-</td>
<td>IV</td>
<td>III</td>
<td>55 gal</td>
</tr>
<tr>
<td>t-Butyl hydroperoxide</td>
<td>70</td>
<td>DTBP and t-BuOH</td>
<td>III</td>
<td>I</td>
<td>55 gal</td>
</tr>
<tr>
<td>t-Butyl hydroperoxide</td>
<td>70</td>
<td>Water</td>
<td>IV</td>
<td>III</td>
<td>55 gal</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate</td>
<td>97</td>
<td>-</td>
<td>II</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate</td>
<td>97</td>
<td>DELETE THIS LISTING</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate</td>
<td>50</td>
<td>DOP or OMS</td>
<td>IV</td>
<td>III</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butylperoxy 2-ethylhexyl carbonate</td>
<td>95</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butyl peroxyisobutyrate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>I</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butyl peroxyxypivalate</td>
<td>45</td>
<td>OMS</td>
<td>IV</td>
<td>III</td>
<td>5 gal</td>
</tr>
<tr>
<td>Cumyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>IV</td>
<td>III</td>
<td>5 gal</td>
</tr>
<tr>
<td>Cumyl peroxyneohexanoate</td>
<td>75</td>
<td>OMS</td>
<td>IV</td>
<td>III</td>
<td>5 gal</td>
</tr>
<tr>
<td>1,1-Di(t-amylperoxy) cyclohexane</td>
<td>80</td>
<td>OMS or BBP</td>
<td>IV</td>
<td>III</td>
<td>5 gal</td>
</tr>
<tr>
<td>Di (4-t-butylcyclohexyl) peroxydicarbonate</td>
<td>98</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>88 lb</td>
</tr>
<tr>
<td>Di-t-butyl peroxide</td>
<td>99</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>55 gal</td>
</tr>
<tr>
<td>Di-sec-butyl peroxydicarbonate</td>
<td>98</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>1,1-Di(t-butyldisiloxane)-3,3,5-trimethyl-cyclohexane</td>
<td>75-95</td>
<td>-</td>
<td>III</td>
<td>I</td>
<td>5 gal</td>
</tr>
<tr>
<td>Didecanoyl peroxide</td>
<td>98</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>50 lb</td>
</tr>
<tr>
<td>Dilauroyl peroxide</td>
<td>98</td>
<td>-</td>
<td>IV</td>
<td>III</td>
<td>110 lb</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di(benzoylperoxy)hexane</td>
<td>95</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>4@5 lb</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di(t-butylperoxy)hexane</td>
<td>92</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>30 gal</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di(2-ethylhexanoylperoxy)hexane</td>
<td>90</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>Ethyl-3,3-di(t-amylperoxy) butyrate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>Ethyl-3,3-di(t-butylperoxy) butyrate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>p-Methyl hydroperoxide</td>
<td>54</td>
<td>Alcohols and ketones</td>
<td>IV</td>
<td>III</td>
<td>55 gal</td>
</tr>
<tr>
<td>2,4-Pentanedione peroxide</td>
<td>4.0% AO</td>
<td>Water and solvent</td>
<td>IV</td>
<td>III</td>
<td>5 gal</td>
</tr>
<tr>
<td>Organic Peroxide</td>
<td>Concentration</td>
<td>Diluent</td>
<td><strong>Control</strong></td>
<td><strong>Emergency</strong></td>
<td><strong>Hazard Identification</strong></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------</td>
<td>---------</td>
<td>-------------</td>
<td>---------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>°F</td>
<td>°C</td>
<td>Health</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>°F</td>
<td>°C</td>
<td>Flammability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Reactivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Class</td>
<td></td>
<td>Container</td>
</tr>
<tr>
<td>r-Amyl hydroperoxide</td>
<td>88</td>
<td>Water</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>r-Amyl peroxyacetate</td>
<td>60</td>
<td>OMS</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>r-Amyl peroxybenzoate</td>
<td>96</td>
<td>—</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>r-Amyl peroxy-2-ethylhexanoate</td>
<td>96</td>
<td>—</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>r-Amyl peroxy-2-ethylhexanoate</td>
<td>96</td>
<td>—</td>
<td>68</td>
<td>20</td>
<td>77</td>
</tr>
<tr>
<td>r-Amyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>32</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>r-Amyl peroxyvalerate</td>
<td>75</td>
<td>OMS</td>
<td>50</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>r-Butyl cumyl peroxide</td>
<td>95</td>
<td>—</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>α-Butyl-4,4-di(r-butyl peroxy) valerate</td>
<td>98</td>
<td>—</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>r-Butyl hydroperoxide</td>
<td>90</td>
<td>Water and r-BuOH</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>r-Butyl hydroperoxide&lt;sup&gt;3&lt;/sup&gt;</td>
<td>70</td>
<td>DTBP and r-BuOH</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>r-Butyl hydroperoxide&lt;sup&gt;3&lt;/sup&gt;</td>
<td>70</td>
<td>Water</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>r-Butyl monoperoxymaleate</td>
<td>98</td>
<td>—</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>r-Butyl peroxyacetate</td>
<td>75</td>
<td>OMS</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>r-Butyl peroxyacetate</td>
<td>60</td>
<td>OMS</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>r-Butyl peroxybenzoate</td>
<td>98</td>
<td>—</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>r-Butyl peroxy-2-ethylhexanoate</td>
<td>97</td>
<td>—</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>r-Butyl peroxy-2-ethylhexanoate</td>
<td>92</td>
<td>—</td>
<td>68</td>
<td>20</td>
<td>77</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate</td>
<td>50</td>
<td>DOP or OMS</td>
<td>86</td>
<td>30</td>
<td>95</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate</td>
<td>95</td>
<td>—</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexyl carbonate</td>
<td>75</td>
<td>OMS</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>t-Butyl peroxysobutyrate</td>
<td>75</td>
<td>OMS</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>t-Butyl peroxyisopropyl carbonate</td>
<td>50</td>
<td>OMS</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>t-Butyl peroxyisopropyl carbonate</td>
<td>75</td>
<td>OMS</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>t-Butyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>t-Butyl peroxyvalerate</td>
<td>75</td>
<td>OMS</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Organic Peroxide</td>
<td>Concentration</td>
<td>Diluent</td>
<td>Control</td>
<td>Emergency</td>
<td>Hazard Identification&lt;sup&gt;2&lt;/sup&gt;</td>
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<td>Diacetyl peroxide</td>
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<td>80</td>
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<td>20</td>
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<td>Water</td>
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<td>—</td>
<td>—</td>
</tr>
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<td>Water</td>
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<td>Dibenzoyl peroxide (paste)</td>
<td>55</td>
<td>Plasticizer</td>
<td>T</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Dibenzoyl peroxide (paste)</td>
<td>55</td>
<td>Plasticizer and water</td>
<td>T</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Dibenzoyl peroxide (paste)</td>
<td>50</td>
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<td>T</td>
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<tr>
<td>Dibenzoyl peroxide (paste)</td>
<td>50</td>
<td>Plasticizer and water</td>
<td>T</td>
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<tr>
<td>Dibenzoyl peroxide (slurry)</td>
<td>40</td>
<td>Water and plasticizer</td>
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<tr>
<td>Dibenzoyl peroxide (powder)</td>
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<td>Starch</td>
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<td>—</td>
<td>86</td>
<td>30</td>
<td>95</td>
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<tr>
<td>1,1-Di(t-butylperoxy) cyclohexane</td>
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<td>Di-sec-butyl peroxydicarbonate</td>
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<td>—</td>
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<td>Di(2-t-butylperoxyisopropyl) benzene</td>
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<td>—</td>
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<td>Di(2-t-butylperoxyisopropyl) benzene</td>
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<td>Diluent</td>
<td>Recommended Maximum Temperatures</td>
<td>Hazard Identification</td>
<td>Class</td>
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<td>Control °F °C</td>
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<td>86      30</td>
<td>95 35</td>
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<td>1</td>
<td>V</td>
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<td>–</td>
<td>86      30</td>
<td>95 35</td>
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<td>T        14 0</td>
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<td>–</td>
<td>–4       –20</td>
<td>14 10</td>
<td>1</td>
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<tr>
<td></td>
<td>40 OMS</td>
<td></td>
<td>5        –15</td>
<td>23 5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>99</td>
<td>–</td>
<td>5        –15</td>
<td>23 5</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>30 Toluene</td>
<td></td>
<td>14       –10</td>
<td>32 0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>98 Calcium carbonate or silica</td>
<td></td>
<td>–13     –25</td>
<td>5 15</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>85 OMS</td>
<td></td>
<td>–13     –25</td>
<td>5 15</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>98</td>
<td>–</td>
<td>–13     –25</td>
<td>5 15</td>
<td>2</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di (benzoylperoxy)hexane</td>
<td>95</td>
<td>–</td>
<td>2        3</td>
<td>3</td>
<td>IV</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di (t-butylperoxy)hexane</td>
<td>92</td>
<td>–</td>
<td>2        3</td>
<td>2</td>
<td>III</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di (t-butylperoxy)hexane</td>
<td>47 Calcium carbonate or silica</td>
<td></td>
<td>1        1</td>
<td>1</td>
<td>V</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di (2-ethylhexanoylperoxy) hexane</td>
<td>90</td>
<td>–</td>
<td>68      20</td>
<td>77 25</td>
<td>0</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-dihydroperoxylhexane</td>
<td>70 Water</td>
<td></td>
<td>2        3</td>
<td>3</td>
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<td>Ethyl-3,3-di(t-amylperoxy) butyrate</td>
<td>75 OMS</td>
<td></td>
<td>1        3</td>
<td>2</td>
<td>IV</td>
</tr>
<tr>
<td>Ethyl-3,3-di(t-butylperoxy) butyrate</td>
<td>75 OMS</td>
<td></td>
<td>2        2</td>
<td>2</td>
<td>IV</td>
</tr>
<tr>
<td>Ethyl-3,3-di(t-butylperoxy) butyrate</td>
<td>40 Clay or calcium silicate</td>
<td></td>
<td>1        3</td>
<td>2</td>
<td>V</td>
</tr>
<tr>
<td>p-Menthyl hydroperoxide</td>
<td>54 Alcohols and ketones</td>
<td>T</td>
<td>3</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Methyl ethyl ketone peroxide</td>
<td>9.0% AO DMP</td>
<td></td>
<td>3        2</td>
<td>2</td>
<td>III</td>
</tr>
<tr>
<td>Methyl ethyl ketone peroxide</td>
<td>5.5% AO DMP</td>
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<td>3        2</td>
<td>2</td>
<td>IV</td>
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<tr>
<td>Methyl ethyl ketone peroxide</td>
<td>9.0% AO Water and glycols</td>
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<td>3        2</td>
<td>2</td>
<td>IV</td>
</tr>
<tr>
<td>Organic Peroxide</td>
<td>Concentration</td>
<td>Diluent</td>
<td>Control</td>
<td>Emergency</td>
<td>Health</td>
</tr>
<tr>
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<td>---------------</td>
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<td>---------</td>
<td>-----------</td>
<td>--------</td>
</tr>
<tr>
<td>Methyl ethyl ketone peroxide and Cyclohexanone</td>
<td>9.0% AO</td>
<td>DMP</td>
<td>3</td>
<td>2</td>
<td>2</td>
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<tr>
<td>peroxide and peroxide mixture</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,4-Pentanedione peroxide</td>
<td>4.0% AO</td>
<td>Water and solvent</td>
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<td>1</td>
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<tr>
<td>Peroxyacetic acid, Type E, stabilized</td>
<td></td>
<td>Water, HOAc, and H₂O₂</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

1. These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49 CFR 173.225 for details.


4. Temperature control should be considered to reduce fire hazard depending on packaging size and recommendations in manufacturers’ literature.

Note: Diluents: AO — Active oxygen; BBP — Butyl benzyl phthalate; DBP — Dibutyl phthalate; DMP — Dimethyl phthalate; DOP — Dioctyl phthalate; DTBP — Di-tertiary-butyl peroxide; HOAc — Acetic acid; H₂O₂ — Hydrogen peroxide; OMS — Odorless mineral spirits; t-BuOH — Tertiary butanol.
<table>
<thead>
<tr>
<th>Organic Peroxide</th>
<th>Concentration</th>
<th>Diluent</th>
<th>Control °F</th>
<th>Control °C</th>
<th>Emergency °F</th>
<th>Emergency °C</th>
<th>Health</th>
<th>Flammability</th>
<th>Reactivity</th>
<th>Container</th>
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</thead>
<tbody>
<tr>
<td>t-Butyl hydroperoxide</td>
<td>90</td>
<td>Water &amp; t-BuOH</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>t-Butyl hydroperoxide</td>
<td>70</td>
<td>DTBP and t-BuOH</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>55 gal (208 L)</td>
</tr>
<tr>
<td>t-Butyl monoperoxymaleate</td>
<td>98</td>
<td>—</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>50 @ 1 lb (50 @ 0.5 kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Butyl peroxyacetate</td>
<td>75</td>
<td>OMS</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Butyl peroxyacetate</td>
<td>60</td>
<td>OMS</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Butyl peroxyisobutyrate</td>
<td>75</td>
<td>OMS</td>
<td>59</td>
<td>15</td>
<td>68</td>
<td>20</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>t-Butyl peroxyisopropyl carbonate</td>
<td>92</td>
<td>OMS</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dibenzoyl peroxide</td>
<td>98</td>
<td>—</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>1 lb (0.5 kg)</td>
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<tr>
<td>2,2-Di(t-butyl peroxy) butane</td>
<td>50</td>
<td>Toluene</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1 gal (4 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Di-sec-butyl peroxydicarbonate</td>
<td>98</td>
<td>—</td>
<td>14</td>
<td>-10</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1 gal (4 L)</td>
</tr>
<tr>
<td>1,1-Di(t-butyl peroxy)-3,3,5-trimethyl-cyclohexane</td>
<td>75-95</td>
<td>— — — — — —</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diisopropyl peroxydicarbonate</td>
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<td>—</td>
<td>23</td>
<td>-5</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>10 lb (4.5 kg)</td>
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<td>2,5-Dimethyl-2,5-dibenzovinylperoxy hexane</td>
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<td>— — — — — —</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4 @ 5 lb (4 @ 2.3 kg)</td>
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<tr>
<td>Di-n-propyl peroxydicarbonate</td>
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<td>—</td>
<td>5</td>
<td>-15</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1 gal (4 L)</td>
<td></td>
<td></td>
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<tr>
<td>Di-n-propyl peroxydicarbonate</td>
<td>85</td>
<td>OMS</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1 gal (4 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

1 These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49 CFR 173.225 for details.


3 Also a flammable liquid; see NFPA 30, *Flammable and Combustible Liquids Code*, for storage requirements.

Note: Diluents: OMS — Odorless mineral spirits; t-BuOH — Tertiary butanol.
<table>
<thead>
<tr>
<th>Organic Peroxide</th>
<th>Concentration</th>
<th>Diluent</th>
<th>Recommended Maximum Temperature</th>
<th>Hazard Identification</th>
<th>Container</th>
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<td></td>
<td></td>
<td>Control °F</td>
<td>°C</td>
<td>Emergency °F</td>
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<td>t-Amyl peroxybenzoate</td>
<td>96</td>
<td>—</td>
<td>77  25</td>
<td>0  3</td>
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<tr>
<td>t-Amyl peroxy-2-ethylhexanoate</td>
<td>96</td>
<td>—</td>
<td>68  20</td>
<td>1  3</td>
<td>2</td>
</tr>
<tr>
<td>t-Amyl peroxynoedecanoate</td>
<td>75</td>
<td>OMS</td>
<td>32  0</td>
<td>1  3</td>
<td>2</td>
</tr>
<tr>
<td>t-Amyl peroxypivalate</td>
<td>75</td>
<td>OMS</td>
<td>50  15</td>
<td>1  3</td>
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<td>n-Butyl-4,4-di(t-butylperoxy) valerate</td>
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<td>77  25</td>
<td>0  3</td>
<td>2</td>
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<tr>
<td>t-Butyl hydroperoxide</td>
<td>30</td>
<td>DTBP and t-BuOH</td>
<td>3  3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>t-Butyl peroxybenzoate</td>
<td>98</td>
<td>—</td>
<td>77  25</td>
<td>0  3</td>
<td>2</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate</td>
<td>97</td>
<td>—</td>
<td>68  20</td>
<td>1  3</td>
<td>2</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexyl carbonate</td>
<td>95</td>
<td>—</td>
<td>50  10</td>
<td>1  3</td>
<td>2</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexyl carbonate</td>
<td>92</td>
<td>—</td>
<td>68  20</td>
<td>1  3</td>
<td>2</td>
</tr>
<tr>
<td>t-Butyl peroxyisobutyrate</td>
<td>75</td>
<td>OMS</td>
<td>50  15</td>
<td>2  3</td>
<td>2</td>
</tr>
<tr>
<td>t-Butylperoxyisopropyl carbonate</td>
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<td>32  0</td>
<td>2  3</td>
<td>2</td>
</tr>
<tr>
<td>t-Butyl peroxynoedecanoate</td>
<td>75</td>
<td>OMS</td>
<td>32  0</td>
<td>2  3</td>
<td>2</td>
</tr>
<tr>
<td>t-Butyl peroxypivalate</td>
<td>75</td>
<td>OMS</td>
<td>32  0</td>
<td>2  3</td>
<td>2</td>
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<td>OMS</td>
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<td>2  3</td>
<td>2</td>
</tr>
<tr>
<td>Cumyl peroxynoheptanoate</td>
<td>75</td>
<td>OMS</td>
<td>32  0</td>
<td>2  3</td>
<td>2</td>
</tr>
<tr>
<td>Diacetyl peroxide</td>
<td>25</td>
<td>DMP</td>
<td>68  20</td>
<td>2  3</td>
<td>2</td>
</tr>
<tr>
<td>1,1-Di(t-amylperoxy) cyclohexane</td>
<td>80</td>
<td>OMS or BBP</td>
<td>77  25</td>
<td>2  3</td>
<td>2</td>
</tr>
<tr>
<td>Dibenzyl peroxide</td>
<td>78</td>
<td>Water</td>
<td>50  10</td>
<td>2  3</td>
<td>2</td>
</tr>
<tr>
<td>Di(4-t-butylcyclohexyl) peroxycarbonate</td>
<td>98</td>
<td>—</td>
<td>86  30</td>
<td>1  3</td>
<td>2</td>
</tr>
<tr>
<td>Di-t-butyl peroxide&lt;sup&gt;3&lt;/sup&gt;</td>
<td>99</td>
<td>—</td>
<td>86  30</td>
<td>1  3</td>
<td>2</td>
</tr>
<tr>
<td>1,1-Di(t-butylperoxy) cyclohexane</td>
<td>80</td>
<td>OMS or BBP</td>
<td>95  35</td>
<td>1  3</td>
<td>2</td>
</tr>
<tr>
<td>Di-sec-butyl peroxycarbonate</td>
<td>98</td>
<td>—</td>
<td>86  30</td>
<td>1  3</td>
<td>2</td>
</tr>
<tr>
<td>Didecanoyl peroxide</td>
<td>98</td>
<td>—</td>
<td>86  30</td>
<td>1  3</td>
<td>2</td>
</tr>
<tr>
<td>1,1-Di(t-butyperoxy) 3,3,5-trimethyl cyclohexane</td>
<td>75.05</td>
<td>—</td>
<td>86  30</td>
<td>1  3</td>
<td>2</td>
</tr>
</tbody>
</table>
Table F.3.3  Typical Class II Formulations (continued)

<table>
<thead>
<tr>
<th>Organic Peroxide</th>
<th>Concentration</th>
<th>Diluent</th>
<th>Control</th>
<th>Emergency</th>
<th>Hazard Identification</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>°F</td>
<td>ºC</td>
<td>Health</td>
<td>Flammability</td>
</tr>
<tr>
<td>Di(2-ethylhexyl) peroxydicarbonate</td>
<td>97</td>
<td>—</td>
<td>−4</td>
<td>−20</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di-(t-butylperoxy)</td>
<td>92</td>
<td>—</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>hexane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di-(2-ethylhexanoylperoxy) hexane</td>
<td>90</td>
<td>—</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-dihydroperoxy hexane</td>
<td>95</td>
<td>2,3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-dihydroperoxy hexane</td>
<td>70 Water</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Ethyl-3,3-di (t-amylperoxy) butyrate</td>
<td>75 OMS</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Ethyl-3,3-di (t-butylperoxy) butyrate</td>
<td>75 OMS</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

1 These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49 CFR 173.225 for details.


3 Also a flammable liquid; see NFPA 30, *Flammable and Combustible Liquids Code*, for storage requirements.

Note: Diluents: BBP — Butyl benzyl phthalate; DMP — Dimethyl phthalate; DTBP — Di-tertiary-butyl peroxide; OMS — Odorless mineral spirits; t-BuOH — Tertiary butanol.
<table>
<thead>
<tr>
<th>Organic Peroxide</th>
<th>Concentration</th>
<th>Diluent</th>
<th>Control °F</th>
<th>Control °C</th>
<th>Emergency °F</th>
<th>Emergency °C</th>
<th>Health</th>
<th>Flammability</th>
<th>Reactivity</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-Amyl hydroperoxide</td>
<td>88</td>
<td>Water</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>55 gal (208 L)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Amyl peroxycetate</td>
<td>60</td>
<td>OMS</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Butyl cumyl peroxide</td>
<td>95</td>
<td>—</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>55 gal (208 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Butyl hydroperoxide</td>
<td>70</td>
<td>Water</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>55 gal (208 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate</td>
<td>50</td>
<td>DOP or OMS</td>
<td>86</td>
<td>30</td>
<td>95</td>
<td>35</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>t-Amyl peroxy-2-ethylhexanoate</td>
<td>96</td>
<td>—</td>
<td>68</td>
<td>20</td>
<td>77</td>
<td>25</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>55 gal (208 L)</td>
</tr>
<tr>
<td>t-Amyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>32</td>
<td>0</td>
<td>50</td>
<td>10</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate</td>
<td>97</td>
<td>—</td>
<td>68</td>
<td>20</td>
<td>77</td>
<td>25</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexyl carbonate</td>
<td>95</td>
<td>—</td>
<td>68</td>
<td>20</td>
<td>77</td>
<td>25</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>t-Butyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>32</td>
<td>0</td>
<td>50</td>
<td>10</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>Cumyl hydroperoxide</td>
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<td>Cumene</td>
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<td>55 gal (208 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>32</td>
<td>0</td>
<td>50</td>
<td>10</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>Cumyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>32</td>
<td>0</td>
<td>50</td>
<td>10</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>1,1-Di(t-amylperoxy)cyclohexane</td>
<td>80</td>
<td>OMS or BBP</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dibenzyloperoxide</td>
<td>75</td>
<td>Water</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>25 lb (11 kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dibenzyloperoxide (paste)</td>
<td>55</td>
<td>Plasticizer</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>350 lb (160 kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dibenzyloperoxide (paste)</td>
<td>50</td>
<td>Plasticizer</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>380 lb (170 kg)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Di(4-t-butylcyclohexyl) peroxygicarbonate</td>
<td>98</td>
<td>—</td>
<td>86</td>
<td>30</td>
<td>95</td>
<td>35</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>88 lb (40 kg)</td>
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<tr>
<td>Di-t-butyl peroxide</td>
<td>98</td>
<td>—</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>55 gal (208 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Di(2,2-t-butylperoxyisopropyl) benzene</td>
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<td>1</td>
<td>2</td>
<td>2</td>
<td>100 lb (45 kg)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Didecanoyl peroxide</td>
<td>98</td>
<td>—</td>
<td>86</td>
<td>30</td>
<td>95</td>
<td>35</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>50 lb (22 kg)</td>
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<tr>
<td>Di-2,4-dichlorobenzoyl peroxide</td>
<td>50</td>
<td>DBP and silicone</td>
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<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diisopropyl peroxydicarbonate</td>
<td>30</td>
<td>Toluene</td>
<td>14</td>
<td>−10</td>
<td>32</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>5 lb (2.3 kg)</td>
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<tr>
<td>Dilauroyl peroxide</td>
<td>98</td>
<td>—</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>110 lb (50 kg)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>p-Menthyl hydroperoxide</td>
<td>54</td>
<td>Alcohols and ketones</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>55 gal (208 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic Peroxide</td>
<td>Concentration</td>
<td>Diluent</td>
<td>Control</td>
<td>Emergency</td>
<td>Hazard Identification</td>
<td>Container</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>---------------</td>
<td>-----------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------------------</td>
<td>-----------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,5-Dimethyl 2,5-di(t-buty1peroxy) hexane</td>
<td>92</td>
<td>—</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>30 gal (110 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,5-Dimethyl 2,5-di(2-ethyl hexanoylperoxy)</td>
<td>90</td>
<td>—</td>
<td>20</td>
<td>25</td>
<td>0</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethyl 3,3-di(t-amylperoxy) butyrate</td>
<td>75</td>
<td>OMS</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethyl 3,3-di(t-butylperoxy) butyrate</td>
<td>75</td>
<td>OMS</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl ethyl ketone peroxide</td>
<td>9.0% AO</td>
<td>DMP</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl ethyl ketone peroxide and Cyclohexanone</td>
<td>9.0% AO</td>
<td>DMP</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,4-Pentanedione peroxide</td>
<td>4.0% AO</td>
<td>Water and solvent</td>
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<td>1</td>
<td>5 gal (19 L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49 CFR 173.225 for details.


3 Also a flammable liquid; see NFPA 30, Flammable and Combustible Liquids Code, for storage requirements.

4 T — Temperature control should be considered to reduce fire hazard depending on packaging size and recommendations in manufacturers’ literature.

Note: Diluents: AO — Active oxygen; BBP — Butyl benzyl phthalate; DBP — Dibutyl phthalate; DMP — Dimethyl phthalate; DOP — Diocyl phthalate; OMS — Odorless mineral spirits.
<table>
<thead>
<tr>
<th>Organic Peroxide</th>
<th>Concentration</th>
<th>Diluent</th>
<th>Control °F</th>
<th>Control °C</th>
<th>Emergency °F</th>
<th>Emergency °C</th>
<th>Health</th>
<th>Flammability</th>
<th>Reactivity</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-Butyl cumyl peroxide</td>
<td>95</td>
<td>—</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>55 gal (208 L)</td>
</tr>
<tr>
<td>t-Butyl hydroperoxide</td>
<td>70</td>
<td>Water</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>55 gal (208 L)</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate</td>
<td>60</td>
<td>DOP or OMS</td>
<td>86</td>
<td>30</td>
<td>95</td>
<td>25</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>t-Butyl peroxypivalate</td>
<td>45</td>
<td>OMS</td>
<td>32</td>
<td>2</td>
<td>50</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>Dibenzoyl peroxide</td>
<td>70</td>
<td>Water</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>25 lb (11 kg)</td>
</tr>
<tr>
<td>Dibenzoyl peroxide</td>
<td>55</td>
<td>Plasticizer and water</td>
<td>T</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>350 lb (160 kg)</td>
</tr>
<tr>
<td>Dibenzoyl peroxide</td>
<td>50</td>
<td>Plasticizer and water</td>
<td>T</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>380 lb (170 kg)</td>
</tr>
<tr>
<td>Dibenzoyl peroxide</td>
<td>40</td>
<td>Water and plasticizer</td>
<td>T</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>380 lb (170 kg)</td>
</tr>
<tr>
<td>Dibenzoyl peroxide</td>
<td>40</td>
<td>Water</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>Dibenzoyl peroxide</td>
<td>35</td>
<td>Starch</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>100 lb (45 kg)</td>
</tr>
<tr>
<td>Di(t-butylperoxy) phthalate</td>
<td>40</td>
<td>DBP</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>30</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>30 gal (110 L)</td>
</tr>
<tr>
<td>Dicetyl peroxycarbonate</td>
<td>85</td>
<td>—</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>44</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>44 lb (20 kg)</td>
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<tr>
<td>Dicumyl peroxide</td>
<td>98</td>
<td>—</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>55 gal (208 L)</td>
</tr>
<tr>
<td>Di(2-ethylhexyl) peroxycarbonate</td>
<td>40</td>
<td>OMS</td>
<td>5</td>
<td>−15</td>
<td>23</td>
<td>−5</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>Dilauroyl peroxide</td>
<td>95</td>
<td>—</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>110</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>110 lb (50 kg)</td>
</tr>
<tr>
<td>2-Menthyl hydroperoxide</td>
<td>54</td>
<td>Alcohols and ketones</td>
<td>T</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>55 gal (208 L)</td>
</tr>
<tr>
<td>Methyl ethyl ketone peroxide</td>
<td>55% AO</td>
<td>DMP</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>Methyl ethyl ketone peroxide</td>
<td>9.0% AO</td>
<td>Water and glycols</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
<tr>
<td>2,4-Pentanedione peroxide</td>
<td>4.0% AO</td>
<td>Water and solvent</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>55</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>5 gal (19 L)</td>
</tr>
</tbody>
</table>

1 These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49 CFR 173.225 for details.


T — Temperature control should be considered to reduce fire hazard depending on packaging size and recommendations in manufacturers’ literature.

Note: Diluents: DBP—Dibutyl phthalate; DMP—Dimethyl phthalate; DOP—Dioctyl phthalate; OMS—Odorless mineral spirits; AO—Active oxygen.
<table>
<thead>
<tr>
<th>Organic Peroxide</th>
<th>Concentration</th>
<th>Diluent</th>
<th>Control °F</th>
<th>Control °C</th>
<th>Emergency °F</th>
<th>Emergency °C</th>
<th>Hazard Identification</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dibenzoyl peroxide (powder)</td>
<td>35</td>
<td>Dicalcium phosphate dehydrate or calcium sulfate dihydrate</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100 lb (45 kg)</td>
<td>100 lb (45 kg)</td>
</tr>
<tr>
<td>Di(2-t-butylperoxyisopropyl) benzene</td>
<td>40</td>
<td>clay</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>100 lb (45 kg)</td>
<td>100 lb (45 kg)</td>
</tr>
<tr>
<td>1,1-Di(t-butylperoxy)-3,3,5-trimethylcyclohexane</td>
<td>40</td>
<td>Calcium carbonate</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>100 lb (45 kg)</td>
<td>100 lb (45 kg)</td>
</tr>
<tr>
<td>Dicumyl peroxide</td>
<td>40</td>
<td>Clay or calcium carbonate</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>100 lb (45 kg)</td>
<td>100 lb (45 kg)</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di(t-butylperoxy) hexane</td>
<td>47</td>
<td>Calcium carbonate or silica</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>100 lb (45 kg)</td>
<td>100 lb (45 kg)</td>
</tr>
<tr>
<td>Ethyl-3,3-di(t-butylperoxy)butyrate</td>
<td>40</td>
<td>Clay or calcium silicate</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>100 lb (45 kg)</td>
<td>100 lb (45 kg)</td>
</tr>
</tbody>
</table>

1 These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49 CFR 173.225 for details.


AO — Active oxygen.

**Statement of problem:** The current classification of the products being changed was found to be incorrect and non-conservative based on the latest testing and other information on these materials. The incorrect classifications results in inconsistent ranking when compared with listings by other international code organizations resulting in confusion for the users. Since all changes are in the direction of higher hazard, improvements on individual sites may be required to safely store the affected materials.

Previously the storage classification for organic peroxide formulations was based upon consideration of incidents involving said formulations, along with expert opinion of technically oriented individuals from the NFPA committee. OPPSD now recommends a more objective and globally consistent method for such classification. The Dutch Code PG S8 (Organic peroxides: Storage, Guideline for the labour-safe, environment safe and fire-safe storage of organic peroxides, December 2011) and similar European classification systems are based on transport classification (United Nations Guideline) in addition to burning rate measured using either large or small scale burning tests.

In addition there are two chemicals listed in container sizes no longer allowed for transport.

**Submitter’s Substantiation:** The Organic Peroxide Producers’ Safety Division (OPPSD) of the Society of the Plastics Industry (SPI) offers comments related to NFPA 400 Hazardous Materials Code. These comments are specifically related to Chapter 14, Organic Peroxide Storage. They reflect the expert opinion of the OPPSD members: AkzoNobel, Arkema, LyondellBasell, Pergan, Syrgis and United Initiators.

The OPPSD recently reviewed the current table of storage classifications for organic peroxide formulations found as Annex F: Typical Organic Peroxide Formulations in NFPA 400. The text of Chapter 14 of NFPA 400 allows classification to be made by parties with technical awareness of these formulations. Additionally Appendix A.14.1.1 of NFPA 400 states: “…each organic peroxide formulation is to be classified with respect to quantity and type of container. Classification should be done by professionals familiar with the properties of the organic peroxide formulation. Property information used for classification of organic peroxide formulations for UN Transportation of Dangerous Goods can be useful for the NFPA 400 classification. Other useful information includes density, small fire test data and fire data for response to sprinkler conditions.” As an association of manufacturers of organic peroxides, the OPPSD meets this requirement.
The storage classifications listed in the 2010 revision of NFPA 400 were reviewed in relation to a similar list of formulations found in European guidance documents as well as having knowledge of the data from which the classifications were developed. The new listing criteria have been expanded to include tests to rate the burning characteristics in simulated storage configurations that had not been included in the original UN classification system.

As a result of the review the OPPSD suggests changes to the storage classification and the recommendations are made after careful and thorough discussion amongst its members.

This material was discussed by a small NFPA 400 Task Group that included two other committee members in addition to the submitters and two interested outside participants. They agreed that this material should be submitted as a TIA.

Two additional corrections were made to Tables due to changes in container sizes allowed for transport. In one case the container size was eliminated completely and therefore the entry completely deleted from the tables. In the second case the allowable container size was decreased and the tables were corrected to reflect the smaller container size that is currently allowed.

Emergency Nature: The proposed TIA intends to correct a previously unknown existing hazard.
TIA FINAL BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the final results show this TIA **HAS NOT** achieved the necessary votes on both Question 1 (**Technical Merit**) and Question 2 (**Emergency Nature**).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is **16**.

\[
[28 \text{ (eligible to vote)} - 6 \text{ (not returned)} - 1 \text{ (abstention)}] = 21 \times 0.75 = 15.75
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
[28 \text{ eligible} \div 2 = 14 + 1 = 15 \text{ (this is the simple majority)}]
\]

---

**28 Eligible to Vote**
**6 Not Returned (Gardner, Guidry, Hsu, Pokorny, Shepard, Wallace)**

**TC FINAL** Ballot results for **Technical Merit** are as follows:

11 Agree (Fash w/comment)
10 Disagree (DerKinderen, Fluer, Franklin, Gresho, James, Key, Kilpatrick, Lee, Ngai, Pierrottie)
1 Abstention (Cope)

**FINAL ACTION: FAILED**

The number of affirmative votes needed to obtain a recommendation to issue the TIA is **15**.

\[
[28 \text{ (eligible to vote)} - 6 \text{ (not returned)} - 2 \text{ (abstentions)}] = 20 \times 0.75 = 15.0
\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
[28 \text{ eligible} \div 2 = 14 + 1 = 15 \text{ (this is the simple majority)}]
\]

**TC FINAL** Ballot results for **Emergency Nature** are as follows:

12 Agree
8 Disagree (Fluer, Franklin, Gresho, James, Key, Kilpatrick, Lee, Pierrottie)
2 Abstentions (Cope, Ngai)

**FINAL ACTION: FAILED**
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT Revised LOG NO. 1072
To Revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3 of the Proposed 2013 Edition of
NFPA 400
Hazardous Materials Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3

______ AGREE  _______ DISAGREE* _______ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Disagree to the extent of doublechecking the organic peroxide class changes of those highlighted in the attached. They differ when compared to DOT classification. Also, if within scope doublecheck recommended max temps for Cetyl peroxynitrite heptanoate. Control -10C? Emerg 0C?

Question 2: I agree that the subject is of an EMERGENCY NATURE.

______ AGREE  _______ DISAGREE* _______ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

______________________________
Signature

______________________________
Name (Please Print)

8/13/12
Date

Please return the ballot on or before Monday, August 13, 2012.

PLEASE RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7110  E-mail: jgooyette@nfpa.org

October 24, 2012  Supplemental Agenda October 29-30, 2012  Page 89 of 951
Table of Organic Peroxides (Annex F-1) Changes

<table>
<thead>
<tr>
<th>Organic Peroxide</th>
<th>Concentration</th>
<th>Diluent</th>
<th>Current Class</th>
<th>New Class</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-Amyl peroxy-2-ethylhexanoate</td>
<td>96</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>55 gal</td>
</tr>
<tr>
<td>t-Amyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Amyl peroxyvalerate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butyl cumyl peroxide</td>
<td>95</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>55 gal</td>
</tr>
<tr>
<td>t-Butyl hydroperoxide</td>
<td>70</td>
<td>DTBP and t-BuOH</td>
<td>III</td>
<td>I high $?$</td>
<td>55 gal</td>
</tr>
<tr>
<td>t-Butyl hydroperoxide</td>
<td>70</td>
<td>Water</td>
<td>III</td>
<td>II</td>
<td>55 gal</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate</td>
<td>97</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate DELETED THIS LISTING</td>
<td>97</td>
<td></td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexanoate</td>
<td>50</td>
<td>DOP or OMS</td>
<td>III</td>
<td>I 5 gal</td>
<td></td>
</tr>
<tr>
<td>t-Butyl peroxy-2-ethylhexyl carbonate</td>
<td>95</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butyl peroxyisobutyrate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>t-Butyl peroxyvalerate</td>
<td>45</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>Cumyl peroxyneodecanoate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>Cumyl peroxyneohetanoate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II</td>
<td>5 gal</td>
</tr>
<tr>
<td>1,1-Di(t-amyloperoxy) cyclohexane</td>
<td>80</td>
<td>OMS or BBP</td>
<td>III</td>
<td>II 5 gal</td>
<td></td>
</tr>
<tr>
<td>Dิ (4-t-butylcyclohexyl peroxydicarbonate)</td>
<td>98</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>88 lb</td>
</tr>
<tr>
<td>Dิ t-butyl peroxide</td>
<td>99</td>
<td>-</td>
<td>III</td>
<td>II</td>
<td>high $?$</td>
</tr>
<tr>
<td>Dิ sec-butyl peroxydicarbonate</td>
<td>98</td>
<td>-</td>
<td>III</td>
<td>I high $?$</td>
<td>55 gal</td>
</tr>
<tr>
<td>1,1-Di( t-butylperoxy)-3,3,5-trimethyl-cyclohexane</td>
<td>75-95</td>
<td>-</td>
<td>III</td>
<td>I high $?$</td>
<td>1 gal</td>
</tr>
<tr>
<td>Didecanoyl peroxide</td>
<td>98</td>
<td>-</td>
<td>III</td>
<td>I 5 gal</td>
<td></td>
</tr>
<tr>
<td>Dilauroyl peroxide</td>
<td>98</td>
<td>-</td>
<td>III</td>
<td>I 5 gal</td>
<td></td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-dibenzoyl peroxyhexane</td>
<td>95</td>
<td>-</td>
<td>III</td>
<td>I @5 lb</td>
<td>4 lb</td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di(t-butylperoxy) hexane</td>
<td>92</td>
<td>-</td>
<td>III</td>
<td>I 5 gal</td>
<td></td>
</tr>
<tr>
<td>2,5-Dimethyl-2,5-di(t-ethylhexanoxy peroxy) hexane</td>
<td>90</td>
<td>-</td>
<td>III</td>
<td>II 5 gal</td>
<td></td>
</tr>
<tr>
<td>Ethyl-3,3-di(t-amyloperoxy) butyrate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II 5 gal</td>
<td></td>
</tr>
<tr>
<td>Ethyl-3,3-di(t-butylperoxy) butyrate</td>
<td>75</td>
<td>OMS</td>
<td>III</td>
<td>II 5 gal</td>
<td></td>
</tr>
<tr>
<td>p-Methyl hydroperoxide</td>
<td>54</td>
<td>Alcohols and ketones</td>
<td>III</td>
<td>55 gal</td>
<td></td>
</tr>
<tr>
<td>2,4-Pentanedione peroxide</td>
<td>40% AO</td>
<td>Water and solvent</td>
<td>III</td>
<td>5 gal</td>
<td></td>
</tr>
</tbody>
</table>

October 24, 2012
Supplemental Agenda October 29-30, 2012
Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3

___________ AGREE    X    DISAGREE*    __________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

See attached.


Question 2: I agree that the subject is of an EMERGENCY NATURE.

___________ AGREE    X    DISAGREE*    __________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

See attached.

________________________________________
Signature
Larry L Fluer

Name (Please Print)
8/6/12

Date

Please return the ballot on or before Monday, August 13, 2012.

PLEASE RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110   E-mail: jgoyette@nfpa.org
Reasons in support of Negative Ballot TIA #1072 Organic Peroxide Classification – Technical Basis

1. Consensus Process

A proposal to reclassify certain materials was the subject of ROC Item 400-22 Log #1 which was rejected by the technical committee for the reason provided in the committee statement as follows:

*The Committee has determined that the proposed changes to Table F.1 and related content in Annex F, represents significant new material introduced at the comment stage, and as such, per the NFPA Regulations Governing Committee Projects, should be HELD for action at the next revision cycle. If the Committee were to act on this material at this stage, it would not provide any opportunity for the public to review and comment. The Chair has established a Task Group on Organic Peroxides that will address this recommendation and other potential changes to Chapter 14 for application within the code for consideration as either a TIA or at the next revision cycle. The Committee also noted that the basis for much of this input by the submitter focuses on storage but the Committee through the task group work should also examine the use implications.*

The meeting minutes of November 4, 2012 for the October 25-26 ROC meeting reflect the following actions:

*Based on discussions following Paul Iacobucci's presentation on the organic peroxide work and his Public Comment, a task group has been established to assess the information provided by Paul in his presentation and to prepare a strategy for including updates based on this work in NFPA 400. The task group will review the material from his presentation and propose a strategy to the Committee with input provided by March 2012, in advance of a tentative April or May 2012 conference call for the full Committee. The Committee agreed that the best plan going forward will be to take the input from the task group and use it for the development of a TIA that would be applicable to the 2013 edition of the code. In addition to the classification and storage quantities in Annex F.1, the task group will also review and recommend changes for the organic peroxide tables in Chapter 14. Henry Febo offered to lead this group and is joined by Paul Iacobucci, Joyce Miles (or ACC representative), and Elizabeth Buc.*

There was no further contact with the committee in the interim. In the substantiation offered in support of the TIA the proponents make the following comment in pertinent part as follows:

Reasons in Support of Disagreement TIA #1072
L. Fluer
8/6/12
“This material was discussed by a small NFPA 400 Task Group that included two other committee members in addition to the submitters and two interested outside participants. They agreed that this material should be submitted as a TIA.”

**Conclusion:** 1) There was no task group report that was shared with the full committee. 2) There was no conference call with the full committee noted to have been held in April or May of 2012 to discuss the findings, and 3) The members of the task group and their interests have not been identified to the committee or the public, and 4) as a result of the actions taken in 1) and 2) above there was no opportunity provided for technical input from committee members other than those who were on the task group.

**2. Quantity Limits:** The submitter relies on the following as stated in the substantiation in pertinent part as follows:

- OPPSD now recommends a more objective and globally consistent method for such classification.
- The Dutch Code PG28 (*Organic peroxides: Storage, Guideline for the labour-safe, environment safe, and fire-safe storage of organic peroxides, December 2011*) and similar European classification systems are based on transport classification (United Nations Guideline) in addition to burning rate measured using either large or small scale burning tests.
- The new listing criteria have been expanded to include tests to rate the burning characteristics in simulated storage configurations that had not been included in the original UN classification system.

It should be understood that the classification system used in Chapter 14 of NFPA 400 is a “package dependent” system of classification. That is the classification is based on the size (quantity) and the assumed type of shipping container. The Dutch Guidelines take a similar approach with further explanation as follows: (underlining below for emphasis)

*Both a bigger packaging unit and a higher storage temperature lead to an increase in heat development and/or a reduction in heat transfer. Storage for a long period of time may accelerate decomposition by autocatalysis.*

*In addition to the organic peroxide type, the degree of containment also determines the effect of a runaway reaction. In a plastic package upon decomposition of the organic peroxide the wall of the package will be weakened by exposure to the high temperature. As a result the package will rupture at an early stage in the runaway reaction, at relatively low pressure. In the case of a*
metal storage container, if there is an insufficient relief vent facility a high pressure is reached. If the design pressure of the metal vessel is exceeded the vessel will explode violently. In all cases hot flammable vapours will be released which may ignite spontaneously. Furthermore the vapour cloud released may lead to a second (gas/vapour) explosion due to spontaneous combustion or contact with an external ignition source.¹

And…


Reasons in Support of Disagreement TIA #1072
L. Fluer
8/6/12

The classification is based on the assumption that organic peroxides are only stored in the transport packaging permitted by law in the Netherlands.²

The proposed changes to the first seven items contained in the TIA as Annex F-1 “Table of Organic Peroxides (Annex F-1 (Changes) were compared to the classifications listed in the December 2011 Edition of the Dutch Guidelines³ with the following results:

<table>
<thead>
<tr>
<th>Material</th>
<th>New Class</th>
<th>Dutch Code PG S 8 Class/UN No.</th>
<th>Proposed or Existing Container Capacity</th>
<th>Dutch Code PG S 8 Container Capacity (L – liters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-amyl peroxypivalate</td>
<td>II</td>
<td>2/3113</td>
<td>5 gal (19 L)</td>
<td>60 L (16 gal)</td>
</tr>
<tr>
<td>t-butyl hydroperoxide DTBP and T-BuOH diluent</td>
<td>II</td>
<td>1/3105</td>
<td>55 gal (208 L)</td>
<td>60 L (16 gal)</td>
</tr>
<tr>
<td>t-butyl peroxy-2-ethylhexanoate</td>
<td>II</td>
<td>2/3113</td>
<td>5 gal (19 L)</td>
<td>60 L (16 gal)</td>
</tr>
</tbody>
</table>

There are unexplained conflicts raised by the TIA between the classification and package size. The Dutch regulations limit the size through the use of a “packing method” which by definition is the Maximum size of the package as defined in the transport legislation.

As illustrated in the table above t-butyl hydroperoxide with DTBP and T-BuOH diluent and a classification of Class I is limited to a container of up to 16 gallons in size. The TIA allows the size of the container to be up to 55 gallons in size.
Conversely, t-amyl peroxyvalerate under the Dutch regulations is allowed to be in containers up to 16 gallons in size, while the TIA limits the containers to a maximum of 5 gallons.

**Conclusion:**

- Each of the items in the table above (of the first 7 reviewed) illustrate apparent inconsistencies with respect to the container specified. No information is provided in the TIA to address the apparent inconsistencies.
- The substantiation provided states that...

  …*The new listing criteria have been expanded to include tests to rate the burning characteristics in simulated storage configurations that had not been included in the original UN classification system.*

  - No listing criterion other than the way a material is listed in the table has been provided. Neither the tests performed nor the standards used to perform the tests have been referenced nor have they been included.
  - The TIA does not contain either a test method, or reference to a test method to be used.
  - No guidance is provided for the classification of materials that may be in a different size of container, or which do not appear on the list.

- It may be appropriate for the task group to continue to work to address unresolved issues before advocating for a TIA that is not code ready.

**Reasons in support of Negative Ballot TIA #1072 Organic Peroxide Classification – Emergency Basis**

The sole justification offered for the declaration of an emergency basis is that the TIA intends to correct a previously unknown existing hazard. It appears that the correlation of US Codes with European “Guidelines” using objective test methodology is a driving issue. However, a brief review of the container sizes used in the European Guidelines when compared with the container sizes referenced in the Annex demonstrate that the classification schemes are not correlated.

One cannot isolate the issue of classification without taking into account the type and the size of the containers which are used for storage. In addition, a classification system that is based on stored containers alone does not assist the user or the AHJ with determining or applying a classification for these same materials when they are in use. The meeting minutes from the October 2011 ROC meeting reflect the need to address the classification of materials in use as well as those in storage.

Reasons in Support of Disagreement TIA #1072
L. Fluer
8/6/12
Acceptance of the TIA suggests that major problems in the classification system are resolved by following the European lead. The use of an objective means for classification is of merit; however, the work raises a number of questions not answered by the TIA. The task force is encouraged to present a complete picture that addresses the shortcomings in the current classification and the container sizing system.

- It is difficult to understand how changing the classification for a formulation in a table without changing the definitional basis for these materials as found in 3.3.67 is warranted.
- In addition, the user of NFPA 400 is given no guidance as to how the formulations in the table have been classified and related to container size as a test methodology is not referenced.

Accepting that the TIA rises to a level of emergency in the classification of these 28 materials based on a comparison to the Dutch and similar unnamed European Guidelines is questionable. While the work to adopt an objective classification system in fact needs to be done, it appears to be incomplete and acceptance at this stage of development is premature. The major deficits in the classification system appear to be:

- The lack of a consensus test standard,
- Lack of consideration of container size (as compared with the methods of classification based on reactivity and burning rate),
- Lack of guidance for the code user as to how to classify materials that are removed from the original shipping container.

The implication that public safety is enhanced by passing this TIA as an emergency measure is not substantiated by the rationale as presented. Further work is needed before such a measure is code ready.
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT Revised LOG NO. 1072
To Revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3 of the Proposed 2013 Edition of NFPA 400
Hazardous Materials Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3

AGREE     X     DISAGREE*     ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.
The changes represent significant new material that the Committee previously agreed should be presented and reviewed by full committee in a meeting or teleconference, but there has been no opportunity for full committee review.

Question 2: I agree that the subject is of an EMERGENCY NATURE.

AGREE     X     DISAGREE*     ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.
Based on outstanding technical questions and inconsistencies identified by other dissenters, the TIA should not be passed on an emergency basis at this time.

Signature
Kathleen Franklin

Name (Please Print)
Kathleen Franklin representing USEPA as alternate for Jim Belke

Date
8-14-12

Please return the ballot on or before Monday, August 13, 2012.

PLEASE RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110 E-mail: jgoyette@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT Revised LOG NO. 1072
To Revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3 of the Proposed 2013 Edition of
NFPA 400
Hazardous Materials Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3

_________ AGREE   _______ DISAGREE*   _______ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

See attached

Question 2: I agree that the subject is of an EMERGENCY NATURE.

_________ AGREE   _______ DISAGREE*   _______ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

See attached

[Signature]
Martin Gresho
Name (Please Print)
8/8/12
Date

Please return the ballot on or before Monday, August 13, 2012.

PLEASE RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7110
E-mail: Jgoyette@nfpa.org
NFPA 400 TIA Log 1072,

Explanation of Martin Gresho Votes

Technical Merits: Respectfully, I do not support the technical merit of this TIA as submitted. I am unsure about both the ranking criteria and the qualification of the (non-NFPA 400) group making the classification changes. It is not clear how the technical changes were developed or if the NFPA 400 Task Group was involved. No Task Group report or meeting minutes were circulated prior to the ballot and no discussion with the full TC was presented. The substantiation offered essentially requires TC members to “trust” the recommendations of a non-NFPA 400 group (the OPPSD). There is no published report or any proceedings available upon which to base or verify the ranking recommended by the OPPSD.

The ranking method used by the OPPSD is not clear. It is not clear whether they used the existing NFPA 400 definitions (NFPA 400: §3.3.67.1 – 3.3.67.5) or a proposed “new” ranking method that is not currently in NFPA 400. The proponent claims that the existing NFPA 400 ranking method is flawed and needs updating so the actual method used in this reclassification is unclear. It appears that a different ranking method was used.

I made clarifying inquiries with the proponent but the explanation offered, though appreciated, was still unclear. (Correspondence chain pasted in below).

I appreciate the work of the Task Group and encourage them to further develop this proposal. One possible method for improvement would be to make clear changes to the ranking methodology first, then offer explanations as needed in the form of Annex A notes, and finally updating the informational Annex F examples table based on some form of report or letter from the OPPSD and endorsed by the Task Group stating the methodology used.

Emergency Nature: I am not convinced that the information contained in this unenforceable, informational Annex warrants an emergency action. The safety impact of this change was not presented in the substantiation.

Correspondence Chain

Question Email #1:

From: Marty Gresho [mailto:marty@fp2fire.com]
Sent: Thursday, July 26, 2012 11:01 AM
To: Febo, Henry
Cc: ‘Pearce, Nancy’
Subject: FW: NFPA 400, TIA Log No. 1072, TC Ballot Package

Hello Henry,

Thanks for taking the initiative to prepare this TIA. Great stuff.
As I read through the substantiation there are two things that come to mind that you may be able to shed some light on and assist me in casting my vote.

1. What are the qualifications of the group that is suggesting the changes to the classification examples? Is this a group that we should accept as an authority in this matter? Did they produce a peer reviewed report that can be referenced?

2. How is Annex material that is essentially for reference only worthy of an emergency action? I suppose it is the non conservative current classification. The answer to #1 will help here as well.

If it will help the TC, feel free to share this interaction with them as well.

Thanks Henry.

Martin T Gresho, PE
FP2FIRE, INC.
Office - 303-642-3547
marty@fp2fire.com
http://www.fp2fire.com

Response #1:
Marty, I’m sort of tight on time today and tomorrow but I think I can provide the bulk of your answers quickly.

I worked with a small task group to develop this from a proposal that was basically submitted by OPPSD (Paul Iacobucci, 400 committee) at the ROC stage was too late and too extensive to act on at that stage. Organic Peroxide Producers Safety Division is the main industry group and in the past was represented by Chet McCloskey who you may remember. The group has done extensive testing to get to the stage where they can rate an OP not only on transport critical properties but also storage impacts. Transport has always been the focus of UN rankings. In the past the committee has been reluctant to implement the UN transport classifications because they didn’t address storage, the focus of the 430/400 hazard rankings developed in this committee years ago.

I’m not sure there is one report but for the TG meetings Paul shared some presentations that explained the background. The closest thing to a paper is the Dutch code, PGS8 which gives more background on the ranking criteria. (It is the Dutch code but already in extensive use in Europe.)

The next stage of this effort by OPPSD is to get the new ranking method into 400 and the thinking of the TG is we might try for an early turnaround on 400 rather than wait for the next planned cycle. We don’t have that part sorted out with NFPA (Guy) but he is aware of the plan. Because of other commitments I have this year, I am thinking we’ll get it moving into the process very late this year or early next. At that point the whole committee will be provided additional information.

With respect to the emergency nature, the manufacturers are seeing conflicts between rankings here in the US and those represented by PGS8. Users are confused and as you can see all the changes being recommended are hazard increases which will mean in a few cases, some additional restrictions/safeguards.

On Tuesday, Kathy Franklin of EPA and a committee member questioned a couple inconsistencies in the sub-tables I believe and there will probably be an update on the vote material. I haven’t looked at the
details but I see a note from Paul that may address it. Again, very busy here and trying to squeeze it all in.

I hope this information helps and you will be able to provide a positive vote when the little tweaks are worked out.

*Henry Febo, PE*
*Asst. Vice President*
*Senior Engineering Technical Specialist*
*FM Global - Engineering Standards*

*Fellow, American Institute of Chemical Engineers*
*Phone: (781) 255-4771*
*E-mail: henry.febo@fmglobal.com*

**Question Email #2:**

**From:** Marty Gresho [mailto:marty@fp2fire.com]
**Sent:** Friday, July 27, 2012 12:43 PM
**To:** Febo, Henry
**Cc:** 'Pearce, Nancy'; 'Iacobucci, P. (Paul)'
**Subject:** RE: NFPA 400, TIA Log No. 1072, TC Ballot Package

Thanks Henry – This background does help.

So if I understand correctly, the proposed re-classifications are based on the OPPSD groups expert opinions based on the existing qualitative definitions for Organic Peroxides in 400 pasted in below.

*(Definitions omitted for brevity)*

It seems important to me that the OPPSD group did not use some other definitions for the classifications such as those that may be incorporated into NFPA 400 later.

Martin T Gresho, PE

**Response #2:**

Fundamentally you are correct since current NFPA definitions are qualitative, they are ‘translating’ new test data into “NFPA”. UN and PGS8 designations are different. The intent, as I noted, is to ‘harmonize’ NFPA with international at the next stage of normal 400 review in a early cycle.

I have been in contact with Nancy and a revised ballot will be sent early next week.

*Henry*
TECHNICAL COMMITTEE LETTER BALLOT

PROPOSED TENTATIVE INTERIM AMENDMENT Revised LOG NO. 1072
To Revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3 of the Proposed 2013 Edition of NFPA 400
Hazardous Materials Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3

_________ AGREE  

_________ DISAGREE*  

_________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I can not

agree with the technical merits due to the reference material was not submitted for review or any test data.

Question 2: I agree that the subject is of an EMERGENCY NATURE.

_________ AGREE  

_________ DISAGREE*  

_________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

This information is found in the annex and is not legal adopted into the code. If there is a concern the local AHJ can revise the level based on information provided. This needs to be submitted to the committee for review and vote prior to NFPA regulation for a standard submission.

Signature

Robert Jann

Name (Please Print)

8/8/2012

Date

Please return the ballot on or before Monday, August 13, 2012.

PLEASE RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110  
E-mail: jgovette@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT Revised LOG NO. 1072
To Revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3 of the Proposed 2013 Edition of
NFPA 400
Hazardous Materials Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3

___________ AGREE ____________ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

See attached

Question 2: I agree that the subject is of an EMERGENCY NATURE.

___________ AGREE ____________ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

See attached

__________________________
Signature

__________________________
A. Hal Key, PE
Name (Please Print)

__________________________
08/01/2012
Date

Please return the ballot on or before Monday, August 13, 2012.

PLEASE RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110 E-mail: jgoyette@nfpa.org
Proposed TIA Log No. 1072

Question #1 – Technical Merits

Explanation of Vote: My negative vote is based more on the philosophy that this committee should not be classifying materials. The “professionals familiar with the formulations” should be classifying these materials. The classification tables should not be part of the Code. It is the committee’s responsibility to properly define the classification criteria so that this classification can occur. Documents such as those identified in this proposal are documents that would meet the criteria as “professionals familiar with the formulations.”

I see validity for changing the data published in the Annex F to bring that data into alignment with the current information from the “professionals familiar with the formulations.” However, the classification of materials in this Code should not be the responsibility of this committee. Documents such as those referenced could be referenced in the Code to give guidance to the proper classification.

Question #2 – Emergency Nature

Explanation of Vote: Based on my explanation on the Technical Merits, I cannot vote in favor that this meets the criteria of “Emergency Nature.”
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT Revised LOG NO. 1072
To Revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3 of the Proposed 2013 Edition of
NFPA 400
Hazardous Materials Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3

            _____ AGREE     _____ DISAGREE*     _____ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

See attached

Question 2: I agree that the subject is of an EMERGENCY NATURE.

            _____ AGREE     _____ DISAGREE*     _____ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

See attached


Signature

Lynne M. Kilpatrick

Name (Please Print)

8-13-12

Date

Please return the ballot on or before Monday, August 13, 2012.

PLEASE RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169    FAX: (617) 984-7110    E-mail: jgovette@nfpa.org
FROM: LYNNE M. KILPATRICK

TECHNICAL MERITS

Explanation of Disagreement:

Because significant new material on organic peroxides was introduced in the comment stage of NFPA 400, the Committee agreed to take input from the task group to develop a TIA prior to the publication of the 2013 edition. However, there was no communication between the task group and the full Committee prior to the development of this TIA and no opportunity to comment on the technical merits of the proposed TIA until this vote. There remain some inconsistencies between the Dutch Guidelines and proposed revisions to the classification and packaging size. I encourage the task group to solicit comments from the full Committee and to ensure that technical questions and inconsistencies raised by Committee members are addressed prior to adoption.

EMERGENCY NATURE

Explanation of Disagreement:

The use of an objective method of classification should be developed by the task group for Committee review but with the outstanding technical questions and inconsistencies that remain I do not support passing this TIA on an emergency basis at this time.
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT Revised LOG NO. 1072
To Revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3 of the Proposed 2013 Edition of NFPA 400
Hazardous Materials Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3

_______ AGREE       X DISAGREE*       _______ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

After reviewing the ballot comments in the initial ballotting for TIA No. 1072 I am changing my vote to disagree. This entire chapter needs attention.

Question 2: I agree that the subject is of an EMERGENCY NATURE.

_______ AGREE       X DISAGREE*       _______ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

This is not an emergency situation.

Signature

R. K. Lee

Name (Please Print)

8/14/12

Date

Please return the ballot on or before Monday, August 13, 2012.

PLEASE RETURN TO:
Joan Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110

E-mail: jgoyette@nfpa.org
October 24, 2012

Supplemental Agenda October 29-30, 2012

Page 108 of 951
Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3

☐ AGREE ☒ DISAGREE* ☐ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

[Signature]

Name (Please Print) [Teresa Pierson]

Date 12/15/12

Please return the ballot on or before Monday, August 13, 2012.

PLEASE RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110 E-mail: jgoyette@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT Revised LOG NO. 1072
To Revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3 of the Proposed 2013 Edition of
NFPA 400
Hazardous Materials Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3

   □ AGREE   □ DISAGREE*   □ X □ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

[Explaination goes here]

Question 2: I agree that the subject is of an EMERGENCY NATURE.

   □ AGREE   □ DISAGREE*   □ X □ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

[Explaination goes here]

Signature

Name (Please Print)

Date

Monday, August 13, 2012.

Please return the ballot on or before Monday, August 13, 2012.

PLEASE RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110
E-mail: jgoyette@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT Revised LOG NO. 1072
To Revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3 of the Proposed 2013 Edition of
NFPA 400
Hazardous Materials Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Tables F.1, F.2.3, F.3.3, F.4.3, F.5.3, and F.6.3

X AGREE  DISAGREE*  ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

My concern is the correlation with existing model fire codes, MAC tables, detection, storage requirements, and existing storage in businesses

Question 2: I agree that the subject is of an EMERGENCY NATURE.

X AGREE  DISAGREE*  ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

________________________________________

Signature
Robert Fash

Name (Please Print)

8-13-2012

Date

Please return the ballot on or before Monday, August 13, 2012.

PLEASE RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110  E-mail: jgoyette@nfpa.org
Item 12-10-8
Revise 5.14.4 as follows:

5.14.4 Each side view mirror reflective surface inboard edge shall extend beyond the outside profile of the modular body.

Submitter’s Substantiation: The committee discussion and intent was definitely that the inboard edge of the mirror was to begin 1 inch outside the body. Leaving the words “outboard edge” would allow a design where the driver would not be able to see around the body by more than a 1.0 inch sliver of mirror. The size of the mirror is dictated by FMVSS standards.

Emergency Nature: There are two major safety issues. Without this change, we increase the likelihood of vehicle accidents and increase the likelihood of serious injury or death of the responders. The issues are:

1. If we do not have the TIA, we are creating a situation in which the ambulance driver would have only one inch of mirror to see down the side of the ambulance. Therefore, the driver would not be able to see any vehicle, person or property that would be in the blind spot, thereby increasing the chances of being involved in a motor vehicle accident.

2. The inability to adequately see down the sides of the ambulance when backing up endangers the lives of the public and any responder who is serving as a back-up guide in that the driver would only have one inch to see any person who may be in a danger zone.

The TIA is needed on an emergency basis to protect and save lives and to avoid sing in unnecessary motor vehicle accidents.
TIA TC FINAL BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the final results show this TIA DID NOT achieve the necessary votes on Question 1 (Technical Merit) but DID pass on Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 18.

\[ 30 \text{ (eligible to vote)} - 5 \text{ (not returned)} - 2 \text{ (abstentions)} = 23 \times 0.75 = 17.25 \]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[ 30 \text{ eligible} \div 2 = 15 + 1 = 16 \text{ (this is the simple majority)} \]

30  Eligible to Vote  
5  Not Returned (Freiburger, Myers, Patrick, Peters, Thackery)

TC FINAL Ballot results for Technical Merit are as follows:
16  Agree
7  Disagree (Bradshaw, Chestnut, Hillenbrand, Lyons, McDonald, Reinert, Tansey)
2  Abstentions (Alger, Olson)

FINAL ACTION: FAILED

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 18.

\[ 30 \text{ (eligible to vote)} - 5 \text{ (not returned)} - 1 \text{ (abstention)} = 24 \times 0.75 = 18 \]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[ 30 \text{ eligible} \div 2 = 15 + 1 = 16 \text{ (this is the simple majority)} \]

TC FINAL Ballot results for Emergency Nature are as follows:
18  Agree (Walton w/comment)
6  Disagree (Bradshaw, Hillenbrand, Lyons, McDonald, Reinert, Tansey)
1  Abstention (Alger)

FINAL ACTION: PASSED
To: Yvonne Smith

From: Jay Bradshaw, NASEMSDF Rep

Re: NFPA 1917 TIA Ballot

If you are able to do so, please use the attached ballot to record our vote against the Technical Merits and the Emergency Necessity.

The explanation still remains appropriate, but upon reflection, we do not think that obtaining it represents our concern about the lack of explanation or committee writing.

Thank you.
TECHNICAL COMMITTEE LETTER BALLOT
Standard for Automotive Ambulances

PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1078, NFPA 1917, 2013 Edition

To Revise 5.14.4 as follows:
5.14.4 Each side view mirror reflective surface outlet at lobe of mirror edge shall be extended at least 1 in. (25.4 mm) beyond the outside boundary of the mirror body.

Submitter's Substantiation: The committee discussion and intent was to change the outlet at lobe of mirror edge to be extended at least 1 in. (25.4 mm) from the outside boundary of the mirror body. This change will increase the visibility of the driver and reduce the likelihood of accidents.

Emergency Nature: There are two major safety issues. Without this change, the likelihood of vehicle accidents and the likelihood of serious injury or death of the responders. The issues are:

1. If the lobe of the mirror is not extended at least 1 in. (25.4 mm) beyond the outside boundary of the mirror body, the driver would not be able to see around the body of the ambulance and thereby increasing the chances of being involved in a motor vehicle accident.

2. The inability to adequately see around the sides of the ambulance, which can lead to serious injury or death of the responders.

The TIA is needed on an emergency basis to protect and save lives and to avoid serious unnecessary motor vehicle accidents.

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise paragraph 5.14.4

AGREE DISAGREE* ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position. Do not omit this section.

Question 2: I agree that the subject is of an EMERGENCY NATURE.

AGREE DISAGREE* ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position. Do not omit this section.

Please return the ballot on or before Friday, September 14, 2012.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator, NFPA, 1 Batterymarch Park, Quincy, MA 02169
FAX: (617) 984-7056 E-mail: ysmith@nfpa.org

Signature

Jay Bradshaw, rep.

Name (Please Print)

Date

9/13/12
TECHNICAL COMMITTEE LETTER BALLOT


To Revise 5.14.4 as follows:

5.14.4 The distance between the adjacent parallel sides shall be determined at least 1/4 inch above the rear edge of the road. The thickness of the vehicle shall be determined by NFPA 97.

Emergency Nature: There is no emergency nature. This issue does not affect the technical merit of the proposed clause that affects the technical merit of the system.

1. How do you have the DA, as we are reading at another in which the ambulance lives, how would you respond, during a fire, to any place of the problem? Therefore, the agency would not be able to address vehicle incidents or events on a system that will be in the field, which will necessarily being the same or being from the field of practice.

2. The inability to adequately access the side of the ambulance when building up the forest, is the same, the public and any responders that are serving and taking in place in the ambulance should not have any gear or equipment that may be a single ride.

The DA is needed for an emergency, has to go and ensure that it is not avoid being in emergency or an emergency vehicle accidents.

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise paragraph

5.14.4

AGREE      DISAGREE  ABSTAIN

EXPLANATION OF VOTE - Please type or print your comments:

An explanation must accompany a disagreement or an abstaining position.

Question 2: I agree that the subject is of an EMERGENCY NATURE

AGREE      DISAGREE  ABSTAIN

EXPLANATION OF VOTE - Please type or print your comments:

An explanation must accompany a disagreement or an abstaining position.

Please return the ballot on or before Friday, September 14, 2012.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator, NFPA, 4 Batterymarch Park, Quincy, MA 02169
FAX: (617) 884-7058  E-mail: ysmith@nfpa.org

Signature

Date: October 24, 2012
TECHNICAL COMMITTEE LETTER BALLOT
Standard for Automotive Ambulances


To Revise 5.14.4 as follows:

5.14.4 Each side view mirror effective surface outlined in black shall extend 1 in. (25.4 mm) beyond the outside profile of the modular body.

Submission's Substantiation: The committee discussion and intent was definitely that the inward edge of the mirror was to begin 1 inch outside the body. Leaving the words "inboard edge" would allow a design where the driver would not be able to see around the body by more than a 1.0 inch sliver of mirror. The size of the mirror is dictated by FMVSS standards.

Emergency Nature: There are two major safety issues. Without this change, we increase the likelihood of vehicle accidents and increase the likelihood of serious injury or death of the responders. The issues are:

1. If we do not have the TIA, we are creating a situation in which the ambulance driver would have only one inch of mirror to see down the side of the ambulance. Therefore, the driver would not be able to see any vehicle, person or property that would be in the blind spot, thereby increasing the chance of an involved in a motor vehicle accident.

2. The inability to adequately see down the sides of the ambulance when backing up endangers the lives of the public and any responder who is serving as a back-up guide so that the driver only have one inch to see any person who may be in a danger zone.

The TIA is needed on an emergency basis to protect and save lives and to avoid unsafe motor vehicle accidents.

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise paragraph 5.14.4

AGREE  X  DISAGREE*  ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position. There is contradicting technical information that needs committee review/discussion. See attached document from Bill Hanley.

Question 2: I agree that the subject is of an EMERGENCY NATURE.

AGREE  X  DISAGREE*  ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Technical Committee was not provided with adequate data to support an emergency nature.

Please return the ballot on or before Friday, September 14, 2012.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator, NFPA, 1 Batterymarch Park, Quincy, MA 02169
FAX: (617) 984-7056  E-mail: ysmith@nfpa.org

Signature  

Date  

9/13/12
To all committee members,

The proposed TIA by Roger may seem straightforward however not having a chance to discuss this because of the emergency nature of the change, I believe the issue is a little more complex.

I clearly understand the desire for safety and 100% support and effort in that direction, however as written I think there are important issues to consider.

1. the width of a typical (90% of ambulances out there) E450, C3500hd, Type III ambulances are 100" min. outside "profile". (96" wide box then add fenders and rub rails) if we add one inch on each side we are at 102" wide before the mirrors. Then add two mirrors at a nominal 10" for typical after market mirror (velvac) we are very very wide. 112-114 OUTSIDE width".

2. even rewording the TIA to the "vertical modular surface" V "profile" still will be difficult to do. Please view attached pic of a Velvac deluxe mirror that DOES NOT meet the proposed TIA. The inside reflective surface is not outside the vertical wall of the module by an inch and would not meet the TIA.

3. IMPORTANT, FMVSS mirror reg DOES NOT dictate size or position for a side view mirror, rather the resulting view the mirror produces so many meters behind the vehicle. I am not sure and would differ to experts but I don't think we need to have the entire reflective surface beyond the body to accomplish the FMVSS spec.

4. Many ambulance corps stations and ambulance bays at older volunteer FD stations only have 9 Foot wide doors, without side molding, exceeding 108" is a major issue in NY and VT stations I am familiar with.

5. do we have data that says the current mirror setup has caused accidents? Is it so urgent to require an emergency TIA without discussion?

Please don't misunderstand where I am coming from.....I strongly support safety!!! But I think this issue needs more discussion and would not be well served making a TIA as written.

Thanks for considering my point of view.

Bill Tamsey
Sept. 17 2012

To: Yvonne Smith NFPA  Fax # (617) 284-7056

RE: NFPA 1917 TIA Log #1078 Ballot

Change of Ballot

From: Kevin Lyons

Fax # 978-674-1844
TECHNICAL COMMITTEE LETTER BALLOT
Standard for Automotive Ambulances

PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1078, NFPA 1917, 2013 Edition
To Revise 5.14.4 as follows:

5.14.4 Each side view mirror reflective surface inboard edge shall extend be positioned at least 1 in. (25.4 mm) beyond the outside profile of the modular body.

Submitter's Substantiation: The committee discussion and intent was definitely that the inboard edge of the mirror was to begin 1 inch outside the body. Leaving the words "inboard edge" would allow a design where the driver would not be able to see around the body by more than a 1.0 inch sliver of mirror. The size of the mirror is dictated by FMVSS standards.

Emergency Nature: There are two major safety issues. Without this change, we increase the likelihood of vehicle accidents and increase the likelihood of serious injury or death of the respondent. The issues are:

1. If we do not have the TIA, we are creating a situation in which the ambulance driver would have only one inch of mirror to see down the side of the ambulance. Therefore, the driver would not be able to see any vehicle, person or property that would be in the blind spot, thereby increasing the chances of being involved in a motor vehicle accident.

2. The inability to adequately see down the sides of the ambulance when backing up endangers the lives of the public and anyone responder who is serving as a back-up guide in that the driver would only have one inch to see any person who may be in a danger zone.

The TIA is needed on an emergency basis to protect and save lives and to avoid unnecessary motor vehicle accidents.

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise paragraph 5.14.4

AGREE   DISAGREE*   ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Item's specific question is:

Question 2: I agree that the subject is of an EMERGENCY NATURE.

AGREE   DISAGREE*   ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

The item can be dealt with now and resolved when 1917 is revisited after the cause is taken care of.

Please return the ballot on or before Friday, September 14, 2012.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator, NFPA, 1 Batterymarch Park, Quincy, MA 02169
FAX: (617) 984-7056 E-mail: ysmith@nfpa.org

Signature

Name (Please Print)

Date

October 24, 2012 Supplemental Agenda October 29-30, 2012 Page 121 of 951
Smith, Yvonne

From: John McDonald (QMDAA) <jmcdonald@gsa.gov>
Sent: Thursday, September 13, 2012 4:12 PM
To: Smith, Yvonne
Cc: Holland, Kendall
Subject: Re: NFPA 1917, TIA Log #1078 Ballot Reminder

Yvonne,

I won't have access to a fax or scanner until Saturday.

Please record me as voting Disagree on the technical merit and emergency nature on the proposed TIA for log 1078 or 1917.

My explanation is that the vehicles must be FMVSS 111 compliant which will prevent the use of the incorrectly positioned mirrors permitted by the current section 5.14.4.

FMVSS 111 requires in part that, "The mirrors shall be located so as to provide the driver a view to the rear along both sides of the vehicle and shall be adjustable both in the horizontal and vertical directions to view the rearward scene."

Thanks

On Tue, Sep 11, 2012 at 9:50 AM, Smith, Yvonne <YSmith@nfpa.org> wrote:

To Technical Committee Members on Ambulances:

This correspondence serves as a reminder to those Technical Committee members who have not yet returned their ballot on NFPA 1917, TIA Log #1078 that the deadline for doing so is Friday, September 14, 2012.

Please complete and return your ballot as soon as possible, but no later than September 14, 2012. As noted on the ballot form, please return the ballot to Yvonne Smith either via e-mail to ysmith@nfpa.org or via fax to 617-984-7056.

Thank you.

Yvonne Smith

Yvonne Smith

Administrator, Technical Projects
TECHNICAL COMMITTEE LETTER BALLOT

Standard for Automotive Ambulances

PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1078, NFPA 1917, 2013 Edition

To Revise 5.14.4 as follows:

5.14.4 Each side view mirror reflective surface extosed inboard edge shall extend be positioned at least 1 in. (25.4 mm) beyond the outside profile of the modular body.

Submitter's Substantiation: The committee discussion and intent was definitely that the inboard edge of the mirror was to begin 1 inch outside the body. Leaving the words "extosed inboard" would allow a design where the driver would not be able to see around the body by more than a 1.0 inch silver of mirror. The size of the mirror is dictated by FMVSS standards.

Emergency Nature: There are two major safety issues. Without this change, we increase the likelihood of vehicle accidents and increase the likelihood of serious injury or death of the responders. The issues are:

1. If we do not have the TIA, we are creating a situation in which the ambulance driver would have only one inch of mirror to see down the side of the ambulance. Therefore, the driver would not be able to see any vehicle, person or property that would be in the blind spot, thereby increasing the chances of being involved in a motor vehicle accident.

2. The inability to adequately see down the side of the ambulance when backing up endangers the lives of the public and any responder who is serving as a back-up guide in that the driver would only have one inch to see any person who may be in a danger zone.

The TIA is needed on an emergency basis to protect and save lives and to avoid such unnecessary motor vehicle accidents.

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise paragraph 5.14.4

____ AGREED ___ DISAGREE* ___ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position. The merits of the proposed TIA are unclear and have the potential to have other issues.

Question 2: I agree that the subject is of an EMERGENCY NATURE.

____ AGREED ___ DISAGREE* ___ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

There appears to be the need for additional discussion and research.

Please return the ballot on or before Friday, September 14, 2012.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator, NFPA, 1 Batterymarch Park, Quincy, MA 02169
FAX: (617) 984-7856 E-mail: ysmith@nfpa.org
Signature

Name (Please Print)  [Signature]  9/11/12
Date

October 24, 2012  Supplemental Agenda October 29-30, 2012  Page 123 of 951
TECHNICAL COMMITTEE LETTER BALLOT

Standard for Automotive Ambulances

PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1078, NFPA 1917, 2013 Edition

To Revise 5.14.4 as follows:

5.14.4 Each side view mirror reflector surface outboard inboard edge shall extend be positioned at least 1 in. (25.4 mm) beyond the outside profile of the modular body.

Submitter's Substantiation: The committee discussion and intent was definitely that the inboard edge of the mirror was to begin 1 inch outside the body. Leaving the words "outboard edge" would allow a design where the driver would not be able to see around the body by more than 1.0 inch of mirror. The size of the mirror is dictated by FMVSS standards.

Emergency Nature: There are two major safety issues. Without this change, we increase the likelihood of vehicle accidents and increase the likelihood of serious injury or death of the responders. The issues are:

1. The inability to adequately see the sides of the ambulance when backing up endangers the lives of the public and any responder who is serving as a backup guide in that the driver would only have one inch to see any person who may be in a danger zone.

2. The TIA is needed on an emergency basis to protect and save lives and to avoid ring in unnecessary motor vehicle accidents.

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise paragraph 5.14.4

AGREE: X DISAGREE* ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position. Please see attached explanation.

Question 2: I agree that the subject is of an EMERGENCY NATURE

AGREE: X DISAGREE* ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position. Please see attached explanation.

Please return the ballot on or before Friday, September 14, 2012.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator, NFPA, 1 Batterymarch Park, Quincy, MA 02169
FAX: (617) 984-7056 E-mail: ysmith@nfpa.org

Signature

WILLIAM F. TANSEY

Name (Please Print) 9-11-12

Date
The proposed TIA by Roger may seem straightforward however not having a chance to discuss this because of the emergency nature of the change, I believe the issue is a little more complex.

I clearly understand the desire for safety and 100% support and effort in that direction, however as written I think there are important issues to consider.

1. The width of a typical (90% of ambulances out there) E450, C3500hd, Type III ambulances are 100" min. outside "profile" (96" wide box then add fenders and rub rails) if we add one inch on each side before the mirror starts, we are at 102" wide before the mirrors. Then add two mirrors at a nominal 10" each for typical after market mirror (velvac), we are very very wide. 122% OUTSIDE width".

2. Even rewording the TIA to the "vertical modular surface" V "profile", which I suspect the committee had in mind is still very wide. Given the 96" Module wall width, having a reflective surface at least 6" outside the vertical modular wall, would provide adequate visibility and meet the FMVSS requirement.

3. IMPORTANT, FMVSS mirror reg DOES NOT dictate size or position for a side view mirror, rather the resulting view the mirror produces so many meters behind the vehicle. I am not sure and would differ to experts but I don't think we need to have the entire reflective surface beyond the body to accomplish the FMVSS spec.

4. Many ambulance corps stations and ambulance bays at older volunteer FD stations only have 9 Foot wide doors, without side molding. Exceeding 108" is a major issue in NY and VT stations I am familiar with.

5. Do we have data that says the current mirror setup has caused accidents? Is it so urgent to require an emergency TIA without discussion?

Please don't misunderstand where I am coming from..... I strongly support safety!!! I also suspect the original spec as written may not meet the fmvss requirements and SHOULD BE CHANGED. But I think this issue needs more discussion and would not be well served making a TIA as written.

Thanks for considering my point of view.

Bill Tansey
TECHNICAL COMMITTEE LETTER BALLOT
Standard for Automotive Ambulances

PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1078, NFPA 1917, 2013 Edition
To Revise 5.14.4 as follows:
5.14.4 Each side view mirror reflective surface outboard inboard edge shall extend be positioned at least 1 in. (25.4 mm) beyond the outside profile of the modular body.

Submitter's Substantiation: The committee discussion and intent was definitely that the inboard edge of the mirror was to begin 1 inch outside the body. Leaving the words "outboard edge" would allow a design where the driver would not be able to see around the body by more than a 1.0 inch silver of mirror. The size of the mirror is dictated by FMVSS standards.

Emergency Nature: There are two major safety issues. Without this change, we increase the likelihood of vehicle accidents and increase the likelihood of serious injury or death of the responders. The issues are:

1. If we do not have the TIA, we are creating a situation in which the ambulance driver would have only one inch of mirror to see down the side of the ambulance. Therefore, the driver would not be able to see any vehicle, person or property that would be in the blind spot, thereby increasing the chances of being involved in a motor vehicle accident.

2. The inability to adequately see down the sides of the ambulance when backing up endangers the lives of the public and any responder who is serving as a back-up guide in that the driver would only have one inch to see any person who may be in a danger zone.

The TIA is needed on an emergency basis to protect and save lives and to avoid same unnecessary motor vehicle accidents.

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise paragraph 5.14.4

AGREE DISAGREE* ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

See attached

Question 2: I agree that the subject is of an EMERGENCY NATURE.

AGREE DISAGREE* ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

See attached

Please return the ballot on or before Friday, September 14, 2012.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator, NFPA, 1 Batterymarch Park, Quincy, MA 02169
FAX: (617) 984-7056 E-mail: ysmith@nfpa.org

Signature
Andrew Alger
Name (Please Print)
9/14/12
Date
TECHNICAL COMMITTEE LETTER BALLOT
Standard for Automotive Ambulances
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1078, NFPA 1917, 2013 Edition

Question 1: I ABSTAIN with the TECHNICAL MERITS of the Proposed TIA to revise paragraph 5.14.4

Abstain – As a test lab (who does not specialize with rear-view mirrors), I don’t have much experience with the end use of an ambulance (backing into a scene, backing into an Emergency drop off, or backing into a station). When positioning an ambulance in our lab for testing purposes, it is recommended a spotter is used so as not to destroy anything (or anybody). I am not in a position where I can make an educated decision on the matter.

Question 2: I ABSTAIN that the subject is of an EMERGENCY NATURE.

Abstain – A quick rudimentary test involving a small sheet of plywood and an F-350 truck (with extendable OEM mirrors) proved the driver could see the rear of the module with only 1” of mirror extending outside of the plywood “module”. Not much else of the scene could be monitored in the mirror because the majority of the mirror was pointing into the cab area. I don’t believe this is an emergency situation needing resolution immediately, but do feel this is cause for concern and should be addressed in the next issue.

Andrew Alger
Progressive Engineering Inc.
58640 State Road 15
Goshen, IN 46528
TECHNICAL COMMITTEE LETTER BALLOT

Standard for Automotive Ambulances

PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1078, NFPA 1917, 2013 Edition

To Revise 5.14.4 as follows:

5.14.4 Each side view mirror shall have a backboard or other such devices shall extend beyond the rearview mirror of the vehicle body an outlet 1 in. (25.4 mm) beyond the maximum outline of the vehicle body.

This revision states that the side view mirror of the vehicle is required to extend 1 inch beyond the maximum outline of the vehicle body. The image shows a diagram illustrating the concept.

Emergency Nature: There are no major safety issues. Without this change, the likelihood of vehicle accidents and the likelihood of serious injury or death of the occupants. The issue is:

1. If we do not have the TIA, we are missing a safety feature. The side view mirror cannot be only 1 inch further than the rearview mirror of the vehicle body. Therefore, the driver would not be able to see any vehicle, person or property that would be in the blind spot, which increases the chances of being involved in a motor vehicle accident.

2. The ability to adequately see the sides of the vehicle when backing up enhances the driver's ability to navigate the vehicle's blind spot to see any person or vehicle that may be in danger.

The TIA is critical to ensure safety and is crucial to the vehicle's ability to navigate the vehicle's blind spot.

Question 1: I agree with the TECHNICAL MERITS of the Proposal TIA to revise paragraph 5.14.4

AGREE: ___________ DISAGREE: ___________ ABSTAIN: ___________

EXPLANATION OF VOTE: Please type or print your comments:

An explanation must accompany a disagreement or abstaining position.

[Additional comments or notes]

Question 2: I agree that the subject is of an EMERGENCY NATURE.

AGREE: ___________ DISAGREE: ___________ ABSTAIN: ___________

EXPLANATION OF VOTE: Please type or print your comments:

An explanation must accompany a disagreement or abstaining position.

[Additional comments or notes]

Please return the ballot on or before Friday, September 14, 2012.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator, NFPA, 1 Batterymarch Park, Quincy, MA 02169
FAX: (617) 984-7056 E-mail: yvsmith@nfpa.org

Signature:

[Signature]

Name (Please Print):

[Name]

Date:

[Date]
TECHNICAL COMMITTEE LETTER BALLOT
Standard for Automotive Ambulances

PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1078, NFPA 1917, 2013 Edition
To Revise 5.14.4 as follows:
5.14.4 Each side view mirror reflective surface outboard inboard edge shall extend be positioned at least 1 in. (25.4 mm) beyond the outside profile of the modular body.

Submitter’s Substantiation: The committee discussion and intent was definitely that the inboard edge of the mirror was to begin 1 inch outside the body. Lacking the words “outboard edge” would allow a design where the driver would not be able to see around the body by more than a 1.0 inch sliver of mirror. The size of the mirror is dictated by FMVSS standards.

Emergency Nature: These are two major safety issues. Without this change, we increase the likelihood of vehicle accidents and increase the likelihood of serious injury or death of the responders. The issues are:

1. If we do not have the TIA, we are creating a situation in which the ambulance driver would have only one inch of mirror to see down the side of the ambulance. Therefore, the driver would not be able to see any vehicle, person or property that would be in the blind spot, thereby increasing the chances of being involved in a motor vehicle accident.

2. The inability to adequately see down the sides of the ambulance when backing up endangers the lives of the public and any responder who is serving as a back-up guide in that the driver would only have one inch to see any person who may be in a danger zone.

The TIA is needed on an emergency basis to protect and save lives and to avoid shig in unnecessary motor vehicle accidents.

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise paragraph
5.14.4  X  AGREE  ________ DISAGREE*  ________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a disagreement or abstaining position.

Question 2: I agree that the subject is of an EMERGENCY NATURE.
X  ________ AGREE  ________ DISAGREE*  ________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a disagreement or abstaining position.

I am in total agreement with the emergency nature of the TIA

Please return the ballot on or before Friday, September 14, 2012.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator, NFPA, 1 Batterymarch Park, Quincy, MA 02169
FAX: (617) 984-7056  E-mail: ysmith@nfpa.org
Signature

William Walton
Name (Please Print) September 7, 2012
Date
Item 12-10-9
I. Revise Table 4.4.1 to read as follows:

<table>
<thead>
<tr>
<th>Product</th>
<th>Test</th>
<th>Time</th>
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<td>All component product</td>
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</tr>
<tr>
<td>All component product</td>
<td>Product label durability testing</td>
<td>Initial cert only</td>
</tr>
<tr>
<td>Life safety rope</td>
<td>Rope breaking and elongation</td>
<td>Every year</td>
</tr>
<tr>
<td>Escape rope</td>
<td>Rope breaking and elongation</td>
<td>Every year</td>
</tr>
<tr>
<td>Water rescue throwlines</td>
<td>Rope breaking and elongation</td>
<td>Every year</td>
</tr>
<tr>
<td>Water rescue throwlines</td>
<td>Floatability</td>
<td>Every year</td>
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<td>Life safety harness</td>
<td>Static</td>
<td>Alternating years with drop test</td>
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<tr>
<td>Belt</td>
<td>Static</td>
<td>Alternating years with drop test</td>
</tr>
<tr>
<td>Belt</td>
<td>Drop</td>
<td>Alternating years with static test</td>
</tr>
<tr>
<td>Auxiliary equipment: Carabiners and snap link</td>
<td>All</td>
<td>Every 2 years</td>
</tr>
<tr>
<td>Auxiliary equipment: Rope grab devices</td>
<td>All</td>
<td>Every 2 years</td>
</tr>
<tr>
<td>Auxiliary equipment: Descent control devices – auto stop</td>
<td>Passive brake holding</td>
<td>Every year</td>
</tr>
<tr>
<td>Auxiliary equipment: Descent control devices – non-auto stop</td>
<td>Manner of function</td>
<td>Every year</td>
</tr>
<tr>
<td>Auxiliary equipment: Portable anchor</td>
<td>All</td>
<td>Initial cert only</td>
</tr>
<tr>
<td>Auxiliary equipment: Pulley</td>
<td>All</td>
<td>Every 2 years</td>
</tr>
<tr>
<td>Auxiliary equipment: pick-off, anchor and rigging Multiple configuration and end to end straps</td>
<td>Breaking Strength</td>
<td>Every year</td>
</tr>
<tr>
<td>Auxiliary equipment: manufactured systems</td>
<td>All</td>
<td>Every year</td>
</tr>
<tr>
<td>Escape Systems</td>
<td>All</td>
<td>Every year</td>
</tr>
<tr>
<td>Life safety rope</td>
<td>Diameter, rope breaking, and elongation</td>
<td>Every year</td>
</tr>
<tr>
<td>Life safety rope fibers</td>
<td>Melting and crystallization temperatures by thermal analysis</td>
<td>Every year</td>
</tr>
<tr>
<td>Escape rope</td>
<td>Diameter, rope breaking, and elongation</td>
<td>Every year</td>
</tr>
<tr>
<td>Fire escape rope</td>
<td>Elevated rope temperature test</td>
<td>Every year</td>
</tr>
<tr>
<td>Escape rope fibers</td>
<td>Melting and crystallization temperatures by thermal analysis</td>
<td>Every year</td>
</tr>
<tr>
<td>Escape webbing</td>
<td>Perimeter, rope breaking, and elongation</td>
<td>Every year</td>
</tr>
<tr>
<td>Fire escape webbing</td>
<td>Elevated rope temperature test</td>
<td>Every year</td>
</tr>
<tr>
<td>Escape webbing fibers</td>
<td>Melting and crystallization temperatures by thermal analysis</td>
<td>Every year</td>
</tr>
<tr>
<td>Moderate elongation laid life saving rope</td>
<td>Diameter, rope breaking, and elongation</td>
<td>Every year</td>
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<tr>
<td>Moderate elongation laid life saving rope fibers</td>
<td>Melting and crystallization temperatures by thermal analysis</td>
<td>Every year</td>
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<tr>
<td>Fire escape webbing</td>
<td>Elevated rope temperature test</td>
<td>Every year</td>
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<tr>
<td>Escape webbing fibers</td>
<td>Melting and crystallization temperatures by thermal analysis</td>
<td>Every year</td>
</tr>
<tr>
<td>Victim extrication devices</td>
<td>Static</td>
<td>Every 2 years</td>
</tr>
<tr>
<td>Item</td>
<td>Test Method</td>
<td>Frequency</td>
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<td>---------------------------------------------------------------------</td>
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<tr>
<td>Litters</td>
<td>Litter strength test – vertical Litter Strength test – horizontal</td>
<td>Initial only/Alternating years with horizontal Initial only/Alternating years with vertical</td>
</tr>
<tr>
<td>Load-bearing textiles used in victim extrication devices</td>
<td>Melting and crystallization temperatures by thermal analysis</td>
<td>Every year</td>
</tr>
<tr>
<td>Thread used in victim extrication devices</td>
<td>Melting and crystallization temperatures by thermal analysis</td>
<td>Every year</td>
</tr>
<tr>
<td>Webbing components</td>
<td>Melting and crystallization temperatures by thermal analysis</td>
<td>Every year</td>
</tr>
<tr>
<td>Thread components</td>
<td>Melting and crystallization temperatures by thermal analysis</td>
<td>Every year</td>
</tr>
<tr>
<td>Escape webbing fibers</td>
<td>Melting and crystallization temperatures by thermal analysis</td>
<td>Every year</td>
</tr>
<tr>
<td>Load-bearing textiles used in belts with optional flame resistance</td>
<td>Flame resistance</td>
<td>Every year</td>
</tr>
<tr>
<td>Load-bearing textiles used in belts with optional flame resistance</td>
<td>Heat resistance</td>
<td>Every year</td>
</tr>
<tr>
<td>Hardware used in belts with optional flame resistance</td>
<td>Heat Resistance</td>
<td>Every year</td>
</tr>
<tr>
<td>Thread used in belts with optional flame resistance</td>
<td>Thread heat resistance</td>
<td>Every year</td>
</tr>
<tr>
<td>Load-bearing textiles used in life safety harnesses with optional flame resistance</td>
<td>Flame resistance</td>
<td>Every year</td>
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<tr>
<td>Load-bearing textiles used in life safety harnesses with optional flame resistance</td>
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<td>Heat resistance</td>
<td>Every year</td>
</tr>
<tr>
<td>Hardware used in life safety harnesses with optional flame resistance</td>
<td>Heat Resistance</td>
<td>Every year</td>
</tr>
<tr>
<td>Thread used in life safety harnesses with optional flame resistance</td>
<td>Thread heat resistance</td>
<td>Every year</td>
</tr>
<tr>
<td>Manufacturer-supplied eye termination</td>
<td>Breaking strength</td>
<td>Every year</td>
</tr>
<tr>
<td>Manufacturer-supplied eye termination</td>
<td>Thread melting</td>
<td>Every year</td>
</tr>
</tbody>
</table>

2. Revise 5.1.5.12 to read as follows:

5.1.5.12 In addition to the compliance specified in 5.1.5.9, rigging and anchor multiple configuration and end to end straps shall include the following additional statement on the product label:

For multiple configuration straps:

“MINIMUM BREAKING STRENGTH AND RATING ARE DETERMINED USING A BASKET (U) CONFIGURATION. IN ADDITION, THIS STRAP HAS A MINIMUM BREAKING STRENGTH OF: ___ kN IN A CHOKER CONFIGURATION ___ kN WHEN PULLED END TO END.”

For end to end straps:

“MINIMUM BREAKING STRENGTH OF ___ kN WHEN PULLED END TO END”

3. Add a new paragraph 5.2.10.6 as follows:
5.2.10.6 The manufacturer of moderate elongation laid life saving ropes that are certified as being compliant with this standard shall furnish the purchaser with a sample of suggested records to be maintained by the purchaser or user of moderate elongation laid life saving rope and a list of items that the records need to contain.

4. Revise 7.4.6.1 and 7.5.6.1 to read as follows:

7.4.6.1 Where harnesses are represented as being flame-resistant, materials and hardware shall be tested individually for flame resistance as specified in Section 8.16, Flame Resistance Test, and shall have an average char length of not more than 100 mm (4 in.), shall have an average afterflame of not more than 2.0 seconds, and shall not melt or drip.

7.5.6.1 Where belts are represented as being flame-resistant, materials and hardware shall be tested individually for flame resistance as specified in Section 8.16, Flame Resistance Test, and shall have an average char length of not more than 100 mm (4 in.), shall have an average afterflame of not more than 2.0 seconds, and shall not melt or drip.

5. Delete paragraph 7.5.7.10 and 7.6.3.9 and renumber subsequent paragraphs; revise paragraph 8.13.1.1 as follows:

7.5.7.10 Where the manufactured system incorporates an escape descent control device that incorporates a passive or active breaking feature that creates friction between the device and the rope, the system shall be tested for maximum payout force as specified in Section 8.13, Payout Test, shall not release the test torso, and shall not exceed 90 N (20 lb).

7.6.3.9 Where the escape descent control device incorporates a passive or active breaking feature that creates friction between the device and the rope, the maximum force required to pay a specific type of rope through the descent control device shall be tested as specified in Section 8.13, Payout Test, and shall not exceed 90 N (20 lb).

8.13.1.1 This test shall apply to descent control systems with passive and active braking systems, and escape manufactured systems.

6. Add a new paragraph 7.6.3.12 as follows:

7.6.3.12 Technical use descent control devices shall be tested for deformation as specified in Section 8.6, Manner of Function Tensile Test, Procedure B, and shall have a minimum breaking strength of at least 13.5 kN (3034 lbf).

7. Revise 7.11.6, 7.11.6.2 and add new 7.11.6.3 to read as follows:

7.11.6 Where an escape system is designated as a fire escape system, additional tests as specified in 7.11.6.1, and 7.11.6.2, and 7.11.6.3 shall be conducted.

7.11.6.2 Where fire escape system anchors are represented as being flame resistant, materials, labels, and hardware shall be tested individually for heat resistance as specified in Section 8.17, Heat Resistance Test, and shall not melt, drip, separate, or ignite; hardware items shall remain functional.

7.11.6.3 Sewing thread utilized in the construction of fire escape systems shall be tested for heat resistance as specified in Section 8.18, Thread Heat Resistance Test, and shall not melt at or below a temperature of 260ºC (500ºF).

8. Revise paragraph 7.15.1 and 7.15.2 as follows:

7.15.1 Technical use belay devices shall be tested for breaking strength manner of function as specified in Section 8.6, Manner of Function Tensile Test, Procedure C, without failure of the device or failure of the rope, with a belay system extension of less than 1 m with an impact force of less than 15 kN (3372 lbf), and shall release the load in a controlled manner.

7.15.2 General-use belay devices shall be tested for breaking strength manner of function as specified in Section 8.6, Manner of Function Tensile Test, Procedure C, without failure of the device or failure of the rope, with a belay system extension of less than 1 m, and with an impact force of less than 15 kN (3372 lbf), and shall release the load in a controlled manner.

9. Delete Section 7.17, and add new paragraphs 7.6.3.11 and 7.11.7 as follows:

7.6.3.11 Escape descent control devices shall be tested for maximum impact force as specified in Section 8.14, Escape Descent Control Device and Systems Drop Test, and shall have the maximum impact force not exceed 8 kN (1798.5 lbf), shall not damage the rope or device, and shall remain functional.
7.11.7 Escape systems shall be tested for maximum impact force as specified in Section 8.14, Escape Descent Control Device and Systems Drop Test, and shall have the maximum impact force not exceed 8 kN (1798.5 lbf), shall not damage the rope or webbing or device, and shall remain functional.

10. Revise 8.15.5 to read as follows:

8.15.5 Report. The time to failure shall be recorded from each test and the average and standard deviation calculated.

11. Delete 8.15.6.1 as follows:

8.15.6.1 Pass/fail performance shall be based on the average time to failure.

Submitter’s Substantiation:

1. Table 4.4.1 - The table is missing recertification for Moderate Elongation Life Saving Rope and includes several duplications and terminology errors.

2. 5.1.5.12 - The terminology in 5.1.5.12 is not consistent with the document. The terms “rigging and anchor” straps have been replaced with “multiple configuration and end to end” straps. The current required statement is incorrect for end to end straps in that they are not required to be tested in a U or choker configuration.

3. 5.2.10.6 - This added text is a requirement for other products covered by NFPA 1983 and provides users with valuable information on maintaining records for this life saving equipment.

4. 7.4.6.1 and 7.5.6.1 - The term “and hardware” was inadvertently added to these paragraphs. Additionally, the char length requirement does not apply to hardware items, and there are no specific requirements for the testing of hardware items in the test method. The requirement as written in the current edition is inappropriate for hardware items, would be impossible to determine and could inhibit product certification.

5. 7.5.7.10, 7.6.3.9, and 8.13.1.1 - Requirement 7.5.7.10 is redundant in that a manufactured system that includes an escape descent device would be classified as an Escape System – and therefore must meet all of the requirements of NFPA 1983 Section 7.11. Additionally, the requirement is incorrectly worded in that there is no torso used in the conduct of the test - thus the statement “shall not release the test torso” has no relevance.

6. 7.6.3.12 - This performance requirement mandates the minimum breaking strength for these particular devices and is therefore a critical safety issue.

7. 7.11.6, 7.11.6.2, and 7.11.6.3 (New) - The change in 7.11.6 adds the requirement of thread heat resistance to fire escape systems. The change in 7.11.6.2 corrects the terminology from “escape anchors” to “fire escape system” as section 7.11.6 contains the requirements for fire escape systems and this requirement applies to the system not just the anchor.

8. 7.15.1 and 7.15.2 - These requirements are currently located in NFPA 1983-2012 Section 8.6.4.5.6. As these parameters are utilized to determine pass/fail of the device they should be relocated to the Performance Requirements. Additionally, this is a manner of function requirement – not a breaking strength requirement. It is impossible to determine breaking strength without failure of the device or rope.

9. 7.17, 7.6.3.1.1 and 7.11.7 (New) - This added text is part of the requirements that apply to escape descent control devices and escape systems. As such, this language should appear with the group of performance requirements for descent control devices (Section 7.6.3) and escape systems (Section 7.11). Having this requirement separate and distinct from the other performance requirements for these devices/systems can lead to confusion and the possibility of neglect of the remainder of the requirements.

10. and 11. 8.15.5 and 8.15.6.1 -This change resolves a conflict with the requirements in 7.10.3 and 7.12.5.

Emergency Nature: This TIA seeks to correct errors and omissions that were overlooked during the Fall 2011 revision cycle process of NFPA 1983. Additionally, some parts of this TIA intend to offer to the public a benefit that would lessen a known hazard, and correct circumstances in which the standard could adversely affect impact on a product or method that was inadvertently overlooked in the total revision process.
TIA CC FINAL BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the final results show this TIA HAS achieved the necessary votes on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 11.

\[24 \text{ (eligible to vote)} - 10 \text{ (not returned)} - 0 \text{ (abstentions)} = 14 \times 0.75 = 10.5\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[24 \text{ eligible} \div 2 = 12 + 1 = 13 \text{ (this is the simple majority)}\]

24 Eligible to Vote
10 Not Returned (Bain, Barker, Duffy, Fargo, Hosea, Johnson, Neilson, Putorti, Reall, Stull)

CC FINAL Ballot results for Technical Merit are as follows:
14 Agree
0 Disagree
0 Abstentions

FINAL ACTION: PASSED

TC FINAL Ballot results for Emergency Nature are as follows:
14 Agree
0 Disagree
0 Abstentions

FINAL ACTION: PASSED

Final FAE-SCE Ballots are on the next page
According to 5.4 in the NFPA (RGCP), the final results show this TIA HAS achieved the necessary votes on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 9.

\[23 \text{ (eligible to vote)} - 11 \text{ (not returned)} - 0 \text{ (abstentions)} = 12 \times 0.75 = 9\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[23 \text{ eligible} \div 2 = 11.5 = 12 \text{ (this is the simple majority)}\]

<table>
<thead>
<tr>
<th>Eligible to Vote</th>
<th>Not Returned (Allen, Byrne, Davis, Gohlke, Hock, Horn, Howard, Metz, Nelson, Paderick, Reall)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC FINAL Ballot results for Technical Merit are as follows:</td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>Disagree</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
</tr>
</tbody>
</table>

**FINAL ACTION: PASSED**

TC FINAL Ballot results for Emergency Nature are as follows:

| Agree | Disagree | Abstentions |
| 12 | 0 | 0 |

**FINAL ACTION: PASSED**
TECHNICAL COMMITTEE LETTER BALLOT
Standard on Life Safety Rope and Equipment for Emergency Services

Reference: Table 4.4.1, 5.1.5.12, 5.2.10.6, 7.4.6.1, 7.5.6.1, 7.5.7.10, 7.6.3.9, 8.13.1.1, 7.6.3.12, 7.11.6, 7.11.6.2, 7.11.6.3 (New), 7.15.1, 7.15.2, 7.17, 7.6.3.1.1, 7.11.7 (New), 8.15.5, and 8.15.6.1

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 4.4.1, 5.1.5.12, 5.2.10.6, 7.4.6.1, 7.5.6.1, 7.5.7.10, 7.6.3.9, 8.13.1.1, 7.6.3.12, 7.11.6, 7.11.8.2, 7.11.8.3 (New), 7.15.1, 7.15.2, 7.17, 7.6.3.1.1, 7.11.7 (New), 8.15.5, and 8.15.6.1

XXXXX AGREE

DISAGREE*

ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position. The document contained several errors due to editing, misinterpretation or poor information exchange. This standard contained a large amount of changes and additions. As such, many errors were made at the editorial level.

Question 2: I agree that the subject is of an EMERGENCY NATURE.

XXXXX XXXX AGREE

DISAGREE*

ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position. These errors directly affect the end product that users will receive and demand immediate action.

Please return the ballot on or before Friday, September 14, 2012.

PLEASE RETURN TO:
Yvonne Smith,
Project Administrator,
NFPA
1 Batterymarch Park, Quincy, MA 02169
FAX: (617) 984-7056 E-mail: ysmith@nfpa.org

Signature
R. Douglas Stephenson

Name (Please Print)
09/07/12-12
Date
Item 12-10-10
NFPA 2001-2012  
*Standard on Clean Agent Fire Extinguishing Systems*  
**TIA Log No:** 1069  
**Reference:** 4.2.1.1.2, 4.2.1.1.3, A.4.2.1.1.2, and A.4.2.1.1.3  
**Comment Closing Date:** September 14, 2012  
**Submitter:** John Spalding, Healey Fire Protection

1. *Add new sections to read as follows:*

   **4.2.1.1.2*** For systems that employ the use of a pressure-reducing device, the minimum design pressure for piping downstream of the pressure reducer shall be determined by system flow calculations.

   **4.2.1.1.3*** Piping for pre-engineered systems shall be designed in accordance with the limitations of the manufacturer’s listed installation manual.

   **A.4.2.1.1.2** The pressure reduction of the system discharge may be accomplished through the system’s cylinder valve or through a separate pressure-reducing device.

   **A.4.2.1.1.3** Pre-engineered systems are designed to listed limitations which may or may not include values for pressures downstream of pressure reducers.

**Submitter’s Substantiation:** Inert gas clean agent systems typically are equipped with pressure reducing devices the sole purpose of which is to reduce the gas pressure from the agent storage container to a much lower pressure – a lower pressure which will permit the use of lighter weight pipe and fittings than that which would be required at the pressures in the agent storage container.

The requirements in NFPA 2001 recognize the existence, purpose and utility of pressure reducing devices to permit the use of lighter weight pipe fittings. In paragraph 4.2.3.1, NFPA 2001 (2012) specifies two distinct minimum working pressure ratings to be used for pipe fittings.

“Fittings shall have a minimum rated working pressure equal to or greater than the minimum design working pressure specified in 4.2.1.1 . . . “

“For systems that employ the use of a pressure-reducing device in the distribution piping, the fittings downstream of the device shall have a minimum rated working pressure equal to or greater than the maximum anticipated pressure in the downstream piping.”

Further, in 4.2.1.1.1 which provides specifications for minimum pipe design pressures, the standard states “*The pressure reducing device shall be readily identifiable.*” Yet, because of the omission which will be discussed below, there is no further reference to the pressure reducing device in the specification of pipe.

NFPA 2001 only specifies one minimum working pressure rating for pipe. The specified minimum rated working pressure for pipe is given in paragraph, 4.2.1.1, 4.2.1.1.1 and the related table 4.2.1.1.1(a). The minimum working pressure rating for pipe is based on the pressure in the agent storage container.

The effect of this dichotomy in pipe and pipe fitting specifications in NFPA 2001 (2012) is for distribution piping downstream of the pressure reducing device, the pipe strength is specified to be on the order of two times (or more) greater than the specified strength of the pipe fittings located downstream of the pressure reducing device. The minimum specified working pressure rating of pipe and pipe fittings should be the same for the same section of the distribution piping network. Pipe and fittings will be subjected to the same pressures. There is no technical justification to require the minimum rated working pressure of pipe to be substantially higher than the minimum rated working pressure of the pipe fittings which connect sections of pipe.

The proposed addition would correct this disparity (and error in NFPA 2001 (2012) and the 2004 and 2008 editions of the standard – see next section) by requiring the minimum design working pressure of the pipe to be based on the same criteria used to determine the minimum design working pressure of the pipe fittings.

Please note that this requirement had previously been approved by the NFPA 2001 technical committee when it accepted in principle Public Comment 2001-5 Log #8 for the 2004 edition of the standard (see attached Report on Comments, 2003 Fall Revision Cycle, pp. 2001-2, -3). The committee took the following action on this public comment:

**Committee Meeting Action: Accept in Principle**

1. Delete the two columns under the caption Piping Downstream of Pressure Reducer. The caption is also deleted.
2. Add the note with the exception. Editorially make the exception part of the note. The note will read as follows:
   
   Note: The minimum design pressure for piping downstream of the pressure reducer shall be determined by system flow calculations. Pre-engineered systems are designed to listed limitations which may or may not include values for pressures downstream of pressure reducers.

In the 2004 edition and subsequent editions of NFPA 2001, the columns of the table providing the minimum design working pressure for inert gas piping downstream of the pressure reducing device were deleted per the Technical Committee direction. **The note which was to have specified the new minimum design working pressure for pipe downstream of the pressure reducing device was omitted, apparently due to an error during processing for publication.**

This TIA would include the material in the Note which was approved by the NFPA 2001 technical committee and inadvertently left out of the standard during the publication process. The TIA recommends placing the approved verbiage as a subsection to 4.2.1.1 for sake of better conformity with the NFPA manual of style.

**Emergency Nature:** The pipe requirements contained in current UL listings and FM approvals of inert gas systems contradict the NFPA 2001 requirement for distribution pipe downstream of the pressure reducing device. Listings and approvals require pipe grade and size to be based on the maximum pressure downstream of the pressure reducing device from the system flow calculations. Thousands of systems have been installed in accordance with system flow calculations and applicable UL listings and FM approvals, yet many of these may not meet the [erroneous] minimum requirements in Table 4-2.1.1(a). This conflict creates a potential and completely unwarranted liability exposure for the manufacturer and installer of these systems creating an emergency situation that requires immediate correction by NFPA. The fact that NFPA staff has indicated that a Tentative Interim Amendment is the only way to make this correction in NFPA 2001 prior to the next edition further supports the emergency nature of this request.

The specification of pipe with minimum design working pressures far in excess of those required for the pipe fittings, if enforced, would lead to unreasonable and unnecessary cost increases for material and installation in order to meet the unwarranted requirement in NFPA 2001.
TIA FINAL BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the final results show this TIA HAS achieved the necessary votes on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 19.

\[31 \text{ eligible to vote} - 6 \text{ (not returned)} - 0 \text{ (abstentions)} = 25 \times 0.75 = 18.75\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[31 \text{ eligible} \div 2 = 15.5 = 14 \text{ (this is the simple majority)}\]

31 Eligible to Vote
6 Not Returned (Barbuzzi, Barylski, Dillon, DiNenno, Maranion, Rivers)

TC FINAL Ballot results for Technical Merit are as follows:
22 Agree (Richard w/comment)
3 Disagree (Cary, Senecal, Wickham)
0 Abstentions

FINAL ACTION: PASSED

TC FINAL Ballot results for Emergency Nature are as follows:
20 Agree
5 Disagree (Aron, Cary, Senecal, Walker, Wickman)
0 Abstentions

FINAL ACTION: PASSED
TECHNICAL COMMITTEE LETTER BALELOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1069
To Add New Sections 4.2.1.1.2, 4.2.1.1.3, A.4.2.1.1.2, and A.4.2.1.1.3 of the 2012 Edition of NFPA 2001,
Standard on Clean Agent Fire Extinguishing Systems

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to new Sections 4.2.1.1.2, 4.2.1.1.3, A.4.2.1.1.2, and A.4.2.1.1.3.

[ ] AGREE [ ] DISAGREE* [ ] ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.


Question 2: I agree that the subject is of an EMERGENCY NATURE.

[ ] AGREE [ ] DISAGREE* [ ] ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*I DON'T BELIEVE THAT THERE IS A LIABILITY ISSUE.

THE FACT THAT THE COMMITTEE IS REVIEWING THIS ISSUE DOES NOT INDICATE THAT THE ISSUE IS OF AN EMERGENCY NATURE

[Signature]

[Name (Please Print)]

[AUG 3, 2012]

Date

Please return the ballot on or before August 16, 2012.

PLEASE RETURN TO:
Elena Carroll, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7110
E-mail: ecarroll@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1069
To Add New Sections 4.2.1.1.2, 4.2.1.1.3, A.4.2.1.1.2, and A.4.2.1.1.3 of the 2012 Edition of
NFPA 2001,
Standard on Clean Agent Fire Extinguishing Systems

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to new Sections
4.2.1.1.2, 4.2.1.1.3, A.4.2.1.1.2, and A.4.2.1.1.3.

_____ AGREE      XX_____ DISAGREE*      _____ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.
Committee should discuss as part of normal revision process.


Question 2: I agree that the subject is of an EMERGENCY NATURE.

_____ AGREE      XX_____ DISAGREE*      _____ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.
This issue does not meet any of the criteria for emergency action.

_____________________________
Signature

_____________________________
William J. Cary
Name (Please Print)

8/15/12
Date

Please return the ballot on or before August 16, 2012.

PLEASE RETURN TO:
Elena Carroll, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7110     E-mail: ecarroll@nfpa.org
October 24, 2012

Supplemental Agenda October 29-30, 2012

Page 144 of 951
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1069
To Add New Sections 4.2.1.1.2, 4.2.1.1.3, A.4.2.1.1.2, and A.4.2.1.1.3 of the 2012 Edition of NFPA 2001,
Standard on Clean Agent Fire Extinguishing Systems

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to new Sections 4.2.1.1.2, 4.2.1.1.3, A.4.2.1.1.2, and A.4.2.1.1.3.

X-YES AGREE ____________ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a disagreement or abstaining position.
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

Question 2: I agree that the subject is of an EMERGENCY NATURE.

AGREE ____________ X DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a disagreement or abstaining position.
The current text has existed in 2001 for several editions without comment or proposed change. The submitter intent and basis is summarized in the last paragraph “if this requirement were enforced” there might be a significant cost impact. This would indicate the requirement has not and is not being enforced thusly mitigating any emergency nature requiring a TIA.

Signature
Fred K Walker, Jr.
Name (Please Print)
17 August 2012
Date
Please return the ballot on or before August 16, 2012.
Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to new Sections 4.2.1.1.2, 4.2.1.1.3, A.4.2.1.1.2, and A.4.2.1.1.3.

__________ AGREE ____X____ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I do support the text changes proposed for paragraphs 4.2.1.1.2 and 4.2.1.1.3 as that text is identical to that accepted by the technical committee in the 2003 ROC for Table 2-2.1.1(a) and apparently editorially overlooked and not included in the 2004, 2008 and 2012 editions of the standard. I do not support the text proposed for A.4.2.1.1.2 because the technical committee has not considered the ramifications of pressure reduction integral to a cylinder valve versus that accomplished by a separate pressure reducing device not the least of which would be the possible modes and consequences of failure of the two different pressure reducing techniques.

Question 2: I agree that the subject is of an EMERGENCY NATURE.

__________ AGREE ____X____ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I cannot rationalize that this matter, which has been overlooked by all for at least 8 years, can all of a sudden be considered a subject of emergency nature. I would suggest this matter be held over for consideration during the next revision cycle of the standard

Signature

Robert T. Wickham
Name (Please Print)

July 25, 2012
Date

Please return the ballot on or before August 16, 2012.

PLEASE RETURN TO:
Elena Carroll, Administrator, Technical Projects
Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to new Sections 4.2.1.1.2, 4.2.1.1.3, A.4.2.1.1.2, and A.4.2.1.1.3.

_____X_______ AGREE ____________ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I agree with the TECHNICAL MERITS of the Proposed TIA but I am concerned the proposed solution will not accomplish the desired outcome. Section 4.2.1.1.1 states “In no case shall the value used for the minimum pipe design pressure be less than that specified in Table 4.2.1.1.1(a)...”. But the proposed section 4.2.1.1.2 is intended to allow for a lower pressure rating, which can not be used because of 4.2.1.1.1 forbids any lower design pressure. Therefore, section 4.2.1.1.1 must be restricted to system without pressure reducing devices and proposed section 4.2.1.1.2 be only for systems with pressure reducing devices.

Question 2: I agree that the subject is of an EMERGENCY NATURE.

_____X_______ AGREE ____________ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

_____________________________________________________________________
_____________________________________________________________________
_electronic signature via email__________________________________________
Signature

 ____________________________
Robert Richard
Name (Please Print)

__________________________
7/26/12
Date

Please return the ballot on or before August 16, 2012.

PLEASE RETURN TO:
Elena Carroll, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7110 E-mail: ecarroll@nfpa.org
Item 12-10-11
September 5, 2012

Amy B. Cronin  
Secretary, NFPA Standards Council  
1 Batterymarch Park  
Quincy, Massachusetts  
USA 02169

Dear Ms. Cronin:

Tyco Fire Protection (TFP) respectfully requests an opportunity to file an appeal with the Standards Council in accordance with section 1.6.1. of the NFPA Regulations Governing Committee Projects, for consideration during their next meeting on October 29th and 30th, 2012. The nature of said appeal is to reverse several recent actions taken by the NFPA 750 committee during the Public Proposal or Input stage for Water Mist Fire Protection Systems wherein they have voted to adopt requirements that TFP believe is outside the current scope of the standard and create a direct conflict with another NFPA standard.

As stated in section 1.1 of the standard, NFPA 750 "contains the minimum requirements for the design, installation, maintenance, and testing of water mist fire protection systems." Therefore, TFP would argue that the committee overstepped the bounds of its responsibilities by implicitly adopting the concept of equivalency in performance and application between systems designed in accordance with NFPA 750, Standard for Water Mist Fire Protection Systems and NFPA 13, Standard for the Installation of Sprinkler Systems through the incorporation of several specific proposed revisions to the standard. Of primary concern are 750 FR9 and 750 FR45 as stated in the Report on First Revision November 2013 document. However there are a number of additional related revisions that are also in question. These items have been identified in yellow in the attached markup of the Report on First Revision - November 2013.

In addition, the recent action taken by the NFPA 750 technical committee as described above creates a direct conflict with the upcoming 2013 edition of NFPA 13, new section 1.1.2 which states "This standard does not provide requirements for the design or installation of water mist fire protection systems, which are not considered fire sprinkler systems and are addressed by NFPA 750, The Standard on Water Mist Fire Protection Systems." See attached page from 13-A2012-ROC 13-4 Log #CC3 AUT-SSI.

It is the opinion of TFP that it is not within the power or responsibility of any NFPA technical committee to adopt either implicitly or explicitly the concept of equivalency in performance or application of one fire protection technology within its existing NFPA design and installation standard with any other technology governed by a separate NFPA design and installation standard. Doing so creates a conflict wherein the requirements of one standard must apply to the other, whilst each standard is represented by a separate technical body, and may or may not be on a separate revision cycle. Each technology should be governed by its own respective design and installation standard, and the related requirements should be supported by the sole technical merits of said technology alone. This approach will preserve the integrity of each standard, eliminate the potential for conflicts between the actions of separate technical committees, and minimize confusion in the industry regarding the application of each standard in practice.
Please be aware that TFP has every intention of addressing these issues by following the standard NFPA revision process, and will submit comments for every single item related to this issue of which we have significant concern. However, as the issue in question is viewed as a departure from the scope of committee power and responsibility, we respectively request that the Standards Council review the recent actions of the NFPA 750 technical committee, and provide a ruling on whether or not said actions are within their scope of responsibility and/or are truly in direct conflict with the 2013 edition of NFPA 13.

If the Standards Council determines that the NFPA 750 technical committee has exceeded their scope of responsibility, or has created a direct conflict with the 2013 edition of NFPA 13, we ask that all related revisions to the standard be returned to the committee at the comment review phase with explicit instructions to remove all instances within the document in which the performance or application of water mist systems is related to sprinkler systems – particularly by referring to them as an “equivalent” or “alternative” to a sprinkler systems for the same application, and where the performance of said system is required to “meet or exceed the capabilities” of a sprinkler system for the same application.

TFP would like to thank you for your time and consideration, and greatly appreciate any support that the Standards Council can offer in this matter. Please feel free to contact me directly should you have questions or concerns.

Thank You

James Golinveaux
General Manager
Water Fire Suppression Products

Appendix:
- 13-A2012-ROC 13-4 Log #CC3 AUT-SSI (markup of section 1.1.2; page 13-6)
- NFPA750 Report on First Revision – November 2013 (markup of multiple revisions in question)
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Update the following references:

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


2.3 Other Publications.

2.3.1 ANSI Publications. American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

ANSI B16.18, Cast Copper Alloy Solder Joint Pressure Fittings, 1994.

2.3.2 ASME Publications. American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.

ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings, 2012.

2.3.3 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P. O. Box C700, West Conshohocken, PA 19428-2959.

2.3.4 AWS Publications. American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126. 
AWS A5.8M/A5.8, Specification for Filler Metals for Brazing and Braze Welding, 1992. 

2.3.5 IMO Publications. International Maritime Organization, 4 Albert Embankment, London, SE1 7SR, United Kingdom.

IMO Assembly Resolution A.800(19), Revised Guidelines for Approval of Sprinkler Systems.


IMO MSC/Circ. 668, Alternative Arrangements for Halon Fire-Extinguishing Systems in Machinery Spaces and Pumprooms.

IMO MSC/Circ. 728, Revised Test Method for Equivalent Water-Based Fire-Extinguishing Systems for Machinery Spaces of Category A and Cargo Pump-Rooms Contained in MSC/Circ. 668.

IMO MSC/Circ. 913, Guidelines for the Approval of Fixed Water-Based Local Application Fire-Fighting Systems for Use in Category A Machinery Spaces, 1999.


2.3.6 ISO Publications. International Organization for Standardization, 1 rue de Varembé, Case postale 56, CH-1211 Geneve 20, Switzerland.


2.3.7 ULC Publications. Underwriters' Laboratories of Canada, 7 Underwriters Road, Toronto, Ontario M1R 3B4, Canada.


2.3.8 U.S. Coast Guard Publication. 2100 Second Street, S.W., Washington, DC 20593-0001.


Title 46, Code of Federal Regulations, Parts 56.50 and 56.75, “Shipping.”

Title 49, Code of Federal Regulations, “Transportation.”

2.3.10 Other Publications.


2.4 References for Extracts in Mandatory Sections.


Statement: Updated references per the NFPA Manual of Style.

750 FR54

(3.3.1 Acceptance Test Plan (New) )

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new definition as shown:

3.3.1 Acceptance Test Plan. A complete step-by-step description of the proposed acceptance test procedure that identifies all devices, controls, and functions to be tested and how the test will be conducted.

Statement: The Technical Committee added this definition for use within the standard
(3.3.3 Deluge System)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: 3.3.3 Deluge System. A water mist system using open nozzles attached to a piping system that is connected to a water supply through a valve that is opened by means of a detection system installed in the same area as the mist nozzles. When the valve opens, water flows into the piping system and discharges through all nozzles attached to the system.

Statement: This term was deleted and replaced with 'Deluge Water Mist System'. See FR5.

(3.3.13 Pressure)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:
3.3.13 Pressure.
3.3.13.1 Nozzle Operating Pressure. The pressure range at which nozzles are listed to control, suppress or extinguish a fire.
3.3.13.2 Standby Pressure. The pressure that exists in the distribution system in the static state, prior to nozzle discharge.
3.3.13.3 System Design Pressure. The maximum pressure a system or component is rated to withstand.
3.3.13.4 Working Pressure. The maximum anticipated static (nonflowing) or pressure applied to the system components exclusive of surge pressures.

Statement: Current definition can be interpreted as standby pressure (pre-activation). The proposed modification makes the definition more consistent with NFPA 13 for the definition of System Working Pressure.

(3.3.14 Pressure Relief Device (New) )

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text to read as follows:
3.3.14 Pressure Relief Device. A device designed for the purpose of preventing pressure levels in excess of the design pressure of the system, the system components, or both.

Statement: The standard currently uses the term Pressure Relief Valve but does not currently define these. These devices are all similar in nature and are sometimes differentiated through their application rather than their operating method or mechanical configuration therefore the Technical Committee changed the text for clarity.

(3.3.15 Pressure-Regulating Valve (New) )

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text to read as follows:
3.3.15 Pressure-Regulating Valve. A valve designed for the purpose of reducing, regulating, controlling, or restricting water pressure.

Statement: The Committee added a new definition to clarify valve operation.
(3.3.17 Total Compartment Application System)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: 3.3.17 Total Compartment Application System. A system designed to discharge water mist to protect all hazards in an enclosure.
Statement: This term was replaced by 'Total Compartment Application Water Mist System'. See FR11.

(3.3.20 Twin-Fluid System)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing definition of Twin-fluid System as follows:

3.3.18 Twin–Fluid System. A water mist system in which water and an atomizing media are separately supplied to and mixed at the water mist nozzle utilizing a separate piping system for each medium or a single piping system for both.

Statement: The definition of twin fluid system in NFPA 750 is based on the idea of two separate piping systems, one for water and one for atomizing medium. It does not agree with the definition in FM 5560 which recognizes that in some cases both water and atomizing medium are delivered in a single piping system.

FM 5560, section 1.9: Twin Fluid System. A water mist system in which water and atomizing media are supplied to the water mist nozzle. These systems may utilize separate piping system or a single piping system.

(3.3.21 Unloader Valve (New))

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text to read as follows:

3.3.21 Unloader Valve. A valve that is designed to relieve excess flow below pump capacity at set pump pressure. [20, 2013]

Statement: The Technical Committee added NFPA 20 extract information.

(3.3.22 Water Mist)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:

3.3.22 Water Mist. A water spray for which the \( D_{v0.99} \) for the flow-weighted cumulative volumetric distribution of water droplets is less than 1000 microns \( \mu \text{m} \) at the within the nozzle operating pressure range minimum design operating pressure of the water mist nozzle.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23.
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

3.3.23.2 Hybrid Multi-functional Water Mist Nozzles. Nozzles capable of operation using both automatic and nonautomatic means.

Statement: The Technical Committee agrees the use of the wording "hybrid water mist nozzles" may potentially cause confusion in the fire protection industry. Recently, independent testing agencies (Factory Mutual) have initiated use of the term "hybrid" to define a group of twin-fluid water mist technologies using a propellant (nitrogen). The introduction of nitrogen into the risk being protected may reduce the oxygen level below 16%. If the level of Oxygen is lowered to below 16%, Factory Mutual is identifying these systems as "hybrid", as they impact a fire via both water discharge and inerting with the propellant. The use of the wording "hybrid" by NFPA and Factory Mutual, both involving water mist technologies, would potentially cause confusion within the fire protection industry.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: 3.3.24 Zoned Application System. A system designed to protect hazards in a predetermined portion of an enclosure.

Statement: This term was replaced by 'Zoned Application Water Mist System'. See FR12.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add a new definition as follows:

3.3.24.1* Automatic Sprinkler Alternative Water Mist Systems. A water mist system utilizing automatic water mist nozzles installed in a building and designed to provide primary fire protection that is an alternative to automatic sprinkler systems.

Statement: The definition is new. It is added to clarify the full range of types of water mist systems. Water mist systems are widely used in applications as an alternative to conventional sprinkler systems.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new:

3.3.24.2 Deluge Water Mist System. A water mist system utilizing nonautomatic mist nozzles (open) attached to a piping network connected to the fluid supply(ies) through a valve controlled by an independent detection system installed in the same area as the mist nozzles.

Statement: This new term was created to comply with NFPA best practices, which discourage multiple definitions for the same term, across all NFPA documents. The new prevents confusion with 'Deluge System', which is used in other standards, and it clarifies water mist systems. See FR
750 FR10

(3.3.24.7 Pre-engineered Water Mist Systems)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

3.3.24.7 Pre-engineered Water Mist Systems. Those systems having predetermined flow rates, nozzle pressures, and water quantities; pipe and tube sizes, maximum and minimum pipe lengths, number of fittings and numbers and types of nozzles, nozzle pressures, atomizing media and water storage quantities, and which do not require additional hydraulic calculations.

Statement: The revised definition includes more information from the annex note to describe pre-engineered systems & clarifies that hydraulic calculations are not required.

750 FR11

(3.3.24.8 Total Compartment Application Water Mist System (New) )

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text as follows:

3.3.24.8 Total Compartment Application Water Mist System. A deluge water mist system that provides complete protection of an enclosure or space by the simultaneous operation of all nozzles in the space by manual or automatic means.

Statement: The definitions currently included in 3.2.22 do not include the full range of types of water mist systems addressed elsewhere in NFPA 750.

750 FR12

(3.3.24.9 Zoned Application Water Mist System (New) )

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text as follows:

3.3.24.9 Zoned Application Water Mist System. A total compartment application water mist system utilizing nonautomatic nozzles, or intermixed nonautomatic and automatic nozzles, in which the piping network is subdivided into predetermined zones controlled by individual control valves, and which protects a predetermined portion of the compartment by the manual or automatic activation of a selected group of nozzles.

Statement: The definitions currently included in 3.3.22 do not include the full range of types of water mist systems addressed elsewhere in NFPA 750.
Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Add new Chapter 5 as follows:

Chapter 5 Classification of Occupancies.

5.1* Classification of Occupancies.  
5.1.1 Occupancy classifications for this standard shall relate to water mist system design, installation, and water supply requirements only.

5.1.2 Occupancy classifications shall not be intended to be a general classification of occupancy hazards.

5.2* Light Hazard Occupancies. Light hazard occupancies shall be defined as occupancies or portions of other occupancies where the quantity and/or combustibility of contents is low and fires with relatively low rates of heat release are expected.

5.3* Ordinary Hazard Occupancies.  
5.3.1* Ordinary Hazard (Group 1). Ordinary hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where combustibility is low, quantity of combustibles is moderate, stockpiles of combustibles do not exceed 8 ft (2.4 m), and fires with moderate rates of heat release are expected.

5.3.2* Ordinary Hazard (Group 2). Ordinary hazard (Group 2) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents are moderate to high, where stockpiles of contents with moderate rates of heat release do not exceed 12 ft (3.66 m) and stockpiles of contents with high rates of heat release do not exceed 8 ft (2.4 m).

5.4 Extra Hazard Occupancies.

5.4.1* Extra Hazard (Group 1). Extra hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents are very high and dust, lint, or other materials are present, introducing the probability of rapidly developing fires with high rates of heat release but with little or no combustible or flammable liquids.

5.4.2* Extra Hazard (Group 2). Extra hazard (Group 2) occupancies shall be defined as occupancies or portions of other occupancies with moderate to substantial amounts of flammable or combustible liquids or occupancies where shielding of combustibles is extensive.

5.5* Special Occupancy Requirements. Water mist systems shall be permitted to be used for special occupancies provided that they have been listed for such occupancies.

5.6 Residential Occupancies.

5.6.1 Residential Occupancies up to and Including Four Stories in Height. Residential Occupancies shall include the following, as defined in NFPA 101®, Life Safety Code:

(1) Apartment buildings  
(2) Lodging and rooming houses  
(3) Board and care facilities  
(4) Hotels, motels, and dormitories.

5.6.2 One- and Two-Family Dwellings. One- and two-family dwellings shall be defined as any detached building or any part of a townhouse structure that is separated from the remainder of the townhouse structure with fire resistance rated assemblies in accordance with local building code; that contains no more than two dwelling units intended to be used, rented, leased, let, or hired out to be occupied; or that is occupied for habitation purposes.

Statement: The technical committee recognizes the concept of using water mist systems for protection of structures as a sprinkler equivalent system. The use of water mist as an automatic sprinkler equivalent is within the systems’ listed applications. The proposed additions recognize that based on performance, listings and field experience, water mist is a viable alternative to provide protection for specific classifications of hazards similar to NFPA 13, Automatic Sprinkler Systems.

Water mist systems are approved by FM for light hazard (FM 5560) and listed by UL for ordinary hazard, group I (UL ZDPA.EX15843) occupancies as defined by NFPA 13. These approvals/listings would permit water mist to be installed as the primary suppression system in a wide range of Occupancy Classifications including Assembly, Business, Educational, Health care, and Residential. Many of these occupancy types benefit from the water efficient nature of the water mist systems. The changes incorporate criteria that define occupancies in the same manner as NFPA 13 and address key design issues.

Water mist systems have obtained the same hazard classification listings given to sprinkler systems (i.e. light and ordinary hazard) and these systems are being recognized as an equivalent system to sprinkler systems.
A new chapter is proposed between existing Chapters 4 and 5. The proposed changes add wording and Annex notes from NFPA 13 for the installation and design of sprinkler equivalent water mist systems. Water mist systems have the potential to provide fire protection against an equally wide range of hazards as conventional sprinkler systems with the added benefit of water efficiency. To facilitate the incorporation of water mist as a primary suppression system, a similar occupancy hazard approach to NFPA 13 is proposed to provide equivalent technical references.

### 750 FR92

*(6.1.2)*

**Submitter:** Technical Committee Water Mist Fire Suppression Systems  
**Recommendation:** Revise existing section as follows:  
**56.1.2 Design Pressure Working Pressure.**  
**56.1.2.1** System components shall be rated for have a design pressure equal to or greater than the maximum working pressure to which they are exposed but not less than 12.1 bar (175 psi).  
**56.1.2.2** Where components are part of a listed, pre-engineered system with a self-contained water supply, the pressure rating shall be in accordance with the listing requirements.  
**Statement:** This is a change to modify the text to be consistent with definitions found in 3.3.23

### 750 FR19

*(6.2.2.1)*

**Submitter:** Technical Committee Water Mist Fire Suppression Systems  
**Recommendation:** Revise text to read as follows:  
**56.2.2.1* Installation.** Gas and water containers shall be designed for installation according to the manufacturer’s installation manual, including provision for attachment of seismic restraint where required.  
**Statement:** This section has been clarified to state that not all systems require the need for seismic restraints.

### 750 FR20

*(6.2.2.4)*

**Submitter:** Technical Committee Water Mist Fire Suppression Systems  
**Recommendation:** Revise text to read as follows:  
**56.2.2.4 Design Pressure.** The design pressure shall be based on the maximum pressure developed by the water mist system at 54°C (130°F) or a higher temperature as specified in the manufacturer’s listing.  
**Statement:** The temperature in 5.2.2.4 is the minimum temperature, higher temperatures can be permitted when listed.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

56.3.1.1 All wetted surfaces in piping, valves, and fittings from the system strainer to the nozzle, shall have corrosion resistance at least equivalent to that for piping as specified in Table 56.3.3.1.

Statement:

Some compression fittings use non-stainless steel nuts as a part of the fitting. Since the nuts do not come in contact with a wetted surface or water, there is no need for the nuts to be stainless steel. This modification to the text will result in lower costs for water mist systems and wider use of the product.

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Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

56.3.4.1* Pipe or tube shall be of noncombustible material having physical and chemical characteristics such that its deterioration under stress can be predicted with reliability.

56.3.4.2* The piping shall be in accordance with ASME B31.1, Power Piping Code or EN13480-3, Metallic Industrial Piping.

Statement:

The ASME Code is not adopted in all countries while the use of NFPA 750 is used as a world standard. This European code standard should be referenced to allow its use since it provides a comparable level of safety as the ASME Code.

The annex material for 6.3.4.1 was reassigned to 6.3.4.2 (See FR23).

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Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

56.3.4.3 Where using the equations provided in ASME B31.1, Power Piping Code, or EN13480-3, Metallic Industrial Piping Code, are used to calculate either the maximum working design pressure (\(P_w\)) for a specific pipe or tube or the minimum wall thickness (\(t_w\)) of the pipe or tube for a specific operating working pressure, a steel temperature of 54°C (130°F) or the expected ambient temperature to which the pipe or tube will be exposed, shall be used, whichever is greater, shall be used.

Statement:

Add reference to European code standard for Metallic Industrial Piping to allow pipe manufactured in Europe to be used and change to modify text to be consistent with definitions found in 3.3.23.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new text:

6.4.1.2 Welding and brazing alloys shall have a melting point above 538°C (1000°F).

Statement: This text appears in Section 5.4.3.5 in the 2010 Edition. Due to the current location of the text, it is only required that welding and brazing alloys have a melting point above 538°C (1000°F) when used in high pressure systems. Low pressure systems can protect similar hazards as high pressure systems, subjecting the system piping the same expected temperatures, thus the requirement for the brazing pipe joining method should be required for all types of water mist systems. It has been moved so that it will fall under the general fitting requirements.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text as follows:

5.4.1.2.2 A supply of minimum of one spare adapters conversion fitting of each type shall be maintained on the premises so that any adapters conversion fittings that have been damaged in any way can be promptly replaced.

5.4.1.2.3 Adapter Conversion fitting information shall also be maintained on the drawings.

Statement: The Technical Committee clarified existing language within the text because of confusion in the field regarding the exact requirement.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing text as follows:

5.4.3.1 Fittings shall have a minimum-rated system design working pressure equal to or greater than the maximum operating working pressure of the water mist systems at 54°C (130°F).

5.4.3.2 For systems that employ the use of a pressure regulating device in the distribution piping, the fittings downstream of the device shall have a minimum-rated system design working pressure equal to or greater than the maximum anticipated working pressure in the downstream piping.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: 5.4.3.5 Welding and brazing alloys shall have a melting point above 538°C (1000°F).

Statement: The text has been moved to 6.4.1.2. See FR27.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new text:

6.5.2 (New) Hangers used on low pressure water mist systems shall be permitted to be designed and installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

Statement: One of the common questions that comes up during the design and installation of low pressure water mist systems is the type of hangers and bracing to use on the system piping. Considering that low pressure water mist systems operate in similar pressure and flow ranges to standard sprinkler and fixed water spray systems, it would seem reasonable to allow the same hanging and bracing requirements to apply per standard industry practice. The hanging and bracing requirements in NFPA 13 are extremely detailed, and are more than adequate to cover the range of applications in which low pressure mist systems are utilized. This would also greatly simplify the process of inspection, testing, and maintenance of low pressure systems.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing text as follows:

56.6.1* Listing. Nozzles shall be listed either individually or as a part of a pre-engineered system, and the listing information shall include the following:

(1) Specific hazards and protection objectives
(2) Volumetric flow rate characteristics of water discharge for each nozzle
(3) Maximum height of protected space
(4) Minimum distance between nozzle tip or diffuser, as applicable, and plane of protection
(5) Maximum spacing between nozzles
(6) Maximum coverage area per nozzle
(7) Minimum spacing between nozzles
(8) Maximum height between ceiling and nozzle diffuser or tip, as applicable
(9) Nozzle obstruction spacing criteria
(10) Maximum spacing of nozzles from walls
(11) Nozzle operating pressure range
(12) Allowable range of nozzle orientation angle from vertically down
(13) Classification of automatic nozzle thermal response characteristics as fast, special, or standard response
(14) Maximum compartment volume, if applicable
(15) Maximum time delay for water mist delivery to the most remote nozzle

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

56.9.1.3.2 Overpressure shall not exceed the design working pressure of the piping system.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

**6.9.1.7 Unloader Valves.** Unloader valves shall be part of a listed or approved as part of the pump assembly or be listed separately.

Statement: The Technical Committee has changed the text because the wording of "approved" and "or approved" was unnecessary.

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Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

**6.9.3.1 Listing.** Controllers for pumps shall be listed fire pump controllers and or listed limited service controllers be installed in accordance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection.*

Statement: The current trend in the industry is to phase out the use of limited service controllers from use in fire protection applications. In addition, all aspects related to the design and installation of fire pumps should be addressed in NFPA20. Arguably, if allowed by NFPA 20, the proposed change would not prohibit the use of limited service controllers in water mist systems.

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Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

**6.10.3.4 Temperature Limitations.** Devices shall be designed to function from a minimum range of 4°C to 54°C (40°F to 130°F), or devices designed to function outside of this range shall be so indicated shall be marked to indicate temperature limitations.

Statement: All approved devices will function between these temperatures per typical testing protocol.

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Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new text to read as follows:

**6.10.3.6.8** The requirements of 6.10.3.6 shall not apply to dry and wet pipe systems utilizing individual thermally activated nozzles.

Statement: The functionality of a “manual release device” is lost on dry or wet pipe systems utilizing individual, thermally activated nozzles.

5.10.3.6 should include an allowance to relax the requirements for a “manual release device” for dry and wet pipe systems utilizing individual, thermally activated nozzles in the same manner that 5.10.3.5.6 relaxes the “emergency release device” requirements of 5.10.3.5 for dry and wet pipe systems utilizing individual, thermally activated nozzles.
750  FR34
(7.1)

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

6.1 General. Water mist systems shall be described by the following four five parameters as appropriate:

(1) System application
(2) Nozzle type
(3) System operation method
(4) System media type
(5) Classification of occupancy

Statement:

These code proposals are part of a larger group of code proposals to recognize the concept of using water mist systems for protection of structures as a sprinkler equivalent system. The use of water mist as an automatic sprinkler equivalent is within the systems’ listed applications. The proposed additions recognize that based on performance, listings and field experience, water mist is a viable alternative to provide protection for specific classifications of hazards similar to NFPA 13, Automatic Sprinkler Systems. The proposed code sections support proposed changes in separate proposals 6.2 and 7.1.

Water mist systems are approved by FM for light hazard (FM 5560) and listed by UL for ordinary hazard, group I (UL ZDPA.EX15843) occupancies as defined by NFPA 13. These approvals/listings would permit water mist to be installed as the primary suppression system in a wide range of Occupancy Classifications including Assembly, Business, Educational, Health care, and Residential. Many of these occupancy types benefit from the water efficient nature of the water mist systems. The intent of these code changes is to recognize automatic water mist as being equivalent to automatic sprinklers when listed as an appropriate option. The changes incorporate criteria that define occupancies in the same manner as NFPA 13 and address key design issues.
Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Revise text to read as follows:

67.2 System Applications. System applications shall consist of one of the following three categories:

1) Local-application systems
2) Total compartment application systems
3) Zoned application systems

4) Automatic sprinkler alternative water mist application systems

67.2.1 Local-Application Systems.

67.2.1.1 Local-application systems shall be designed and installed to provide complete distribution of mist on or around the hazard or object to be protected.

67.2.1.2 Local-application systems shall be designed to protect an object or a hazard in an enclosed, unenclosed, or open outdoor condition.

67.2.1.3 Local-application systems shall be actuated by automatic nozzles or by an independent detection system.

67.2.2 Total Compartment Application Systems.

67.2.2.1 Total compartment application systems are designed and installed to provide complete protection of an enclosure or space.

67.2.2.2 The complete protection of an enclosure or space shall be achieved by the simultaneous operation of all nozzles in the space by manual or automatic means.

67.2.3 Zoned Application Systems.

67.2.3.1 Zoned application systems are a subset of the compartment system and are designed to protect a predetermined portion of the compartment by the activation of a selected group of nozzles.

67.2.3.2 Zoned application systems shall be designed and installed to provide complete mist distribution throughout a predetermined portion of an enclosure or space. This shall be achieved by simultaneous operation of a selected group of nozzles in a predetermined portion of the space by manual or automatic means.

67.2.3.3 Zoned application systems shall be actuated by automatic nozzles or by an independent detection system.

67.2.4 Automatic Sprinkler Alternative Water Mist Systems.

67.2.4.1 Automatic sprinkler alternative water mist systems shall be designed and installed to provide automatic fire protection throughout a building or area.

67.2.4.2 Automatic sprinkler alternative water mist system devices shall be listed for the intended occupancy classification as described in Chapter 5 unless otherwise permitted in this standard.

67.2.4.3 Automatic sprinkler alternative water mist systems shall be of the wet pipe or dry pipe type.

67.2.4.4 The requirements of 7.2.4.3 shall not apply where environmental or operational conditions dictate whether there is a wet or dry system.

Statement: The use of water mist as an automatic sprinkler equivalent is within the systems' listed applications. The proposed additions recognize that based on performance, listings and field experience, water mist is a viable alternative to provide protection for specific classifications of hazards similar to NFPA 13, Automatic Sprinkler Systems.

Water mist systems are approved by FM for light hazard (FM 5560) and listed by UL for ordinary hazard, group I (UL ZDPA.EX15843) occupancies as defined by NFPA 13. These approvals/listings would permit water mist to be installed as a primary suppression system in a wide range of Occupancy Classifications including Assembly, Business, Educational, Health care, and Residential. Many of these occupancy types benefit from the water efficient nature of the water mist systems. The intent of these code changes is to recognize automatic water mist as being equivalent to automatic sprinklers when listed as an appropriate option.

These changes establish that water mist systems are equivalent to automatic sprinklers and state the basic requirements that sprinkler equivalent water mist systems must meet. Criteria are based on NFPA 13, Automatic Sprinkler Systems, limitations.
750 FR18

(7.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: **67.3 Nozzle Types.** Water mist nozzles shall be classified as one of the following three types:

1. Automatic
2. Nonautomatic
3. Hybrid Multifunctional

Statement: The Technical Committee agrees the use of the wording "hybrid water mist nozzles" may potentially cause confusion in the fire protection industry. Recently, independent testing agencies (Factory Mutual) have initiated use of the term "hybrid" to define a group of twin-fluid water mist technologies using a propellant (nitrogen). The introduction of nitrogen into the risk being protected may reduce the oxygen level below 16%. If the level of Oxygen is lowered to below 16%, Factory Mutual is identifying these systems as "hybrid", as they impact a fire via both water discharge and inerting with the propellant. The use of the wording "hybrid" by NFPA and Factory Mutual, both involving water mist technologies, would potentially cause confusion within the fire protection industry.

750 FR37

(7.4.3.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

**67.4.3.3** The pressurized piping in all preaction systems shall be supervised to ensure system piping integrity.

Statement: By adding the word "system", the Technical Committee clarified existing language within the text because of confusion in the field regarding the exact requirement.

750 FR36

(7.4.4.3 (New))

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new text to read as follows:

**7.4.4.3** The pressurized piping in all dry pipe systems shall be supervised to ensure system integrity.

Statement: The Technical Committee has added a requirement that the dry pipe portion of the system requires monitoring or supervision similar to NFPA 13 with the text revised.

750 FR74

(8.1.2)

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise as follows:

**78.1.2 System Design and Installation Manual.** Materials and devices shall be installed in accordance with the manufacturer’s system design and installation manual.

Statement: This revision improves consistency between chapters.
Recommendation: Add new text to read as follows:

8.1.6 Automatic Sprinkler Alternative Water Mist Systems.

8.1.6.1 Spacing and Location of Nozzles. The requirements for spacing, location, and position of water mist nozzles shall be based on the following principles:

1. Nozzles shall be installed throughout the premises unless the nozzles are specifically tested and the test results demonstrate that omission of water mist nozzles from certain limited areas is permissible.
2. Nozzles shall be located so as not to exceed the spacing criteria specified by the manufacturer in the system design and installation manual.
3. Nozzles shall be positioned and located so as to provide satisfactory performance with respect to activation time and distribution pattern.
4. When nozzles are specifically tested and the test results demonstrate that deviations from clearance requirements to obstructions do not impair the ability of the system to control or suppress a fire, their positioning and locating in accordance with the test results shall be permitted.
5. Clearance between nozzles and ceilings exceeding the maximums specified in the standard or in the manufacturer’s system design and installation manual shall be permitted, provided that tests or calculations demonstrate performance of the automatic water mist nozzles comparable to those installed in conformance with this standard.
6. Furniture, portable wardrobe units, cabinets, trophy cases, and similar objects or features not intended for occupancy, whether freestanding or attached to the finished structure, do not require nozzles to be installed in them.

8.1.6.2 System Protection Area Limitations. The maximum area on any one floor to be protected by water mist supplied by any one water mist system riser or combined system riser shall be as follows:

1. Light hazard - 4,831 m² (52,000 ft²)
2. Ordinary hazard - 4,831 m² (52,000 ft²)
3. Extra hazard - 3,716 m² (40,000 ft²)

8.1.6.3 Mezzanines. The floor area occupied by mezzanines shall not be included in the area limits of 8.1.6.2.

8.1.6.4 Multiple Occupancies Within a Building. Where single automatic sprinkler alternative water mist systems protect extra hazard areas covered by other NFPA standards, in addition to ordinary or light hazard areas, the extra hazard coverage shall not exceed the floor area specified for that hazard and the total area coverage shall not exceed 4,831 m² (52,000 ft²).

8.1.6.5 Multiple Buildings. Multiple buildings attached by canopies, covered breezeways, common roofs, or a common wall(s) shall be permitted to be supplied by a single system riser provided that the maximum system size complies with 8.1.6.2.

Statement: These code proposals are part of a larger group of code proposals to recognize the concept of using water mist systems for protection of structures as a sprinkler alternative system. The use of water mist as an automatic sprinkler alternative is within the systems’ listed applications. The proposed additions recognize that based on performance, listings and field experience, water mist is a viable alternative to provide protection for specific classifications of hazards similar to NFPA 13, Automatic Sprinkler Systems. Water mist systems are approved by FM for light hazard (FM 5560) and listed by UL for ordinary hazard, group I (UL ZDPA.EX15843) occupancies as defined by NFPA 13. These approvals/listings would permit water mist to be installed as the primary suppression system in a wide range of Occupancy Classifications including Assembly, Business, Educational, Health care, and Residential. Many of these occupancy types benefit from the water efficient nature of the water mist systems. The intent of these code changes is to recognize automatic water mist as being equivalent to automatic sprinklers when listed as an appropriate option.
750 FR40
(8.3.2)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

78.3.2 Installation Standards. All water and atomizing media piping and tubing for water mist systems shall be installed in accordance with one of the following:

1. ASME B31.1, Power Piping Code
2. EN13480-3, Metallic Industrial Piping

(8.3.3) Water piping only, in low-pressure systems installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, only for water piping in low-pressure systems.

(8.3.4) Piping installed in accordance with its water mist system listing where the listing provides installation criteria are different from ASME B31.1, Power Piping Code or EN13480-3, Metallic Industrial Piping.

Statement: The Technical Committee agrees with the additional references except reference to UL 1821 is unnecessary since item (4) permits unique listing criteria.

750 FR97
(8.3.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: 7.3.3 Pressure Rating. All system piping, tubing, and hose shall be rated for the maximum working pressure to which they are exposed.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23

750 FR98
(8.4.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: 7.4.3 Pressure Rating. All fittings shall be rated for the maximum working pressure to which they are exposed.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23

750 FR99
(8.5.6.2)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:

78.5.6.2 The system design working pressure shall be in accordance with the manufacturer’s listing.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise as follows:

78.8.3 Pressure Regulating, and Pressure Relief Valves, and Unloader Valves.

78.8.3.1 Valves For Use With Water Pressure Regulating Valves.

78.8.3.1.1 Pressure regulating valves shall be installed in any portion of the system where the potential exists for the working system pressure to exceed the system design maximum rated working pressure of the system, the system components, or both.

Statement: The current text from section 7.8.3 Pressure Regulating, Pressure Relief Valve and Unloader Valve does not address Pressure Regulating Valves of the Unloader Valve type and this is a change to modify the text to be consistent with definitions found in 3.3.23

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

78.8.3.1.2 These valves shall open when the system at a pressure reaches 95 percent of the greater than the working pressure and less than the system-rated design pressure.

Statement: This change results in a more practical requirement for setting of a relief valve.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:

78.8.3.1.3 A relief valve of not less than 13 mm (1 1/2 in.) shall be provided on the discharge side of the pressure regulating valve that is set to operate at a pressure not exceeding the system-rated design pressure.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text as follows:

8.8.3.1.8 Unloader valves shall not be required to meet the requirements of 8.8.3.1.1 through 8.8.3.1.7.

8.8.3.1.9 Unloader valves shall meet the requirements of NFPA 20, Chapter 8.

Statement: The current text does not address Pressure Regulating Valves of the Unloader Valve type.
Submitter: Technical Committee Water Mist Fire Suppression Systems

**Recommendation:** Revise existing section as follows:

> **78.8.3.2.2** PRVs shall be installed when the supply pressure is higher than the system design operating pressure of the water mist system.

**Statement:** This is a change to modify the text to be consistent with definitions found in 3.3.23

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Submitter: Technical Committee Water Mist Fire Suppression Systems

**Recommendation:** Revise text to read as follows:

> **89.2.1** Scope. Listing of water mist fire protection systems or devices shall be based on a comprehensive evaluation designed to include fire test protocols, system components, and the contents of the manufacturer’s design and installation manual.

**Statement:** The Technical Committee has added the wording "or devices" for clarity because the "listing evaluations" include devices.

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Submitter: Technical Committee Water Mist Fire Suppression Systems

**Recommendation:** Revise text as follows:

> **8.2.4.2** The system hardware shall be listed for the intended application.

**Statement:** The Technical Committee recognizes the component listing is already covered in Sec.5.1.1
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text to read as follows:

9.3.2. Performance Objectives for Automatic Sprinkler Alternative Water Mist Systems
9.3.2.1 Automatic sprinkler alternative water mist systems designed in accordance with this standard shall meet or exceed the capabilities of a comparable sprinkler system.
9.3.2.2. Automatic sprinkler alternative water mist systems shall be listed for the appropriate occupancy classifications in Chapter 5.

Statement: The proposed additions recognize that based on performance, listings and field experience, water mist is a viable alternative to provide protection for specific classifications of hazards similar to NFPA 13, Automatic Sprinkler Systems.
Water mist systems are approved by FM for light hazard (FM 5560) and listed by UL for ordinary hazard, group I (UL ZDPA.EX15843) occupancies as defined by NFPA 13. These approvals/listings would permit water mist to be installed as a primary suppression system in a wide range of Occupancy Classifications including Assembly, Business, Educational, Health care, and Residential. Many of these occupancy types benefit from the water efficient nature of the water mist systems. The intent of these code changes is to recognize automatic water mist as being equivalent to automatic sprinklers when listed as an appropriate option. Changes to 8.3 establish basic performance objectives for sprinkler equivalent water mist systems. These requirements are met through the listing of the system for the different hazard occupancies.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

8.9.4.2 Fire Hazard Classification. The fire hazard shall be classified either by the combustible loading and fuel type or by the occupancy classifications in Chapter 5.

Statement: These code proposals are part of a larger group of code proposals to recognize the concept of using water mist systems for protection of structures as a sprinkler equivalent system. The use of water mist as an automatic sprinkler equivalent is within the systems’ listed applications.
Water mist systems are approved by FM for light hazard (FM 5560) and listed by UL for ordinary hazard, group I (UL ZDPA.EX15843) occupancies as defined by NFPA 13. These approvals/listings would permit water mist to be installed as the primary suppression system in a wide range of Occupancy Classifications including Assembly, Business, Educational, Health care, and Residential. Many of these occupancy types benefit from the water efficient nature of the water mist systems. The intent of these code changes is to recognize automatic water mist as being equivalent to automatic sprinklers when listed as an appropriate option. The changes incorporate criteria that define occupancies in the same manner as NFPA 13 and address key design issues.
Revised section 8.4.2 establishes fire hazard classification approach for sprinkler equivalent water mist systems.
Chapter 10 Automatic Sprinkler Alternative Water Mist Systems

10.1 General. The requirements of Section 10.1 shall apply to all automatic sprinkler alternative water mist systems unless modified by a specific section of Chapter 10.

10.1.1 A building or portion thereof shall be permitted to be protected in accordance with any applicable design basis conforming to Section 7.2 at the discretion of the designer.

10.1.2 Water Demand. The water demand requirements for engineered water mist systems shall be those specified by the water mist equipment manufacturer's design and installation manual.

10.1.3 Water Supplies.

10.1.3.1 Quantity. Water supplies for water mist systems shall be in conformance with Chapter 12 of this standard and this section.

10.1.3.2 For automatic sprinkler alternative water mist systems, the minimum water demand requirements for the water mist system shall be determined by adding the hose stream allowance, if any, to the water demand for the water mist nozzles.

10.1.3.3 Duration. The minimum water supply shall be available for the minimum duration specified in Chapter 12.

10.1.3.4 Tanks shall be sized to supply the equipment they serve.

10.1.3.5 Pumps shall be sized to supply the equipment they serve.

10.1.4 Hose Allowance.

10.1.4.1 Where the water supply for an automatic sprinkler alternative water mist system serves concurrently as the source of water for inside or outside hoses, the concurrent hose stream allowance shall be added to the water mist system demand at the point of entry into the building, and upstream of any pumps, filters or strainers on the water mist system.

10.1.4.2 The hose stream allowance shall be in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, for the occupancy being protected.

10.1.4.3 Intermediate and High Pressure Water Mist Systems. Where inside or outside hose streams are required in areas protected by an intermediate or high pressure automatic sprinkler alternative water mist system, a separate standpipe system for the hose stream shall be provided in accordance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

10.1.4.4 Low Pressure Water Mist. Where an automatic sprinkler alternative water mist system is served by a common fire pump capable of meeting the water mist system demand, and the fire standpipe demand is in conformance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems, a separate riser is not required for each system.

Statement: This code proposal recognizes the concept of using water mist systems for protection of structures as an alternative sprinkler system. The use of water mist as an automatic sprinkler equivalent is within the systems' listed applications. The proposed additions recognize that based on performance, listings and field experience, water mist is a viable alternative to provide protection for specific classifications of hazards similar to NFPA 13, Automatic Sprinkler Systems. Water mist systems are approved by FM for light hazard (FM 5560) and listed by UL for ordinary hazard, Group I (UL ZDPA.EX15843) occupancies as defined by NFPA 13. These approvals/listings would permit water mist to be installed as the primary suppression system in a wide range of Occupancy Classifications including Assembly, Business, Educational, Health care, and Residential. Many of these occupancy types benefit from the water efficient nature of the water mist systems. The intent of these code changes is to recognize automatic water mist as being equivalent to automatic sprinklers when listed as an appropriate option. The changes incorporate criteria that define occupancies in the same manner as NFPA 13 and address key design issues.

New Section 9.1 – Discusses criteria for water supplies and hose allowances. The use of water mist as a sprinkler equivalent system will require interaction with other fire service systems such as hose streams and fire department connections. In some cases, it is not practical to have a combined standpipe for water mist and hose streams. High pressure water mist systems will require a separate standpipe where hose streams are required. A redundant pump will be required for water mist systems where a fire department pumper cannot meet the system demand. It is the intent of the proposed changes to require a fire department connection wherever it would be of benefit. The location of the fire department connection will be dependent on the system design pressure as proposed in the code changes.
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Insert as part of new Chapter 10:

10.2 Occupancy Hazard Fire Control Approach.

10.2.1 Occupancy Classifications.

10.2.1.1 Occupancy classifications for this standard shall relate to water mist installations and their water supplies only.

10.2.1.2 Occupancy classifications shall not be used as a general classification of occupancy hazards.

10.2.1.3 Occupancies or portions of building occupancies shall be classified according to the quantity and combustibility of contents, the expected rates of heat release, the total potential for energy release, the heights of stockpiles, and the presence of flammable and combustible liquids, using the definitions contained in Chapter 5.

10.3 Residential Occupancy Fire Control Approach.

10.3.1 Residential Occupancies Up To and Including 4 Stories In Height.

10.3.1.1 Scope.

10.3.1.1.1 This section shall cover the design and installation of automatic sprinkler alternative water mist systems for protection against fire hazards in residential occupancies up to and including four stories in height.

10.3.1.2 System Arrangement. In townhouse-style buildings protected in accordance with this standard, each dwelling unit shall have its own dedicated water mist system or the control valves for the water mist system shall be located outside the dwelling units or in a common area.

10.3.1.3 Listed or Labeled. Listed or labeled devices and materials shall be installed and used in accordance with the listing limitations and the manufacturers’ instructions unless permitted by other sections of this document.

10.3.1.4 Nozzles.

10.3.1.4.1 Only new listed nozzles shall be installed on a water mist system.

10.3.1.4.2 Nozzles shall be installed in accordance with their listing.

10.3.1.4.3 Nozzle Positioning. Nozzles shall be positioned in accordance with the manufacturer’s installation manual so that the response time and discharge are not unduly affected by obstructions such as ceiling slope, beams, or light fixtures.

10.3.1.4.4 Painting and Finish.

10.3.1.4.4.1 Nozzle painting and finish material shall be only as permitted by the manufacturer.

10.3.1.4.4.2 Where nozzles have had paint applied by other than the manufacturer, they shall be replaced with new listed nozzles of the same type.

10.3.1.5 Aboveground Piping and Equipment.

10.3.1.5.1 Where nonmetallic pipe is used, the pipe shall be designed to withstand a working pressure of not less than the anticipated system pressure at 120°F (49°C).

10.3.1.5.2 Pipe or tube listed for light hazard occupancies shall be permitted to be installed in ordinary hazard rooms of otherwise light hazard occupancies where the room does not exceed 400 ft² (37 m²).

10.3.1.6 Valves.

10.3.1.6.1 Identification of Valves.

10.3.1.6.1.1 The control valve sign shall identify the portion of the building served.

10.3.1.6.1.2 Systems that have more than one control valve that must be closed during work on a system or space shall have a sign referring to the existence and location of the other valves.

10.3.1.7 Design Criteria.

10.3.1.7.1 The system shall provide at least the flow required for the multiple and single nozzle operating criteria specified by the system listing.

10.3.1.7.2 The system shall provide at least the flow required to produce a minimum discharge density that meets the nozzle listing.

10.3.1.7.3 Number of Design Nozzles. The number of design nozzles under flat, smooth, horizontal ceilings shall include the number of nozzles within a compartment up to a maximum of four adjacent nozzles that require the greatest hydraulic demand.

10.3.1.8 Pipe Sizing. Piping shall be sized using hydraulic calculation procedures in accordance with Chapter 11.

10.3.1.10 Water Supply.

10.3.1.10.1 Automatic. Every automatic sprinkler alternative water mist system shall have at least one automatic water supply in conformance with Chapter 12 of this standard.

10.3.1.10.2 Minimum Duration. The water supply shall be capable of supplying the system demand for at least 30
10.3.1.10.3 Source. The water supply source shall be one of the following:

1. A connection to a reliable waterworks system with or without a pump, as required
2. An elevated tank
3. A pressure tank installed in accordance with Chapter 12 and NFPA 22, Standard for Water Tanks for Private Fire Protection
4. A stored water source with an automatically operated pump

10.3.1.10.4 Fire Pump. Where a fire pump is installed, the fire pump shall be installed in accordance with Chapter 12 and NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection.

10.3.1.10.5 Domestic Demand. Domestic demand shall be included as part of the overall system demand for systems with common domestic/fire mains where no provisions are made to prevent the domestic waterflow upon nozzle system activation.

Statement: New section discusses the Occupancy Hazard Fire Control approach similar to NFPA 13 Chapter 11 criteria. This section supplements the addition of the new Chapter 5.

750 FR115
(10.3.2 through 10.3.2.2 (New))

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Insert as part of new Chapter 10:
10.3.2 One- and Two-Family Dwellings.

10.3.2.1 Scope.

10.3.2.1.1 This section shall cover the design and installation of automatic sprinkler alternative water mist systems for protection against fire hazards in one- and two-family dwellings.

10.3.2.1.2 The automatic sprinkler alternative water mist system shall be designed to protect against a fire originating from a single ignition location.

10.3.2.2 General. Smoke alarms shall be provided in accordance with NFPA 72, National Fire Alarm and Signaling Code.

Statement: New Section 9.3.2 – New Section contains criteria similar to NFPA 13D for protection of one- and two-family dwellings. The level of protection is intended to reflect safeguards similar to NFPA 13D. It is not intended that smoke detectors not be required where water mist systems are installed. Smoke detectors provide advanced early warning to building occupants. Noting that a system would be required to be installed in accordance with its DIOM, to keep water mist systems an affordable option for one- and two-family dwellings, it is proposed that certain parts of the system not require listings for fire protection service. A similar clause is located in NFPA 13D that does not require pumps, tanks, or hangars to be listed. Requiring a listing of every component for residential systems would increase the cost such that residential systems would not be a cost effective solution for home fire protection. The equipment will still have been tested as a whole and installed in accordance with the DIOM. In this case, it is not necessary that each component be “listed.”
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Insert as part of new Chapter 10:

10.3.2.3 System Components.

10.3.2.3.1 General. Tanks, pumps, filters, hangers, waterflow detection devices, and waterflow valves shall be in accordance with manufacturer’s requirements, but are not required to be listed.

10.3.2.3.2 Aboveground Pipe and Tube. Pipe or tube used in automatic sprinkler alternative water mist systems shall be of the materials specified in Table 6.3.3.1 or shall be listed for use with water mist systems at the anticipated system pressure.

10.3.2.3.3 Aboveground Fittings. Fittings used in automatic sprinkler alternative water mist systems shall be in accordance with Section 6.4 or shall be listed for use with water mist systems at the anticipated system pressure.

10.3.2.3.4 Pre-engineered Systems. Where listed pre-engineered systems are installed, they shall be installed within the limitations that have been established by the testing laboratories.

10.3.2.4 Installation Requirements.

10.3.2.4.1 Valves.

10.3.2.4.1.1 A single control valve arranged to shut off both the domestic system and the water mist system shall be installed unless a separate shutoff valve for the water mist system is installed in accordance with 10.3.2.4.1.2.

10.3.2.4.1.2 The water mist system piping shall not have a separate control valve installed unless supervised by one of the following methods:

(1) Central station, proprietary, or remote station alarm service
(2) Local alarm service that causes the sounding of an audible signal at a constantly attended location
(3) Valves that are locked open

10.3.2.4.2 Piping Support.

10.3.2.4.2.1 Listed pipe shall be supported in accordance with any listing limitations.

10.3.2.4.2.2 Pipe that is not listed, and listed pipe with listing limitations that do not include piping support requirements, shall be supported from structural members using support methods in accordance with the manufacturer’s installation manual.

10.3.2.4.2.3 Piping laid on open joists or rafters shall be supported in a manner that prevents vertical and lateral movement of the nozzle.

10.3.2.4.3 Nozzles.

10.3.2.4.3.1 Listed nozzles shall be used.

10.3.2.4.3.2 Nozzles shall not be used on systems other than wet pipe systems unless specifically listed for use on that particular type of system.

10.3.2.4.3.3 Nozzles shall be supported in manner that prevents lateral and vertical movement.

10.3.2.4.3.4 Painting and Ornamental Finishes. Nozzles shall not be painted or enameled unless the finishes have been applied by the manufacturer and the nozzle has been listed with such finishes.

10.3.2.4.4 Drains and Test Connections.

10.3.2.4.4.1 Each water mist system shall have a drain on the system side of the control valve.

10.3.2.4.4.2 A valve shall be installed in the drain piping.

10.3.2.4.4.3 A drain shall be installed for each trapped portion of a dry system that is subject to freezing temperatures.

10.3.2.4.4.4 Where waterflow alarms are provided, inspector's test connections shall be installed at locations that allow flow testing of water supplies, connections, and alarm mechanisms.

10.3.2.4.4.5 The inspector’s test connections shall contain an orifice equal to or smaller than the smallest nozzle installed in the system.

10.3.2.4.5 Pressure Gauges.

10.3.2.4.5.1 Where a dry system is installed, a pressure gauge shall be installed to indicate system air pressure.

10.3.2.4.5.2 Where a pressure tank is used for the water supply, a pressure gauge shall be installed to indicate tank pressure.

10.3.2.4.6 Alarms. Local waterflow alarms shall be provided on all water mist systems in homes not equipped with smoke alarms or smoke detectors in accordance with NFPA 72, National Fire Alarm and Signaling Code.

10.3.2.4.7 Attics. Where nonmetallic piping is installed in attics, adequate insulation shall be provided on the attic side of the piping to avoid exposure of the piping to temperatures in excess of the pipe's rated temperature.

10.3.2.5 Water Supply.

10.3.2.5.1 The water quality for the system shall meet the requirements of Chapter 12.
10.3.2.5.2 Prior to system acceptance, a system utilizing a pump shall be tested by opening the drain/test connection.
10.3.2.5.3 The pump shall sense the flow, turn on, and flow water for the required duration of 12.1.2 or 12.1.3 without interruption.
10.3.2.5.4 Where a pump and tank is the source of supply for a water mist system but is not a portion of the domestic water system, the following criteria shall be met:
   (1) A test connection shall be provided downstream of the pump that creates a flow of water equal to the smallest nozzle on the system and shall return water to the tank.
   (2) Pump motors using ac power shall be connected to a 240 V normal circuit.
   (3) Any disconnecting means for the pump shall be approved.
   (4) A method for refilling the tank shall be piped to the tank.
   (5) A method of seeing the water level in the tank shall be provided without having to open the tank.
   (6) The pump shall not be permitted to sit directly on the floor.
10.3.2.5.5 Where more than one dwelling unit is served by the same water supply pipe, each dwelling unit shall have an individual control valve that serves the water mist system in that dwelling unit and the owner of each unit shall have access to the valve that controls the water mist system in their unit.
10.3.2.5.6 The control valve shall be permitted to serve the domestic water supply.
10.3.2.5.7 In the situation addressed by 10.3.2.5.5, no valve controlling the water mist system in a unit shall be located in another unit.
10.3.2.5.8 Manufactured Home Water Supply. For buildings manufactured off-site, the minimum pressure needed to satisfy the system design criteria on the system side of the meter shall be specified on a data plate by the manufacturer.
10.3.2.5.9 Common Supply Pipes.
   10.3.2.5.9.1 Where common supply pipes serve both water mist and domestic use, they shall comply with 10.3.2.5.9.2 and 10.3.2.5.9.3.
   10.3.2.5.9.2 In common water supply connections serving more than one dwelling unit and where no provision is made to prevent flow into the domestic water system upon activation of a nozzle, 19 L/min (5 gpm) shall be added to the water mist system demand to determine the size of common piping and the size of the total water supply requirements.
   10.3.2.5.9.3 A warning sign, with minimum ¼ in. letters, shall be affixed adjacent to the main shutoff valve and shall state the following:
     WARNING: The water system for this home supplies water mist nozzles that require certain flows and pressures to fight a fire.
     Devices that restrict the flow or decrease the pressure or automatically shut off the water to the water mist system, such as water softeners, filtration systems, and automatic shutoff valves, shall not be added to this system without a review of the water mist system by a fire protection specialist. Do not remove this sign.

Statement: Requiring a listing of every component for residential systems would increase the cost such that residential systems would not be a cost effective solution for home fire protection. The equipment will still have been tested as a whole and installed in accordance with the DIOM. In this case, it is not necessary that each component be “listed”. Section 9.3.2.4.1 requires control valves to shut off both the domestic and water mist water supply unless the requirements of Section 9.3.2.4.1.2 are met to reduce the likelihood of control valve being shut accidently. The need for domestic water would force the occupants to keep the control valve open and the water mist system active.
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Insert as part of new Chapter 10:

10.3.2.6 Discharge Criteria.

10.3.2.6.1 Number of Design Nozzles. The number of design nozzles under flat, smooth, horizontal ceilings shall include all nozzles within a compartment, up to a maximum of two nozzles that require the greatest hydraulic demand.

10.3.2.6.2 The system shall provide at least the flow required for the multiple and single nozzle operating criteria specified by the nozzle listing.

10.3.2.7 System Design.
10.3.2.7.1 Location of Nozzles.

10.3.2.7.1.1 In basements where ceilings are not required for the protection of piping or where metallic pipe is installed, residential nozzles shall be permitted to be positioned in a manner that anticipates future installation of a finished ceiling.

10.3.2.7.1.2 Nozzles shall be installed in all areas except where omission is permitted by 10.3.2.7.1.3 through 10.3.2.7.1.5.

10.3.2.7.1.3 Nozzles shall not be required in bathrooms of 5.1 m² (55 ft²) and less.

10.3.2.7.1.4 Nozzles shall not be required in clothes closets, linen closets, and pantries that meet all of the following conditions:

(1) The area of the space does not exceed 2.2 m² (24 ft²).
(2) The least dimension does not exceed 0.9 m (3 ft).
(3) The walls and ceilings are surfaced with noncombustible or limited-combustible materials as defined in NFPA 220, Standard on Types of Building Construction.

10.3.2.7.1.5* Nozzles shall not be required in garages, open attached porches, carports, and similar structures.

Statement: This section describes the water supply requirements for residential homes. The ten minute water supply time is based on the assumption that ten minutes is adequate time to evacuate most homes. Residential fire tests require that the system limit the room temperature for ten minutes which relates to the ten minute water supply requirement. If more than one dwelling unit is served by a water mist system, each dwelling should have its own control valve. Where there is a common water supply connection, additional flow should be added to the demand to ensure the system operates as expected.
(10.3.2.7.1.6 through 10.3.2.7.1.9) (New)

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Insert as part of new Chapter 10:

10.3.2.7.1.6 Nozzles shall not be required in attics, penthouse equipment rooms, elevator machine rooms, concealed spaces dedicated exclusively to and containing only dwelling unit ventilation equipment, floor/ceiling spaces, elevator shafts, crawl spaces, and other concealed spaces that are not used or intended for living purposes and do not contain fuel-fired equipment.

10.3.2.7.1.7 Where fuel-fired equipment is present, at least one quick-response intermediate temperature nozzle shall be installed above the equipment.

10.3.2.7.1.8 Nozzles shall not be required in covered unheated projections of the building at entrances/exits as long as the dwelling unit has another means of egress.

10.3.2.7.1.9 Nozzles shall not be required for ceiling pockets that meet the following conditions:

1. The total volume of unprotected ceiling pocket does not exceed 2.83 m$^3$ (100 ft$^3$).
2. The entire floor under the unprotected ceiling pocket is protected by the nozzles at the lower ceiling elevation.
3. Each unprotected ceiling pocket is separated from any adjacent unprotected ceiling pocket by a minimum 3.05 m (10 ft) horizontal distance.
4. The interior finish of the unprotected ceiling pocket is noncombustible or limited-combustible material.
5. Skylights not exceeding 2.97 m$^2$ (32 ft$^2$) shall be permitted to have a plastic cover.

Statement: The areas listed in Section 9.3.2.6.1.6 represent areas where fire occurrences are rare or fire locations that rarely result in fatalities. Several of the locations would require more expensive dry systems where a cost-benefit analysis does not support the added benefit of protecting the spaces. Section 9.3.2.6.1.6.1 allows residential nozzles to be installed in unfinished basements to provide additional protection without increasing the cost. It is assumed that the potential exists for all unfinished basements to become finished and therefore the water mist piping can be laid out as such to prevent a contractor from having to retrofit the system. Although residential nozzles may not be listed for exposed wood joist, it is assumed that people will not be sleeping in an unfinished basement and that the delay in activation time will not jeopardize the life safety of occupants on other floors.

11.1.2 (New)

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new text as follows:

11.1.2 The minimum water demand requirements for engineered water mist systems shall be determined by adding concurrent water demands, if any, to the discharge rate and operating pressure of the system determined by hydraulic calculations conforming to this chapter.

Statement: The Technical Committee is making this change because of the hose demand requirements within the occupancy sections in the new Chapter 5.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing text:

911.1.23 Modifications. Where any modification is made that alters the system flow characteristics of an existing, engineered water mist system, system flow calculations shall be furnished indicating the previous design, volume, and pressure at points of connection, and calculations also shall be provided to indicate indicating the effect of the modification on the existing systems shall be provided.

Statement: Editorial revision.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

911.2.3 Minimum and maximum operating pressures at each nozzle shall be within the listed operating range. Nozzles shall operate within the range of the listed nozzle operating pressure.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing as follows:

4912.3.1 Design quantities of water, additives (if used), and atomizing media (if used) shall be capable of supplying the system in accordance with one of the following, as applicable:

(1) A minimum duration of 30 minutes.
(2) For pre-engineered systems, the design quantities of water, additives (if used), and atomizing media (if used) shall be capable of two complete discharges, or as required by the manufacturer’s listing requirements, minimum 2 times the period to extinguish the fires during test, the rundown time of turbine, or the time necessary to secure fuel lines to the rotating equipment, whichever is greater.
(3) Specific hazard evaluation.
   (a) Where the hazard has been evaluated by a fire protection engineer using standard methods of fire hazard analysis, the water supply duration shall be determined by the specified performance characteristics of the water mist system.
   (b) It shall be permitted for this method to result in water supply duration requirements greater than or less than those specified in 10.3.1(1).
(4) For one- and two-family dwellings, a minimum duration of 10 minutes.

Statement: Residential fire tests require that the system limit the room temperature for ten minutes which relates to the ten minute water supply requirement.
Submitter: Technical Committee Water Mist Fire Suppression Systems

**Recommendation:** Revise existing text as follows:

12.5.1.6 Filter Rating or Strainer Mesh Openings. The maximum filter rating or strainer mesh opening shall **not** be greater than 80 percent of the minimum nozzle waterway dimension.

**Statement:** The Technical Committee has added clarification text because the 80% requirement should not be specific.

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Submitter: Technical Committee Water Mist Fire Suppression Systems

**Recommendation:** Add new text:

12.5.2.3 Where high pressure automatic sprinkler alternative water mist systems are provided in lieu of sprinkler systems in accordance with 7.2.4, redundant pressure source components shall be provided and the required water mist pumps shall be arranged such that when the largest pump is out of service, the greatest demand can still be satisfied.

**Statement:** A single pump failure should not result in a system failure.

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Submitter: Technical Committee Water Mist Fire Suppression Systems

**Recommendation:** Revise text to read as follows:

12.5.2.4 The discharge piping for water mist pumps and pump assemblies for high pressure or intermediate pressure water mist systems shall be equipped with a valved test connection and provisions for the installation of a flow metering device to permit accurate measurement of the pump performance during the acceptance test and during annual testing.

**Statement:** The revised wording makes clear that a flow meter need not be a part of the assembly while providing a means of connecting a portable flow meter temporarily during acceptance testing and during annual testing. Portable flow measuring devices are more desirable since they can be easily calibrated at regular intervals. Flow meters which are built into an assembly must either be calibrated in the assembly or removed calibration. In situ calibration is difficult and costly whereas removal from the assembly changes the flow conditions on the meter and leaves the assembly with a missing part during the calibration process. Additionally, the re-installation of the device after calibration allows for the possibility of improper connection.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

12.5.5.1* A fire department connection shall be provided on the discharge side of the pressure source components all water mist systems, except as provided in 12.5.5.2.

Statement: There is a certain amount of confusion among engineers and AHJs regarding the use of fire department connections on sprinkler equivalent water mist systems. The additional sections clarify how the standpipe riser function may be achieved for low pressure and high pressure water mist systems. See also Fig. A.11.1.6 (j) and A.11.1.6 (k) for more information and diagram.

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Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing sections as follows:

12.5.5.2 The following systems shall not require a fire department connection:

Fire department connections shall not be required for the following water mist systems:

1. Fire department connections shall not be required for systems protecting less than 200 m² (2000 ft²).
2. Fire department connections shall not be required for systems with operating system design pressures in excess of 12 bar (175 psi) and supplied only by storage cylinders.
3. Fire department connections shall not be required for systems where the atomizing medium is essential for fire suppression.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23

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Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise:

12.5.5.3 For water mist systems with system design pressures less than or equal to 12 bar (175 psi), the connection of the fire department connection to the system shall be made on the upstream (supply) side of the system strainer or filter for systems with operating pressures less than or equal to 12 bar (175 psi).

12.5.5.4 For water mist systems with system design pressures in excess of 12 bar (175 psi), the connection of the fire department connection to the system shall be made on the suction side of the pressure source components for systems with operating pressures in excess of 12 bar (175 psi).

Statement: There is a certain amount of confusion among engineers and AHJs regarding the use of fire department connections on sprinkler equivalent water mist systems. The additional sections clarify how the standpipe riser function may be achieved for low pressure and high pressure water mist systems. See also Fig. A.11.1.6 (j) and A.11.1.6 (k) for more information and diagram.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new text:

14.1.1 An acceptance test plan shall be approved prior to scheduling of acceptance testing.

Statement: The Technical Committee clarifies that the client and the contractor should agree on procedures for the test prior to the testing taking place.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new:

14.1.3* When a water mist system operates in conjunction with other building systems, functions, or components, the final testing shall be conducted simultaneously with those systems.

Statement: The new article establishes the requirement to integrate acceptance testing of the water mist system with related building systems, as per NFPA 3. Sprinkler equivalent water mist systems will have interconnection with automatic door closing, elevator recall and other building functions.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text:

14.2.1.2.2 Each pipe section shall be internally cleaned prior to installation using an acceptable method as required by the manufacturer to meet the requirements of 14.2.1.2.1.

Statement: There is a lot of confusion in the industry regarding acceptable methods for preparing and cleaning pipe, and a wide range of piping methods which can be used in water mist systems. As a result, depending on the type of piping and the preparation method used, it is unnecessary to require that it be cleaned in every instance. By keeping the existing paragraph 12.2.1.2.2, it is implied that piping should not be installed if not completely clean. Requiring the manufacturer to specify how to clean each and every pipe section before installation is impractical and unnecessary unless very specific piping systems and preparation methods are required as part of the listing.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

14.2.2.2.1 All interior piping and attached appurtenances subjected to a system working pressure less than or equal to 10.4 bar (150 psi) shall be hydrostatically tested at 13.8 bar (200 psi) and shall maintain that pressure without loss for 2 hours as determined by a drop in gauge pressure or visible leakage.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new text:

14.2.2.2.4* When subject to hydrostatic test pressures, the clapper of a differential-type valve shall be permitted to be held off its seat.

Statement: The current requirement allows for a strainer to be used which could inhibit flow to the nozzle by causing a restriction, thus having an adverse affect on the performance of the water mist system. This additional requirement provides guidance to alleviate this possible obstruction. There should be no negative impact to current nozzle designs by listed manufacturers and is to address possible future designs.
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing:

Chapter 15 System Inspection, Testing, and Maintenance

15.1 Except as specified in 15.2, a water mist system installed in accordance with this standard shall be inspected, tested, and maintained in accordance with NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

15.2* A water mist system installed in one- and two-family dwellings shall be inspected, tested and maintained in accordance with instructions provided by the installer.

13.1 Responsibility of the Owner or Occupant:

13.1.1 General:
13.1.1.1 The responsibility for properly maintaining a water mist fire protection system shall be the obligation of the property owner.

13.1.1.2 By means of periodic inspection, tests, and maintenance, in accordance with the standard and manufacturers’ requirements, either this equipment shall be shown to be in good operating condition or that defects or impairments exist.

13.1.1.3 Inspection, testing, and maintenance activities shall be implemented in accordance with procedures meeting or exceeding those established in this document and in accordance with the manufacturer’s instructions.

13.1.1.4 These tasks shall be performed by personnel who have developed competence through training and experience.

13.1.2 Notification:
13.1.2.1 The owner or occupant shall notify the authority having jurisdiction, the fire department (if required), and the alarm receiving facility before shutting down a system or its supply.

13.1.2.2 The notification shall include the purpose of the shutdown, the system or component involved, and the estimated time needed.

13.1.2.3 The authority having jurisdiction, the fire department, and the alarm receiving facility shall be notified when the system, supply, or component is returned to service.

13.1.3 Correction or Repair:
13.1.3.1 The owner or occupant shall promptly correct or repair deficiencies, damaged parts, or impairments found while performing the inspection, test, and maintenance requirements of this standard.

13.1.3.2 Corrections and repairs shall be performed by qualified maintenance personnel or a qualified contractor.

13.1.4 System Re-evaluation:
13.1.4.1 The owner or occupant shall give special attention to factors that might alter the requirements for a continued approved installation.

13.1.4.2 Such factors shall include, but shall not be limited to, the following:

(1) Occupancy changes
(2) Process or material changes
(3) Structural revisions such as relocated walls, added horizontal or vertical obstructions, or ventilation changes
(4) Removal of heating systems in spaces with piping subject to freezing

13.1.5 Changes of Occupancy:
13.1.5.1 Where changes in the occupancy, hazard, water supply, storage arrangement, structural modification, or other conditions that affect the installation criteria of the system are identified, the owner or occupant shall promptly take steps to evaluate the adequacy of the installed system to protect the hazard in question, such as contacting a qualified contractor, consultant, or engineer.

13.1.5.2 Where the evaluation reveals a deficiency, the owner shall notify the insurance underwriter, the authority having jurisdiction, and the local fire department.

13.1.6 Return to Service:
13.1.6.1 Where a water mist system is returned to service following an impairment, it shall be verified that it is working properly.

13.1.6.2 Chapter 12 shall be referenced to provide guidance on the type of inspection or test, or both, that is required.

13.2 Inspection and Testing:

13.2.1 Components and Systems:

13.2.1.1 All components and systems shall be inspected and tested to verify that they function as intended.

13.2.1.2 Water mist systems that are equipped with an additive system shall be tested with the specific additive system
13.2.2* Frequencies. The frequency of inspections of components of water mist systems shall be in conformance with the manufacturer’s listing requirement and NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

13.2.3* Restoration. Following tests of components or portions of water mist systems that require valves to be opened or closed, the system shall be returned to service, with verification that all valves are restored to their normal operating position, that the water has been drained from all low points, that screens and filters have been checked and cleaned, and that plugs or caps for auxiliary drains or test valves have been replaced.

13.2.4 Specialized Equipment. Specialized equipment required for testing shall be in accordance with the manufacturer’s specifications.

13.2.5 High Pressure Cylinders. High pressure cylinders used in water mist systems shall not be recharged without a hydrostatic test (and remarking) if more than 5 years have elapsed from the date of the last test. Cylinders that have been in continuous service without discharging shall be permitted to be retained in service for a maximum of 12 years, after which they shall be discharged and retested before being returned to service.

13.3 Maintenance.

13.3.1 Maintenance shall be performed to keep the system equipment operable or to make repairs.

13.3.2 As-built system installation drawings, original acceptance test records, and device manufacturer’s maintenance bulletins shall be retained to assist in the proper care of the system and its components.

13.3.3 Preventive maintenance includes, but is not limited to, lubricating control valve stems, adjusting packing glands on valves and pumps, bleeding moisture and condensation from air compressors and air lines, and cleaning strainers.

13.3.4* Scheduled maintenance shall be performed as outlined in Table 13.3.4.

13.3.5 Corrective maintenance includes, but is not limited to, replacing loaded, corroded, or painted nozzles, replacing missing or loose pipe hangers, cleaning clogged fire pumps, replacing valve seats and gaskets, and restoring heat in areas subject to freezing temperatures where water-filled piping is installed.

13.3.6 Emergency maintenance includes, but is not limited to, repairs due to piping failures caused by freezing or impact damage, repairs to broken water mains, and replacing frozen or fused nozzles, defective electric power, or alarm and detection system wiring.

13.3.7 Specific maintenance activities, where applicable to the type of water mist system, shall be performed in accordance with the schedules in Table 13.3.4.

13.3.8 Replacement components shall be in accordance with the manufacturer’s specifications and the original system design.

13.3.9 Spare components shall be accessible and shall be stored in a manner to prevent damage or contamination.

13.3.10* After each system operation, a representative sample of operated water mist nozzles in the activated zone shall be inspected.

13.3.11 After each system operation due to fire, the system filters and strainers shall be cleaned or replaced.

13.4 Training.

13.4.1 All persons who might be expected to inspect, test, maintain, or operate water mist systems shall be trained thoroughly in the functions they are expected to perform.

13.4.2 Refresher training shall be provided as recommended by the manufacturer or by the authority having jurisdiction.

Statement: The Technical Committee intends to delete the existing inspection, testing & maintenance requirements in Chapter 13 & replace this text with a reference to NFPA 25
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:

16.1.12.10 Brazed joints using filler materials with melting points below 927°C (1700°F) shall be permitted in systems that comply with all of the following:

1. Brazed joints shall be made in accordance with 46 CFR 56.75 using a filler material having a melting temperature above 538°C (1000°F).
2. All shutoff valves upstream of, or within, copper piping having brazed joints shall be electrically supervised with an audible and visual signal at a control station.
3. Each shutoff valve shall be located within an enclosed stair or outside the protected zone.
4. The system shall be wet pipe automatic.
5. Brazed joints shall not be located in machinery spaces, spaces containing pressurized oil lines, areas subject to flammable liquid or gas fires, or other areas having high fire risks.
6. Each section capable of being isolated shall be fitted with a relief valve set at a pressure greater than the working pressure and less than the maximum working design pressure of the system.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:

16.2.11.1 The system's water supply and the system piping shall be capable of maintaining the minimum required nozzle operating pressure for each type of nozzle at the highest elevation of each type of nozzle.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise annex text to read as follows:

A.3.3.23.2 Hybrid Multi-functional Water Mist Nozzles. The actuation of a hybrid multi-functional water mist nozzle can be by a built-in detection and activation device and/or by an independent means of activation.

Statement: The use of the wording 'hybrid water mist nozzles' may potentially cause confusion in the fire protection industry. Recently, independent testing agencies (Factory Mutual) have initiated use of the term 'hybrid' to define a group of twin-fluid water mist technologies using a propellant (nitrogen). The introduction of nitrogen into the risk being protected may reduce the oxygen level below 16%. If the level of Oxygen is lowered to below 16%, Factory Mutual is identifying these systems as 'hybrid', as they impact a fire via both water discharge and inerting with the propellant. The use of the wording 'hybrid' by NFPA and Factory Mutual, both involving water mist technologies, would potentially cause confusion within the fire protection industry. As NFPA is assumed to use the 'hybrid' designation for the water mist nozzles in NFPA 750 only, this wording change should be accommodated.
750  FR70
(A.3.3.24.1 Automatic Sprinkler Alternative Water Mist Systems (New))

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text as follows:

A.3.3.24.1 Automatic Sprinkler Alternative Water Mist Systems. Water mist systems can be designed and installed to meet fire protection objectives in a manner equivalent to sprinkler systems.

Statement: Water mist systems are widely used in applications as an alternative to conventional sprinkler systems.

750  FR60
(A.4.1)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

A.4.1. A water mist system is a water-based fire protection system using very fine water sprays (i.e., water mist). The very small water droplets allow the water mist to control or extinguish fires by cooling of the flame and fire plume, oxygen displacement by water vapor, radiant heat attenuation and prevention of fire spread by pre-wetting of combustibles. Water mist systems have been proven effective in controlling, suppressing, or extinguishing many types of fires. Potential applications include the following:

1. Gas jet fires
2. Flammable and combustible liquids
3. Hazardous solids, including fires involving plastic foam furnishings
4. Protection of aircraft occupants from an external pool fire long enough to provide time to escape
5. Ordinary (Class A) combustible fires such as paper, wood, textiles.
6. Occupancy classifications in accordance with Chapter 5
7. Electrical hazards, such as transformers, switches, circuit breakers, and rotating equipment
8. Electronic equipment, including telecommunications equipment
9. Highway and railway tunnels. (See NFPA 502 Standard for Road Tunnels, Bridges, and Other Limited Access Highways.)

Statement: Annex note A.4.1 provides examples of applications where Water Mist systems have been proven effective in controlling, suppressing, or extinguishing fires. The proposed additions clarify that water mist systems are water-based fire protection systems, that sprinkler equivalent water mist systems provide fire protection equivalent to automatic sprinkler systems, and also that zoned water mist systems have been proven to be effective fire protection against vehicle fires in tunnels.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new text:

A.5.1 The occupancy examples in the listings as shown in the various hazard classifications are intended to represent the norm for those occupancy types. Unusual or abnormal fuel loadings or combustible characteristics and susceptibility for changes in those characteristics for a particular occupancy are considerations that should be included in the selection and classification. The light hazard classification is intended to encompass residential occupancies; however, this is not intended to preclude the use of listed residential nozzles in residential occupancies or residential portions of other occupancies.

A.5.2 Light hazard occupancies include occupancies having uses and conditions similar to the following:
- Animal shelters
- Churches
- Clubs
- Eaves and overhangs, if of combustible construction with no combustibles beneath
- Educational Hospitals, including animal hospitals and veterinary facilities
- Institutional
- Kennels
- Libraries, except large stack rooms
- Museums
- Nursing or convalescent homes
- Offices, including data processing
- Residential
- Restaurant seating areas
- Theaters and auditoriums, excluding stages and prosceniums
- Unused attics
- Note that it is not the committee's intent to automatically equate library bookshelves with ordinary hazard occupancies or with library stacks. Typical library bookshelves of approximately 2.4 m (8 ft) in height, containing books stored vertically on end, held in place in close association with each other, with aisles wider than 762 mm (30 in.) can be considered to be light hazard occupancies. Similarly, library stack areas, which are more akin to shelf storage or record storage, as defined in NFPA 232, Standard for the Protection of Records, should be considered to be ordinary hazard occupancies.

A.5.3 Ordinary hazard occupancies (Group 1) include occupancies having uses and conditions similar to the following:
- Automobile parking and showrooms
- Bakeries
- Beverage manufacturing
- Canneries
- Dairy products manufacturing and processing
- Electronic plants
- Glass and glass products manufacturing
- Laundries
- Restaurant service areas

A.5.3.1 Ordinary hazard occupancies (Group 2) include occupancies having uses and conditions similar to the following:
- Agricultural facilities
- Barns and stables
- Cereal mills
- Chemical plants ordinary
- Confectionery products
- Distilleries
- Dry cleaners
Exterior loading docks (Note that exterior loading docks used only for loading and unloading of ordinary combustibles should be classified as OH2. For the handling of flammable and combustible liquids or hazardous materials or where utilized for storage, exterior loading docks and all interior loading docks should be protected based upon the actual occupancy and the materials handled on the dock, as if the materials were actually stored in that configuration.)

Feed mills
Horse stables
Leather goods manufacturing
Libraries large stack room areas
Machine shops
Metal working
Mercantile
Paper and pulp mills
Paper process plants
Piers and wharves
Plastics fabrication, including blow molding, extruding, and machining; excluding operations using combustible hydraulic fluids
Post offices
Printing and publishing
Racetrack stable/kennel areas, including those stable/kennel areas, barns, and associated buildings at state, county, and local fairgrounds
Repair garages
Resin application areas
Stages
Textile manufacturing
Tire manufacturing
Tobacco products manufacturing
Wood machining
Wood product assembly

A.5.4.1 Extra hazard occupancies (Group 1) include occupancies having uses and conditions similar to the following:
Aircraft hangars (except as governed by NFPA 409, Standard on Aircraft Hangars)
Combustible hydraulic fluid use areas
Die casting
Metal extruding
Plywood and particleboard manufacturing
Printing [using inks having flash points below 38°C (100°F)]
Rubber reclaiming, compounding, drying, milling, vulcanizing
Saw mills
Textile picking, opening, blending, garnetting, or carding, combining of cotton, synthetics, wool shoddy, or burlap
Upholstering with plastic foams

A.5.4.2 Extra hazard occupancies (Group 2) include occupancies having uses and conditions similar to the following:
Asphalt saturating
Flammable liquids spraying
Flow coating
Manufactured home or modular building assemblies (where finished enclosure is present and has combustible interiors)
Open oil quenching
Plastics manufacturing
Solvent cleaning
Varnish and paint dipping

A.5.5 Special occupancies include occupancies having uses and conditions similar to the following:
Machinery spaces
Special hazard machinery spaces
Combustion turbines
Wet benches and other similar processing equipment
Local application
Industrial oil cookers
Computer room subfloors
**Statement:** The proposed changes adds Annex notes from NFPA 13 for the installation and design of sprinkler equivalent water mist systems. Water mist systems have the potential to provide fire protection against an equally wide range of hazards as conventional sprinkler systems with the added benefit of water efficiency. To facilitate the incorporation of water mist as a primary suppression system, a similar occupancy hazard approach to NFPA 13 is proposed to provide equivalent technical references. This approach is recognized and used in the fire suppression design industry and facilitates the acquirement of system listings as some of the fire tests are already in place. Light and ordinary hazard listings have already been given to water mist systems.

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750 FR22
(A.6.3.4.2)

**Submitter:** Technical Committee Water Mist Fire Suppression Systems

**Recommendation:** A.6.3.4.2 The FSSA Pipe Design Handbook for Use with Special Hazards Fire Suppression Systems provides guidance on how to apply the ASME B31.1, Power Piping Code.

**Statement:** Corrected an editorial mistake from prior edition.

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750 FR25
(A.6.4.1.2.1 (New))

**Submitter:** Technical Committee Water Mist Fire Suppression Systems

**Recommendation:** Add new annex text as follows:

A.6.4.1.2.1 An example of a suitable means of identification can be a metallic tag attached to the fitting with a stainless steel wire.

**Statement:** Adding this annex material clarifies any confusion in the field regarding exactly what is required.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing as follows:

A.5.6.6.1 In recognition of the future value of scientifically based fire protection system engineering or design methods but in consideration of the fact that the present water mist technology base is likely incomplete for general system design purposes, it is recommended that the nozzle-listing agencies collect and report to the manufacturer the following data for possible future use as required listing information:

Calculation of the Cumulative Volumetric Distribution of Water Droplets. The cumulative volumetric distribution of water droplets is to be reported as the flow rate per unit area weighted distribution of water droplets measured at the 24 locations shown in Figure A.5.6.1(a), as a minimum. The radial array of measurement locations is to be positioned symmetrically about the central axis of the water mist nozzle. Additional data can be included in the weighted average calculation by rotating the complete measurement location array (totaling 48 locations) by 22.5 degrees relative to the first set of locations. The nozzle spray pattern’s diameter \( D \), utilized for calculating the radial distances to the measurement locations, is to be determined utilizing the spray envelope methodology of A.5.6.1, Water Discharge Distribution, at 1.0 m (39.4 in.) below the tip of the nozzle.

Water discharge distribution measurements in a plane oriented perpendicular to the central axis of the nozzle and 1.0 m (39.4 in.) below the tip are to be conducted using 0.305m × 0.305m (1 ft × 1 ft) collection pans centered on the radial measurement locations and oriented as shown in Figure A.5.6.1(a). In the case of spray pattern diameters less than 3.05 m (10 ft), multiple discharge tests are to be performed to avoid physical interference between the pans.

Droplet size distribution measurements in a plane oriented perpendicular to the central axis of the nozzle and 1.0 m (39.4 in.) below the tip are to be conducted at each of the 24 measurement locations shown in Figure A.5.6.1(a).

The droplet size distribution and water discharge distribution measurements are to be made at the minimum and maximum rated pressure of the nozzle. The droplet size distribution at each measurement location and pressure is to be weighted proportionally against the corresponding relative flow rate per unit area of water discharge. The nozzle droplet size distribution is to be reported as a single summation of the weighted cumulative count and volume percent droplet distributions for all measurement locations. The summation can be calculated using the following series of formulas and presented in a chart such as that shown in Figure A.5.6.1(b):

1. For a single measurement location, \( x \), and bin size, \( y \):
   a. Cumulative count percent (single bin),
   ***EXISTING EQUATION***
   where:
   \( n_x \) = number of droplets in a single bin size for location \( x \)
   \( n_x \) = total number of droplets in the sample at location \( x \)
   b. Proportional flow rate per unit area,
   ***EXISTING EQUATION***
   where:
   \( f_x \) = flow rate per unit area at location \( x \)
   \( F \) = total cumulative flow rate for all locations,
   ***EXISTING EQUATION***
   c. Flow weighted cumulative count percent (single bin),
   ***EXISTING EQUATION***

The preceding equations are to be used for all locations and all bin sizes.

2. For the summation of all measurement location data:
   a. Flow weighted cumulative count percent (single bin),
   ***EXISTING EQUATION***
   b. Flow weighted cumulative volume (single bin),
   ***EXISTING EQUATION***
   where:
   \( b_y \) = minimum diameter for bin size \( y \)
   c. Flow weighted cumulative volume percent (single bin),
   ***EXISTING EQUATION***
   ***EXISTING FIGURE A.5.6.1(b) AS FIGURE A.6.6.1(b)***
ASTM E 799, Standard Practice for Determining Data Criteria and Processing for Liquid Drop Size Analysis, is to be used for guidance in performing the droplet size distribution measurements, including determination of appropriate size class bounds and the minimum-to-maximum droplet diameter range at each location.

Method 2 for Calculating a Weighted Average Drop Size Distribution Curve. The following spreadsheet method can be used to obtain a statistically representative measurement of the drop size distribution of a water spray:

1. Determine the diameter (D) of the spray cone at a distance 1 m below the nozzle.
2. As shown in Figure A.6.6.1(a), the locations for measuring drop size distribution are calculated as 0.203 × D, 0.353 × D, and 0.456 × D, from the center axis of the spray cone. Measuring at these locations guarantees that all the sample areas, A_i, are equal. Calculate A_i as the area of the cone of diameter (D) divided by the number of sample points (preferably 24).
3. Measure the flux density (Vi) at each position at which the drop size distribution will be measured. This can be done by placing collector pans exactly at the points of interest. If the pan locations do not coincide exactly with the drop size measurement locations, plot the flux density profile along the axis of interest and read off the Vi value for the correct location. The method for calculating the weighted average is expressed as

**EXISTING EQUATION**

where:

- \( R_k \) = weighted cumulative volume percent readings for drop sizes equal to and less than \( d_{\text{upper}} \).
- \( R_i \) = cumulative volume percent readings for drop sizes equal to and less than \( d_{\text{upper}} \) at location \( i \).
- \( A_i \) = area centered at location \( i \) in which the drop size distribution can be closely represented by \( R_k \).
- \( V_i \) = water flux density measured at location \( i \).

4. Use a drop sizing instrument conforming to ASTM E 799, Standard Practice for Determining Data Criteria and Processing for Liquid Drop Size Analysis, to measure the drop size distribution at the point determined in Step 2. One of the outputs from such an instrument is a table of cumulative percent volume versus diameter bins, defined by the upper and lower diameters of a range of drop sizes. Using the upper bin diameter (\( d_{\text{upper}} \)) ensures that the resulting plot can be interpreted as "R percent of the mass . . . in drops of diameter ‘less than’ \( d_k \)." These data must be input into a spreadsheet like that shown in Table A.6.6.1. Then, using the \( V_i \), or flux density measured at location \( i \), and the area \( A_i \) that the measurement represents, calculate the weighted average drop size distribution, \( R_k \).

Water Discharge Distribution: Water discharge distribution in a plane 1.0 m (3.3 ft) below and perpendicular to the central axis of the nozzle using 0.305 m × 0.305 m (1 ft × 1 ft) collection pans. The water distribution measurements are to be made at the minimum- and maximum-rated nozzle operating pressures of the nozzle and over an area sufficient to collect at least 90 percent of the water discharge.

Nozzle Spray Profile: Profile of the nozzle spray envelope encompassing at least 90 percent of the water discharge, measured from the tip of the nozzle and extending over the effective range determined from the listing investigation. The profile of the nozzle spray envelope is to be provided at the minimum- and maximum-rated operating pressures of the nozzle as well as over the intended range of orientation angles if in other than the vertically down orientation.

Spray Thrust Force: Spray thrust force as measured in a plane perpendicular to the central axis of the nozzle, at a distance of 0.305 m (1 ft) below the nozzle and over an area sufficient to capture at least 90 percent of the water discharge. The measurements are to be made at the minimum- and maximum rated nozzle operating pressures of the nozzle. For fire test purposes, the maximum distance from test fires should be considered as one of the following:

1. The manufacturer’s maximum spacing of nozzles from walls or one-half of the manufacturer’s recommended maximum spacing between nozzles, whichever is greater
2. The manufacturer’s recommended placement of nozzles with regard to local hazard protection

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

A.9.2 Results. The results of the listing testing should identify the following:

1. System flow rate (minimum and maximum)
   (a) Flow rate per unit area (if applicable)
   (b) Flow rate per unit volume (if applicable)

2. System operating pressures (minimum and maximum)
   (a) Nozzle operating pressure range
   (b) Pump/cylinder operating pressure range
   (c) Pump inlet and outlet pressure and flow rate requirements

3. General water requirements
   (a) Quantity/duration
   (b) Quality
   (c) Temperature

4. Nozzle characteristics
   (a) Type(s)/model number(s)
   (b) Flow rate (minimum and maximum)
   (c) Operating pressure range (minimum and maximum)

5. Nozzle spray characteristics
   (a) Spray angle
   (b) Drop size distribution
   (c) Momentum/velocity

6. Nozzle installation parameters
   (a) Distance above floor (minimum and maximum)
   (b) Distance below ceiling (minimum and maximum)
   (c) Distance above hazard (minimum and maximum)
   (d) Nozzle spacing (minimum and maximum)
   (e) Orientation
   (f) Minimum distance from walls
   (g) Minimum distance from obstructions

7. Activation device
   (a) Type/model number
   (b) Activation, temperature
   (c) Activation, smoke obscuration

8. General design parameters
   (a) Pipe requirements
      i. Size
      ii. Operating Design pressures/wall thickness
   (b) Fittings
      i. Type
      ii. Operating Design pressure
   (c) Pumps
      i. Valves, fittings, and filters
      ii. Power requirements
      iii. Operating pressure and flow rates
   (iv. Water requirements
   (d) Cylinders
      i. Valves and fittings
      ii. Capacity
      iii. Operating pressures
Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23

750 FR14
(A.9.2.1 (New) )

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new section as follows:
A.9.2.1 Requirements for complete water mist systems, including fire test protocols, system component test procedures, and the manufacturer’s design and installation manual, have been published in ANSI/FM Approvals 5560, American National Standard for Water Mist Systems. Other listing organizations generally apply their own requirements.

Statement: The Technical Committee has revised this information to include reference to a currently available standard and also indicates that other standards are available.

750 FR71
(A.10.1.2 (New) )

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new annex section for new Chapter 10:
A.10.1.2 Concurrent water demands might include domestic or process water usage and any fire hose allowances. It is important to account for concurrent demands because they may diminish the pressure available to the water mist system pump. Water mist systems utilizing stored water from a tank or reservoir require sufficient volume of stored water to meet the water mist system discharge rate for the duration specified in Chapter 12.

Statement: The Technical Committee is making this change because of the hose demand requirements within the occupancy sections in the new Chapter 5

750 FR41
(A.10.1.4 (New) )

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new annex section for new Chapter 10:
A.10.1.4 See Figure A.13.1.6(i) and A.13.1.6(k) for piping diagrams of the intended point of connection where the hose allowance should be accounted for and be protected from entry of debris by means of filters or strainers.

Statement: New Section 9.1 Discusses criteria for water supplies and hose allowances. The use of water mist as a sprinkler equivalent system will require interaction with other fire service systems such as hose streams and fire department connections. In some cases, it is not practical to have a combined standpipe for water mist and hose streams. High pressure water mist systems will require a separate standpipe where hose streams are required. A redundant pump will be required for water mist systems where a fire department pumper cannot meet the system demand. It is the intent of the proposed changes to require a fire department connection wherever it would be of benefit. The location of the fire department connection will be dependent on the system design pressure as proposed in the code changes.
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add annex text for new Chapter 10:
A.10.3.1.4.4 Painting can retard the thermal response of the heat-responsive element, interfere with the movement of parts, and render the nozzle inoperative.

Statement: The Technical Committee added a clarification of text in the annex concerning painting of the nozzles.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add annex text for new Chapter 10:
A.10.3.2.7.1.5 Although NFPA 750 does not require garages to be protected, some authorities having jurisdiction add this requirement locally. In such circumstances, residential nozzles with a two nozzle design in the garage and the same piping as used in the rest of the dwelling can be used. It is recognized that residential nozzles have not been tested specifically for fires in garages, but field experience has shown that having protection helps to alert occupants to the fact that there is a fire, reduce the possibility of flashover, and improve the chances for occupants to escape.

Statement: This is additional information for the AHJ for protecting residential garages.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Revision: A.11.1.4

Statement: The annex material is more suited to pre-engineered systems.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Revision: A.12.5.5

Statement: There is a certain amount of confusion among engineers and AHJs regarding the use of fire department connections on sprinkler equivalent water mist systems. The additional sections clarify how the standpipe riser function may be achieved for low pressure and high pressure water mist systems.
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text to annex as follows:

**A.12.5.5.1** Piping diagrams showing FDC arrangements for low-, high- and intermediate-pressure water mist systems are shown in Figure A.13.1.6(i) and Figure A.13.1.6(k).

**Statement:** There is a certain amount of confusion among engineers and AHJs regarding the use of fire department connections on sprinkler equivalent water mist systems. The additional sections clarify how the standpipe riser function may be achieved for low pressure and high pressure water mist systems. See also Fig. A.13.1.6 (j) and A.13.1.6 (k) for more information and diagram.

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Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing:

**A.13.1.6** See Figure A.13.1.6(a) through Figure A.13.1.6(i).

***Existing Figures A.11.1.6(a) through A.11.1.6(i) as Figures A.13.1.6(a) through A.13.1.6(i)***

***Insert NEW Figure A.13.1.6(j) & A.13.1.6(k)***

**Statement:** The Technical Committee would like to show the difference in the hose requirements for low pressure & intermediate/high pressure water mist systems.

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Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new annex text to read as follows:

**A.14.1.3** When a water mist system operates in conjunction with other building systems, functions or components, the final testing should be conducted simultaneously with those systems per NFPA 3, Recommended Practice on Commissioning and Integrated Testing of Fire Protection and Life Safety Systems.

**Statement:** The addition of this annex will encourage the use of NFPA 3 during final commissioning thereby enabling the proper integration and performance of all related fire protection systems as was intended.

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Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add annex material as follows:

**A.14.1.4** The acceptance test form is provided for the authority having jurisdiction. See Figure A.14.1.4.

***NEW Figure A.14.1.4***

**Statement:** Currently there is no form for properly documenting the results for a Water Mist System acceptance test. The technical committee is adding this form to the annex to aid users.
Legend
1. Water supply – potable quality
2. Backflow prevention device
3. Fire department connection
4. Filters or screens with bypass
5. Standby pressure maintenance pump
6. Positive displacement pump or multi-pump assembly
7. Thermal regulator and drain
8. Pressure regulating or unloader valves with return to suction
9. Test connection with flow meter and test header
10. Water mist system zone control valves
11. Pressure relief valve

Figure A.11.1.6 (j). Example of a piping arrangement with fire department connection for intermediate or high pressure water mist systems with positive displacement pump or pump assembly.
Legend
1. Water supply – potable quality
2. Backflow prevention device
3. Filters or screens with bypass
4. Fire pump bypass line
5. Standard fire pump
6. Pressure relief valve
7. Standby pressure maintenance pump
8. Test connection with flow meter
9. Water Mist zone control valves
10. Strainer or filter on FDC line
11. Fire department connection for low pressure system

Figure A.11.1.6(k). Example of a piping arrangement with fire department connection for low pressure water mist systems.
## Water Mist System Acceptance Test Report

### Property Information
- Building Name: ______________________________________________________
- Address: ____________________________________________________________
- Building Owner: _____________________________________________________
- Address: ____________________________________________________________
- Phone/Fax/E-mail: ____________________________________________________

### Contractor Information
- Company Name: _____________________________________________________
- Address: ____________________________________________________________
- Contact Person: ______________________________________________________
- Phone/Fax/e-mail: ____________________________________________________

### System Check or Test

#### System piping flushed
- Hydraulically calculated demand rate: □ Yes □ No
- Maximum flow rate: □ Yes □ No

#### System piping cleaned prior to assembly?
□ Yes □ No

#### Hydrostatic Test
- Low pressure System – tested at 200psi for two hours
  With no visible leakage? □ Yes □ No

- Intermediate & High Pressure system – tested at 1.5
  Times the working pressure for 10 minutes and 110
  minutes at working pressure ? □ Yes □ No

#### Pneumatic Test
- Dry & Preaction systems – air test at 40psi for 24 hours
  With no leakage more than 1.5psi. □ Yes □ No

#### Piping system complies with design, installation drawings and
Hydraulic calculations? □ Yes □ No

#### Nozzle and pipe size complies with approved installation drawings?
□ Yes □ No

#### Pipe size reductions and tee fitting position complies with design?
□ Yes □ No

#### Piping restrained from vertical and lateral movement during discharge?
□ Yes □ No

#### Discharge nozzle orientation produces optimum water mist application?
□ Yes □ No

#### Water and gas storage containers located per approved drawings?
□ Yes □ No

#### All containers mounted in accordance with manufacturers
Recommendations? □ Yes □ No

#### All wiring installed properly in conduit and in compliance with
approved drawings? □ Yes □ No

#### AC and DC wiring not combined in common raceway or conduit
unless shielded and grounded? □ Yes □ No

#### All circuits free of ground faults and short circuits?
□ Yes □ No

#### Detection devices checked for proper type and location per approved
system drawings? □ Yes □ No

#### Detectors installed in accordance with:
- NFPA 72 National fire Alarm and Signaling Code □ Yes □ No
- CAN/ULC S524-06 Standard for the Installation of Fire Alarm
  Systems and □ Yes □ No
- CAN/ULC SS29-02 Standard for Smoke Detectors for Fire
  Alarm Systems □ Yes □ No

#### Manual pull stations accessible, identified and protected from
Damage? □ Yes □ No
Abort switches are deadman type, properly installed, accessible and clearly identified? □ Yes □ No

Normal and manual emergency control overrides abort function? □ Yes □ No

Polarity verified for all polarized alarm devices and auxiliary relays? □ Yes □ No

End-of-line resistors installed across detection and alarm bell circuits where required? □ Yes □ No

Control unit checked for proper installation & accessibility? □ Yes □ No

All wiring checked for proper grounding & shielding? □ Yes □ No

Water mist system piping not used for electrical ground? □ Yes □ No

Each detector checked for proper response? □ Yes □ No

**Auxiliary Functions**

Operation of auxiliary functions verified in accordance with system requirements and design specifications:

- Alarm sounding / display devices? □ Yes □ No
- Remote annunciators? □ Yes □ No
- Air-handling shutdown? □ Yes □ No
- Power shutdown? □ Yes □ No

Manual pull station overrides abort switches? □ Yes □ No

Supervised circuits checked for trouble response? □ Yes □ No

Cross-zoned detection functions in accordance with design specifications? □ Yes □ No

**System Operational Test**

Full flow test? □ Yes □ No

Where a full flow test is not possible, water flow test from each test connection? □ Yes □ No

For multiple systems, simultaneous operational test? □ Yes □ No

All operating parts tested? □ Yes □ No

All devices function & sequenced properly? □ Yes □ No

All strainers / filters cleaned or replaced after testing? □ Yes □ No

System design information sign provided? □ Yes □ No

**Test Witnessed By:**

<table>
<thead>
<tr>
<th>Owner/authorized agent</th>
<th>Title</th>
<th>Date</th>
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<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>Installing Contractor</th>
<th>Title</th>
<th>Date</th>
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</tbody>
</table>

Additional comments:
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text as follows:

A.14.2.2.4 This practice is conducted to prevent damage to the valve during the hydrostatic test.

Statement: The current requirement allows for a strainer to be used which could inhibit flow to the nozzle by causing a restriction, thus having an adverse affect on the performance of the water mist system. This additional requirement provides guidance to alleviate this possible obstruction. There should be no negative impact to current nozzle designs by listed manufacturers and is to address possible future designs.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing:

A.13.2.2 Table A.13.2.2 indicates the recommended frequencies of inspection of typical components of water mist systems. See NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, for comprehensive requirements for inspection, testing, and maintenance of water mist systems.

***DELETE existing Table A.13.2.2***

A.13.2.3 If differences indicate a significant change or deterioration in performance, appropriate maintenance actions should be taken to restore the component or system to its original performance.

A.13.3.10 The representative sample should include 10 percent of the water mist nozzles in the activated zone. If contamination of filters or strainers is found on inspection, it is recommended that all nozzles within the activated zone be inspected.

Statement: The Technical Committee intends to delete the existing inspection, testing & maintenance requirements in Chapter 13 & replace this text with a reference to NFPA 25. See also FR72 and FR88.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add annex text:

A.15.2 The occupants of a home with a water mist system should understand that maintaining a water mist system is mostly about common sense. Keeping the control valve open, not hanging items from the nozzles, and making sure that the nozzles do not get painted or obstructed are the most important items. It is also important to know where the control valve is located so that the water can be shut down after water mist activation to minimize water damage. The building owner or manager should understand the water mist system operation and should conduct periodic inspections and tests to make sure that the system is in good working condition. A recommended inspection and testing program, includes the following:

1. Monthly inspection of all valves to ensure that they are open.
2. Monthly inspection of tanks, if present, to confirm they are full.
3. Monthly testing of pumps, if present, to make sure they operate properly and do not trip circuit breakers when starting.
4. Testing of all wastewater devices, where provided, every 6 months including monitoring service (note that notification of the monitoring service is essential to make sure that the fire department is not called due to testing).
5. Ongoing visual inspection of all nozzles to make sure they are not obstructed and decorations are not attached or hung from them.
6. Whenever painting is done or home improvements are made in the dwelling unit, special attention should be paid to ensure that nozzles are not painted or obstructed either at the time of installation or during subsequent redecoration. When painting is being done in the vicinity of nozzles, every nozzle should be covered with a bag, which should be removed immediately after painting is finished.

Statement: With the addition of the new Chapter 10 text (residential occupancy design), the Technical Committee would like to add clarification for the maintenance of water mist systems in one & two family dwellings.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

C.1 General. In the absence of a generalized design method based on engineering first principles, water mist systems must be listed for specific hazards and protection objectives. It is the intent of NFPA 750 that such listings be obtained through full-scale fire tests and system component evaluations conducted by internationally recognized laboratories to demonstrate that performance objectives can be met. New potential applications of water mist arise continuously, for which ad hoc test procedures have been developed. Only a limited number of such ad hoc fire test protocols meet the intent of this standard, which is as follows:

1. Test protocols should be based on a fire protection engineering evaluation of the fire hazard, the compartment conditions, and the performance objectives for the system.
2. Test protocols should be developed, carried out, and interpreted by internationally recognized fire testing laboratories.

Only test protocols developed in that manner are recognized as the basis of a listing. The full listing consists of an approval report describing the results of the performance-based fire testing and of the component evaluations; and the manufacturer’s design installation and maintenance manual. The nozzle characteristics; spacing between nozzles; distances from ceilings, walls, or obstructions; minimum nozzle operating pressures; and water supply requirements are all established by the approval report.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing:

C.1.2 Table C.1.2 identifies several organizations with wide international recognition that currently develop or administer test protocols for water mist fire suppression systems. The following sections provide brief descriptions of the scope of application and the acceptance criteria of the test protocols that are the basis for the 1998 listings for water mist systems. The testing laboratories can add or subtract certain fire tests, at their discretion, based on their interpretation of the system performance limits. The reader should refer to the original test protocols for complete test details.

***Insert REVISED Table C.1.2***

Statement: The purpose of substituting the text in the table is due to the fact that information in the table and Annex C is badly outdated. Reference is given to documents that have been replaced by new ones and many IMO documents are missing altogether. Even though Annex C and this table are for information purposes only, the information is wrong, even with respect to FM.

750 FR111

(C.2.7)

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

C.2.7 Local Application Systems for Machinery Spaces. The appendix to IMO MSC/Circ. 913, Guidelines for the Approval of Fixed Water-Based Local Application Fire-Fighting Systems for Use in Category A Machinery Spaces, indicates that local application systems are intended to provide additional, localized fire suppression in areas where there is a possibility of flammable or combustible liquids contacting heated surfaces, such as the fire hazard portions of internal combustion machinery used for the ship’s main propulsion and power generation, boiler fronts, the fire hazard portions of incinerators, and purifiers for heated fuel oil within Category A machinery spaces. The system is intended as a supplement to the required total flooding system and will allow immediate, manually activated fire control without the necessity of engine shutdown, personnel evacuation, shutting down of forced ventilation fans, or the sealing of the space. In the case of periodically unattended machinery spaces, the fire-fighting system shall have both automatic and manual release capabilities.

The appendix to MSC/Circ. 913 contains the fire test protocol used to evaluate the water mist nozzles for this application. The test method verifies the design criteria for vertical and horizontal grids of nozzles. The test method is intended to evaluate maximum nozzle spacing, minimum and maximum distances from the nozzle to the hazard, the minimum nozzle flow rate, and minimum and maximum nozzle operating pressures. Component testing standards are taken from those listed in IMO MSC/Circ. 689/728 IMO/MSC/Circ 1165. The fire tests are to be conducted in an open area of at least 100 m². Both 1 MW and 6 MW spray fires using light diesel oil as the fuel source are included in the protocol.

Statement: This is a change to modify the text to be consistent with definitions found in 3.3.23
<table>
<thead>
<tr>
<th>Agency</th>
<th>Water Mist Fire Test Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>International Maritime Organization, London, UK</strong></td>
<td>MSC/Circ.1165, Revised guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms. Appendix B “Test method for fire testing equivalent water-based fire-extinguishing systems for machinery spaces of category A and cargo pump-rooms”, June 2005 as amended in MSC.1/Circ.1237, Amendments to the revised guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms (MSC/Circ.1165), October 2007 and in MSC.1/Circ.1269, Amendments to the revised guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms (MSC/Circ.1165), June 2008</td>
</tr>
<tr>
<td>2. <strong>FM Approvals, 1151 Boston-Providence Turnpike, P.O. Box 9102, Norwood, MA, 02062.</strong></td>
<td>MSC.1/Circ.1387, Revised guidelines for the approval of fixed water-based local application fire-fighting systems for use in category A machinery spaces (MSC/Circ.913), Appendix “Test method for fixed water-based local application fire-fighting systems”, December 2010 Res. A.800, Revised Guidelines for Approval of Sprinkler Systems Equivalent to that Referred to in SOLAS Regulation II-2/12 Appendix 2 “Fire test procedures for equivalent sprinkler systems in accommodation, public space and service areas on passenger ships”, December 1995 as amended in Res.MSC.265(84), Amendments to the revised guidelines for approval of sprinkler systems equivalent to that referred to in SOLAS regulationII-2/12 (Resolution A.800(19)), May 2008 MSC.1/Circ.1268, Guidelines for the Approval of Fixed Pressure Water-spraying and Water-based Fire Extinguishing Systems for Cabin Balconies Appendix “Test method for fixed pressure water-spraying and water-based fire-extinguishing systems for cabin balconies”, May 2008 MSC.1/Circ.1272, Guidelines for the Approval of Fixed Water-based Fire Extinguishing Systems for Ro-ro Spaces and Special Category Spaces equivalent to that referred to in Resolution A.123(1) Appendix “Test method for fixed water-based fire-fighting systems for ro-ro spaces and special category spaces”, May 2008</td>
</tr>
<tr>
<td>(c) Fire Tests for Water Mists Systems for the Protection of Combustion Turbines with Volumes Exceeding 9175 ft³ (260 m³)</td>
<td></td>
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<tr>
<td>(d) Fire Tests for Water Mists Systems for the Protection of Wet Benches and Other Similar Processing Equipment</td>
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<tr>
<td>(e) Fire Tests for Water Mists Systems for the Protection of Local Applications</td>
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<tr>
<td>(f) Fire Tests for Water Mists Systems for the Protection of Industrial Oil Cookers</td>
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<tr>
<td>(g) Fire Tests for Water Mists Systems for the Protection of Computer Room Sub Floors</td>
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</tr>
<tr>
<td>(h) General Requirements</td>
<td></td>
</tr>
<tr>
<td>(i) Performance Requirements (Water Mist Nozzles and System Components)</td>
<td></td>
</tr>
<tr>
<td>(j) Operations Requirements</td>
<td></td>
</tr>
</tbody>
</table>

**FM Approvals Class Number 5560, Approval Standard for Water Mist Systems**

| (a) Fire Tests for Water Mists Systems for the Protection of Machinery in Enclosures with Volumes not Exceeding 2825 ft³ (80 m³) |
| (b) Fire Tests for Water Mists Systems for the Protection of Combustion Turbines in Enclosures with Volumes not Exceeding 2825 ft³ (80 m³) |
| (c) Fire Tests for Water Mists Systems for the Protection of Machinery in Enclosures with Volumes not Exceeding 9175 ft³ (260 m³) |
| (d) Fire Tests for Water Mists Systems for the Protection of Combustion Turbines in Enclosures with Volumes not Exceeding 9175 ft³ (260 m³) |
| (e) Fire Tests for Water Mists Systems for the Protection of Machinery in Enclosures with Volumes Exceeding 9175 ft³ (260 m³) |
| (f) Fire Tests for Water Mists Systems for the Protection of Combustion Turbines in Enclosures with Volumes Exceeding 9175 ft³ (260 m³) |
| (g) Fire Tests for Water Mists Systems for the Protection of Light Hazard Occupancies |
| (h) Fire Tests for Water Mists Systems for the Protection of Wet Benches and Other Similar Processing Equipment |
| (i) Fire Tests for Water Mists Systems for the Protection of Local Applications |
| (j) Fire Tests for Water Mists Systems for the Protection of Industrial Oil Cookers |
| (k) Fire Tests for Water Mists Systems for the Protection of Computer Room Sub Floors, |
| (l) Fire Tests for Water Mists Systems for the Protection of Continuous Wood Board Presses |
| (m) Operations Requirements |

3. Underwriters Laboratories Inc., Northbrook, IL, USA
   ANSI / UL 2167, Water Mist Nozzles for Fire Protection Service
   [contents can be read from the standard]

4. CEN, Europe
   CEN/TS 14972, Fixed firefighting systems - watermist systems - design and installation
   [contents can be read from the standard]
**Submitter:** Technical Committee Water Mist Fire Suppression Systems  
**Recommendation:** Revise existing:

****Insert Include 750_L64_Rec Here****

**Statement:** Editorial – The proposed information for Annex C.3 is to replace the dated information with more current specifications. It is also to simplify the information provided in Annex C.3 since the FM Approval Standard 5560, Water Mist Systems is now a published document and access to the test specifications in the Standard are free to the public.

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**Submitter:** Technical Committee Water Mist Fire Suppression Systems  
**Recommendation:** C.4.3 Residential Areas. The ANSI/UL 2167 Test Protocol for Residential Areas is very similar to that for residential sprinklers. A residential fuel package is used in a compartment fitted with combustible wall panels and ceiling tiles. **Six** nozzles are installed in the room, which has two open doors on opposite sides, with the fuel package located in a corner. **Two nozzles are located at their maximum spacing and the third nozzle is located near one of the door openings.** Testing is required with a 2.4 m high ceiling and the maximum ceiling height specified in the manufacturer’s design and installation manual. Performance criteria include maximum temperatures at several locations and one nozzle is permitted to operate during the test. **The nozzle closest to the fuel package is installed at its maximum spacing, and the remaining five nozzles are installed using their minimum permitted spacing.** Performance criteria include maximum temperatures at several locations. If only one nozzle operates, the manufacturer’s design and installation manual has to specify at least a two nozzle design. If two or three nozzles operate, at least a four nozzle design is to be specified.

**Statement:** These revisions reflect the updated methods referred to in ANSI/UL 2167.

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**Submitter:** Technical Committee Water Mist Fire Suppression Systems  
**Recommendation:** C.4.5 Ordinary Hazard Group 1. The ANSI/UL 2167 Test Protocol for Ordinary Hazard Group 1 Hazard Areas requires that fire tests be conducted both under an open ceiling and in a corner arrangement. The first series of fire tests is conducted under a smooth flat ceiling having provisions for venting gases around the perimeter set at the maximum height specified in the manufacturer’s design and installation manual. The fire source consists of a 4.7 m wide × 5.9 m long × 2.4 m high array of Class II commodity (double tri-wall corrugated paper cartons with a five-sided steel liner on a 107 cm × 107 cm × 12.7 cm high hardwood pallet). During the 45-minute test, ceiling steel temperatures cannot exceed 282 °C (540 °F) for more than 5 minutes, the number of operating nozzles cannot exceed a design area of 93 m², and damage to the commodity cannot exceed 50 percent. The corner fire tests are similar to the IMO public space corner tests except that empty cardboard cartons are used in lieu of the sofas.

**Statement:** These revisions reflect the updated methods referred to in ANSI/UL 2167.
C.3 Factory Mutual Research Corporation FM Approvals Fire Test Protocols.

C.3.1 General. FM Approvals Class Number 5560, Approval Standard for Water Mist Systems, contains comprehensive test requirements for evaluating a complete water mist system, including the water mist nozzles, water mist system components: design, installation, and operations manuals; hydraulic calculation methods; and fire test protocols for the applications in C.3.2 through C.3.1.3. Similar fire test protocols can be found in ANSI/FM Approvals 5560, American National Standard for Water Mist Systems.

C.3.2 Machinery in Enclosures with Volumes Not Exceeding 80 m³ (2825 ft³). This application includes enclosures with machinery such as internal combustion engines, oil pumps, oil tanks, fuel filters, generators, transformer vaults, gear boxes, drive shafts, lubrication skids, diesel engine–driven generators, and other similar equipment using liquid hydrocarbon fuel and/or hydraulic, heat transfer, and lubrication fluids; enclosures with incidental use or storage of hydrocarbon ignitible liquids (also known as flammable liquids) of not more than two 55 gal (208 L) drums. All hazards included under the scope of this total flooding application are to be protected for a minimum of twice the longest time to extinguish the test fires, the time to shut down process equipment, or 10 minutes, whichever is greatest.

C.3.3 Combustion Turbines in Enclosures with Volumes Not Exceeding 80 m³ (2825 ft³). Combustion turbines included under the scope of this total flooding application are to be protected for a minimum of twice the longest time to extinguish the test fires, turbine rundown time (including the time that the turbine surfaces are above the auto-ignition temperature of the lubricating fluid), the time to shut down process equipment, or 10 minutes, whichever is greatest. Consultation with FM Global Property Loss Prevention Data Sheet Number 7-79, Fire Protection for Combustion Turbine Installations, is required for installation of these systems.

C.3.4 Machinery in Enclosures with Volumes Not Exceeding 260 m³ (9175 ft³). This application includes rooms with machinery such as oil pumps, oil tanks, fuel filters, generators, transformer vaults, gear boxes, drive shafts, lubrication skids, diesel engine–driven generators, and other similar machinery using fuel and/or lubrication fluids with volatilities less than or equal to light diesel. All hazards included under the scope of this total flooding application are to be protected for a minimum of twice the longest time to extinguish the test fires, the time to shut down process equipment, or 10 minutes, whichever is greatest.

C.3.5 Combustion Turbines in Enclosures with Volumes Not Exceeding 260 m³ (9175 ft³). Combustion turbines included under the scope of this total flooding application are to be protected for a minimum of twice the longest time to extinguish the test fires, turbine rundown time (including the time that the turbine surfaces are above the auto-ignition temperature of the lubricating fluid), the time to shut down process equipment, or 10 minutes, whichever is greatest. Consultation with FM Global Property Loss Prevention Data Sheet Number 7-79, Fire Protection for Combustion Turbine Installations, is required for installation of these systems.

C.3.6 Machinery in Enclosures with Volumes Exceeding 260 m³ (9175 ft³). This application includes enclosures with machinery such as internal combustion engines, oil pumps, oil tanks, fuel filters, generators, transformer vaults, gear boxes, drive shafts, lubrication skids, diesel engine–driven generators, and other similar equipment using...
liquid hydrocarbon fuel and/or hydraulic, heat transfer, and lubrication fluids; enclosures
with incidental use or storage of hydrocarbon ignitable liquids (also known as flammable
liquids) of not more than two 208 L (55 gal) drums. All hazards included under the
scope of this total flooding application are to be protected for a minimum of twice the
longest time to extinguish the test fires, the time to shut down process equipment, or 10
minutes, whichever is greatest. For primary protection consideration, see Section 1.9 of
FM 5560, Definitions, “Primary Protection,” and consult the FM Global Property Loss
Prevention Data Sheet for the recommended protection of the specific hazard in the
applicable occupancy.

C.3.7 Combustion Turbines in Enclosures with Volumes Exceeding 260 m³ (9175
ft³). Combustion turbines included under the scope of this total flooding application are
to be protected for a minimum of twice the longest time to extinguish the test fires, the
turbine rundown time (including the time that the turbine surfaces are above the auto-
ignition temperature of the lubricating fluid), the time to shut down process equipment,
or 10 minutes, whichever is greatest. Consultation with FM Global Property Loss
Prevention Data Sheet Number 7-79, Fire Protection for Combustion Turbine
Installations, is required for installation of these systems. For primary protection
consideration, see Section 1.9 of FM 5560, Definitions, “Primary Protection.”

C.3.8 Light Hazard Occupancies. Typical light hazard occupancies within the scope of
this application are defined in FM Global Property Loss Prevention Data Sheet Number
3-26, Fire Protection Water Demand for Nonstorage Sprinklered Properties. The
occupancies are defined as Hazard Category 1 (HC-1). Water mist systems are not to
be used to protect HC-2, HC-3, or HC-4 occupancies. The applications are limited to
celling heights of 2.4 m (8 ft) for restricted areas and 5 m (16 ft 5 in.) for unrestricted
areas (refer to Section 1.9 of FM 5560, Definitions, “Light Hazard Occupancy,” for
specific descriptions of restricted and unrestricted areas). The water supply must be
capable of supplying 60 minutes of water to the hydraulically most remote nine
automatic nozzles or all automatic nozzles within a 1,500 ft² (140 m²) demand area,
whichever is greater, for systems approved for the protection of unrestricted areas. For
installations with less than 1,500 ft² (140 m²) in area, the water supply are to be capable
of supplying 60 minutes of water to all nozzles in the protected area. For systems
approved for the protection of restricted areas, the water supply is to be capable of
supplying 60 minutes of water to all automatic nozzles within the compartment.
Consultation with FM Global Property Loss Prevention Data Sheet Number 4-2, Water
Mist Systems, and FM Global Property Loss Prevention Data Sheet Number 3-26, Fire
Protection Water Demand for Nonstorage Sprinklered Properties, is required for
installation of these systems.

C.3.9 Wet Benches and Other Similar Processing Equipment. This application
includes tools that consist of ventilated and unventilated compartments, spin rinse
dryers, alcohol vapor dryers, chemical and mechanical polishing tools, and step and
repeat exposure systems. All hazards included under the scope of this local application
are to be protected for a minimum of 10 minutes or twice the longest time to extinguish
the worst-case fire scenario, whichever is greater. Consultation with FM Global Property
Loss Prevention Data Sheet Numbers 4-2, Water Mist Systems, and 7-7,
Semiconductor Fabrication Facilities, is required for installation of these systems.
C.3.10 Local Application Occupancies. Typical local application occupancies within the scope of this section are defined in the FM Global Property Loss Prevention Data Sheet Number 7 Series (Hazards). Consultation with these data sheets is required for installation of these systems. Water mist systems that successfully pass the local application fire scenarios are limited to protection of the following applications:

A. Ignitible liquid (also known as flammable liquid) pool fires where the liquid release can be confined to a diked area. The entire surface of the diked area is to be protected by the water mist system.

B. Ignitible liquid (also known as flammable liquid) channel fires in channels not exceeding the water mist system manufacturer’s maximum specified width and with no limit to channel length.

C. Partially obstructed ignitible liquid (also known as flammable liquid) pool fires where the percentage of obstructed surface is limited to that tested.

D. Spray fires up to 6 MW fueled by ignitible liquids (also known as flammable liquids).

E. Spray and pool fire combinations where the release can be confined to a diked area.

F. Ignitible liquid (also known as flammable liquid) residues (ink and paper dust) on printing presses.

Applicants who want to protect special hazard equipment with ignitible liquids (also known as flammable liquids) with volatilities less than or equal to that of heptane will need to conduct the local application fire scenarios substituting heptane for diesel as the test fuel where appropriate. All hazards are to be protected for a minimum of twice the longest time to extinguish the test fires, time to shut down process equipment, or 10 minutes, whichever is greatest. Consultation with FM Global Property Loss Prevention Data Sheet Number 4-2, Water Mist Systems, is required for installation of these systems.

C.3.11 Industrial Oil Cookers. Application of the water mist system is limited to the protection of industrial oil cookers only and does not include the protection of other equipment, such as exhaust ducts, heaters, heat exchangers, and food processing areas, unless tested for these applications. Consideration of the application and use of nozzle protection caps to prevent or reduce the amount of nozzle contamination should be given, and the use of such caps should be included in the fire test and nozzle performance test requirement programs. This local application does not include the protection of other equipment such as exhaust air ducts, heaters, heat exchangers, and food processing or food preparation areas. Consultation with FM Global Property Loss Prevention Data Sheet Numbers 4-2, Water Mist Systems, and 7-20, Oil Cookers, is required for installation of these systems.

Industrial oil cookers typically are noninsulated conveyorized fryers or occasional batch kettles, used in food processing plants for chicken, fish, potato products (e.g., fries, chips), doughnuts, and many other food products. These cookers are extremely different in size, configuration, and construction from standard kitchen or restaurant oil cookers or fryers and require a different type of extinguishment system. Industrial oil cookers come in many sizes. They can contain up to approximately 900 L (5000 gallons) of cooking oil. Industrial oil cookers (except for some batch kettles) typically have movable covers or hoods that can be hydraulically operated.
The hood is generally in a closed position during a normal operation period but can be opened occasionally for routine maintenance. There are also exhaust stacks connected on top of the hood. The most severe fire incident involving industrial oil cookers is a fire caused by overheating the cooking oil until it reaches its auto-ignition temperature (AIT). Installation of an interlocking system to prevent the oil from reaching its AIT is a normal practice in the industry. However, an AIT fire can still occur due to a system malfunction or simple human error. Thus, all the performance tests proposed in this document require extinguishment of an AIT fire. The AIT fire is particularly challenging because of the rapid spread of flame over the oil surface and the difficulty in extinguishing the fire because flame extinction is required over the entire surface with simultaneous rapid cooling to prevent re-ignition.

Exhaust air fans should be interlocked to automatically shut down upon fire detection or operation of the water mist system. Exhaust duct protection, as outlined in FM Global Property Loss Prevention Data Sheet Number 7-78, Industrial Exhaust Systems, is required and should be specified in the manufacturer’s design, installation, operation, and maintenance manual. (Note: Water spray protection for the ducts is required if operation of the duct system during water mist system discharge is necessary. Automatic sprinkler protection is recognized as an effective alternative to water spray.) Commonly used cooking oils, their flash points, and their AITs are listed in Table C.3.11 as a reference only. Canola oil is considered a representative vegetable oil and can be used as the testing medium in industrial oil cooker fire tests. Canola oil has a nominal density equal to 0.93 kg/L (7.8 lb/gal) and nominal specific heat equal to 2.5 kJ/kg · °C (0.59 Btu/lb · °F). Alternative cooking oils can be used based on the manufacturer’s intended applications for protection, and approval is limited to cooking oils with flash points and AITs less than or equal to the tested oil.
### Table C.3.11. Nominal Flash Points and Auto-Ignition Temperatures (AITs) of Commonly Used Cooking Oils

<table>
<thead>
<tr>
<th>Cooking Oil</th>
<th>Flash Point</th>
<th>Auto Ignition Temperature (AIT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>°C</td>
<td>°F</td>
</tr>
<tr>
<td>Canola</td>
<td>338</td>
<td>641</td>
</tr>
<tr>
<td></td>
<td>363</td>
<td>686</td>
</tr>
<tr>
<td>Corn</td>
<td>342</td>
<td>647</td>
</tr>
<tr>
<td></td>
<td>362</td>
<td>684</td>
</tr>
<tr>
<td>Cotton seed</td>
<td>334</td>
<td>633</td>
</tr>
<tr>
<td></td>
<td>366</td>
<td>690</td>
</tr>
<tr>
<td>Peanut</td>
<td>348</td>
<td>659</td>
</tr>
<tr>
<td></td>
<td>370</td>
<td>698</td>
</tr>
<tr>
<td>Soybean (soya)</td>
<td>333</td>
<td>631</td>
</tr>
<tr>
<td></td>
<td>377</td>
<td>710</td>
</tr>
<tr>
<td>Sunflower</td>
<td>340</td>
<td>644</td>
</tr>
<tr>
<td></td>
<td>359</td>
<td>678</td>
</tr>
<tr>
<td>Palm</td>
<td>328</td>
<td>623</td>
</tr>
<tr>
<td></td>
<td>377</td>
<td>710</td>
</tr>
</tbody>
</table>

The agent supply is to be capable of supplying agent to all open nozzles at the maximum rated operating pressure for a minimum of twice the total time needed to extinguish the worst-case fire scenario and subsequently cool the oil to a temperature below its flash point, as established by the testing or 10 minutes, whichever is greater.

### C.3.12 Computer Room Subfloors

Typical occupancies within the scope of this application are defined in FM Global Property Loss Prevention Data Sheet Numbers 4-2, *Water Mist Systems*, and 5-32, *Electronic Data Processing Systems*. System installations are limited to computer room subfloor areas and heights not exceeding those tested. Additionally, the equivalent opening area of the subfloor cannot exceed those tested. The agent supply should be capable of supplying agent to all nozzles at the maximum rated operating pressure for a minimum of twice the longest time to extinguish the test fires or 10 minutes, whichever is greater. This protocol evaluates only the fire extinguishment capabilities of the water mist system. An evaluation of the smoke-cleansing capabilities is not made. Consultation with FM Global Property Loss Prevention Data Sheet Numbers 4-2, *Water Mist Systems*, and 5-32, *Electronic Data Processing Systems*, is required for installation of these systems.

### C.3.13 Continuous Wood Board Presses

This application is further defined in FM Global Property Loss Prevention Data Sheet Number 7-10, *Wood Processing and Woodworking Facilities*. Application of the water mist system is limited to the protection of the continuous wood board press only and does not include the protection of other equipment unless tested for other applications. All hazards included under the scope of this application are to be protected for a minimum of twice the longest time to extinguish the test fires or 30 minutes, whichever is greater. Consultation with FM Global Property Loss Prevention Data Sheet Numbers 4-2, *Water Mist Systems*, and 7-10, *Wood Processing and Woodworking Facilities*, is required for installation of these systems.

Factory Mutual Research Corporation (FMRC) has developed the following test protocols, which are the basis for current listings of water mist systems and components [denoted by FMRC as Fine Water Spray (FWS) systems]:

1. **FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Combustion Turbine Enclosures, Machinery Spaces, and Special Hazard Machinery Spaces with Volumes Not Exceeding 2825 ft³ (80 m³)**
C.3.1.1 Note that the term machinery space refers to flammable liquid hazards no greater than those of diesel fuel, and the term special hazard machinery space refers to flammable liquid hazards no greater than those of n-heptane. These terms should not be confused with the term machinery space used in the International Maritime Organization (IMO) documents relating to fine water spray. They are not intended to be interchangeable.

C.3.1.2 The standards describe fire test performance criteria and methods. Because each fine water spray system is unique in its design and use of components, the component testing of each fine water spray system is evaluated on a case-by-case basis. The components are tested for functionality, performance, integrity, and reliability. The manufacturers’ design, installation, and maintenance manual(s) are reviewed for technical content and clarity. The supplied hydraulic calculations are also reviewed.

C.3.2 FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Combustion Turbine Enclosures, Machinery Spaces, and Special Hazard Machinery Spaces with Volumes Not Exceeding 80 m³ (2825 ft³). The objective of this standard is to ensure that the fine water spray system extinguishes spray and pool fires that can occur, for example, due to breaks in lubrication, hydraulic, or fuel lines. Typically, these fires are highly shielded. While spray fires can occur only as the result of a supply line break, pool fires can occur as a result of a breakage or as a result of a small leak over a large period of time. This standard is limited to volumes not exceeding 80 m³ (2825 ft³). The FMRC standard assumes automatic interlocks for the following:

(1) All fuel supply lines (for combustion turbines, bearing lubrication can be left on to allow the turbine to coast down)
(2) Door closures
(3) Ventilation shutdown
(4) Electrical systems

C.3.2.2 The water supply required is dependent on the application. For combustion turbines, the water supply has to be sufficient to protect the turbine for the duration of its coast downtime. For machinery spaces and special hazard machinery spaces, the protection time is 10 minutes.

C.3.2.3 The detection is by means of heat detectors. The detection is so designed as to detect the fire and activate the fine water spray system within 60 seconds of the ignition.
C.3.2.4 The fine water spray system has to extinguish all spray and pool fires within 5 minutes from the time of ignition. Tests are conducted in closed enclosures as well as enclosures with natural ventilation. For optional protection of insulated combustion turbines, the insulation mat can be suppressed rather than extinguished.

C.3.2.5 In addition to the fire performance criteria, fine water spray systems used for the protection of combustion turbines cannot cause damage to the turbine by means of thermal shock or cracking of the turbine casing or induce blade rubbing. The rate of cooling of the steel test plate (1m×2m×5cm thick) must not exceed limits set by FMRC. It can be more difficult to successfully pass the cooling test than to pass the fire tests, and the results of the cooling test often indicate the number, type, and placement of the fine water spray nozzles.

C.3.3 FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Combustion Turbine Enclosures, Machinery Spaces, and Special Hazard Machinery Spaces with Volumes Not Exceeding 9175 ft³ (260 m³).

C.3.3.1 The objective of this standard is to ensure that the fine water spray system extinguishes spray and pool fires that can occur, for example, due to breaks in lubrication, hydraulic, or fuel lines. Typically, these fires are highly shielded. While spray fires can occur only as the result of a supply line break, pool fires can occur as a result of a breakage or as a result of a small leak over a large period of time. This standard is limited to volumes not exceeding 260 m³ (9175 ft³). The FMRC standard assumes automatic interlocks for the following:

1. All fuel supply lines (for combustion turbine, bearing lubrication can be left on to allow the turbine to coast down)
2. Door closures
3. Ventilation shutdown
4. Electrical systems

C.3.3.2 The water supply required is dependent on the application. For combustion turbines, the water supply has to be sufficient to protect the turbine for the duration of its coast downtime. For machinery spaces and special hazard machinery spaces, the protection time is 10 minutes.

C.3.3.3 The detection is by means of heat detectors. The detection is so designed as to detect the fire and activate the fine water spray system within 60 seconds of the ignition.

C.3.3.4 The fine water spray system has to extinguish all spray and pool fires within 5 minutes from the time of ignition. Tests are conducted in closed enclosures as well as enclosures with natural ventilation. For optional protection of insulated combustion turbines, the insulation can be suppressed rather than extinguished. In addition to demonstrating performance in volumes not exceeding 260 m³ (9175 ft³), systems also have to demonstrate the capability to perform in small [130 m³ (4590 ft³)] enclosures.

C.3.3.5 In addition to the fire performance criteria, fine water spray systems used for the protection of combustion turbines cannot cause damage to the turbine by means of thermal shock, cause cracking of the turbine casing, or induce blade rubbing. The rate of cooling of the steel test plate (1m×2m×5cm thick) cannot exceed limits set by FMRC. It can be more difficult to successfully pass the cooling test than to pass the fire tests.
and the results of the cooling test often indicate the number, type, and placement of the fine water spray nozzles.

C.3.4 FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Combustion Turbine Enclosures, Machinery Spaces, and Special Hazard Machinery Spaces with Volumes Exceeding 9175 ft³ (260 m³).

C.3.4.1 The objective of this standard is to ensure that the fine water spray system extinguishes spray and pool fires that can occur, for example, due to breaks in lubrication, hydraulic, or fuel lines. Typically, these fires are highly shielded. Although spray fires can occur only as the result of a supply line break, pool fires can occur as a result of a breakage or as a result of a small leak over a large period of time. The FMRC standard assumes automatic interlocks for the following:

1. All fuel supply lines (for combustion turbines, bearing lubrication can be left on to allow the turbine to coast down)
2. Door closures
3. Ventilation shutdown
4. Electrical systems

C.3.4.2 This standard is based on the IMO Standard for Shipboard Machinery Spaces, although the hazards discussed in both documents are different. Due to differences in system design and performance, extrapolation of results to larger room sizes is not permitted by FMRC at this time.

C.3.4.3 The water supply required is dependent on the application. For combustion turbines, the water supply has to be sufficient to protect the turbine for the duration of its coast downtime. For machinery spaces and special hazard machinery spaces, the protection time is 60 minutes. Typically, the volumes tested exceed 800 m³ (28,230 ft³).

C.3.4.4 The detection is by means of heat detectors. The detection is so designed as to detect the fire and activate the fine water spray system within 60 seconds of the ignition.

C.3.4.5 The fine water spray system has to extinguish all spray, pool, and crib fires within 30 minutes from the time of ignition. The exception is a small shielded diesel pool fire that has to be suppressed. Tests are conducted in enclosures with natural ventilation. For optional protection of insulated combustion turbines, the insulation mat can be suppressed rather than extinguished.

C.3.4.6 In addition to the fire performance criteria, fine water spray systems used for the protection of combustion turbines cannot cause damage to the turbine by means of thermal shock or cracking of the turbine casing or induce blade rubbing. The rate of cooling of the steel test plate (1 m × 2 m × 5 cm thick) cannot exceed limits set by FMRC. It can be more difficult to successfully pass the cooling test than to pass the fire tests, and the results of the cooling test often indicate the number, type, and placement of the fine water spray nozzles.

C.3.5 FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Light Hazard Occupancies.

C.3.5.1 The objective of this standard is to ensure that the fine water spray system controls fires typically found in light hazard occupancies and prevents the spread of the fire beyond the room or area of origin. These fires typically involve furnishings and wall coverings. This standard limits the heights of enclosed spaces to 2.4 m (8 ft) and the heights of unrestricted spaces to 5 m (16 ft 5 in.).
C.3.5.2 This standard is based on the IMO Standard for Shipboard Corridors, Cabins, and Public Spaces, although the hazards discussed in both documents are different.

C.3.5.3 The water supply required is 60 minutes for the most remote nine nozzles at the rated operating pressure.

C.3.5.4 The detection is by means of individual heat responsive elements on the nozzles. The nozzles should meet FMRC requirements for quick response sprinklers and are limited to a maximum nominal temperature rating of 107°C (225°F). Nozzle spacing is to be uniform with uniform spacing, preferably one-half of the standard nozzle spacing, from the wall.

C.3.5.5 The fire performance tests consist of three test areas: small compartment, large compartment, and open space.

C.3.5.5.1 The small compartment [3 m × 4 m × 2.4 m (10 ft × 13 ft × 8 ft) high] has a door 0.8 m × 2.2 m (2 ft 6 in. × 7 ft 2 in.) high and represents a small ship cabin. The fuel package for this room consists of two bunk beds identical to the IMO specification. The purpose of this test is to delineate mist nozzles from sprinklers. The fire is ignited on the lower mattress, and the test methodology is identical to that specified in the IMO test series. Pass/fail criteria are based on damage of the lower bunk (maximum of 40 percent), ceiling surface temperature over ignition [maximum of 260°C (500°F)], and a maximum gas temperature 76 mm (3 in.) below the ceiling of 315°C (600°F).

C.3.5.5.2 The large compartment [having equal sides not exceeding 6 m (20 ft) and a height of 2.4 m (8 ft)] has two doors [each 0.8 m × 2.2 m (2 ft 6 in. × 7 ft 2 in.) high] located in diagonally opposite corners. A nozzle is placed in the doorway opposite the fuel package. The fuel package and test method are identical to the IMO specification. The heptane under the wood crib is ignited first, then followed 40 seconds later by the ignition of the excelsior. The doorway nozzles do not operate (indicating that the fire would not have spread to an adjacent area). Additional pass/fail criteria include ceiling surface temperature over ignition [maximum of 265°C (510°F)] and a maximum gas temperature 76 mm (3 in.) below the ceiling of 315°C (600°F).

C.3.5.5.3 The open space test is conducted under a ceiling with a minimum area of 80 m² (860 ft²) to simulate an uninterrupted area and a ceiling height of 5 m (16 ft 5 in.). At least 16 nozzles are installed in the ceiling and the fuel package (sofas, as outlined in the IMO specification) are to be arranged per the IMO specification. The test is conducted three times: once each with the ignition under one nozzle, between two nozzles, and between four nozzles. Pass/fail criteria are based on fewer than five nozzles operating, at least one unoperated nozzle beyond those that operate, damage of the sofa cushions (maximum of 50 percent), ceiling surface temperature over ignition [maximum of 260°C (500°F)], and a maximum gas temperature 76 mm (3 in.) below the ceiling of 315°C (600°F).

C.3.5.6 FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Wet Benches and Other Processing Equipment.

C.3.6.1 The objective is to ensure that the fine water spray system extinguishes pool fires typically found in wet benches and other similar clean room processing equipment.

C.3.6.2 The detection system has to be approved specifically for use in wet bench applications. Fine water spray systems used for this application are typically of the zoned, deluge type. Operating elements currently used in automatic sprinklers have not been shown to be sufficiently fast enough to prevent significant nonthermal damage.
C.3.6.3 The simulated clean room is 5.5m× 3.7m× 3.7m (18 ft × 12 ft × 12 ft) high with porous ceiling and floor plates. An airflow (downward) with a velocity of 0.31 m/sec (60 ft/min) is maintained throughout the test. The minimum airflow by the open face of the wet bench is 4.5 m3/min/linear m (150 ft3/ min/linear ft). The wet bench measures approximately 2.3 m × 1.4 m × 2 m (7.5 ft × 4.5 ft × 6.5 ft) high and is divided into two areas: the ventilated subsurface (or plenum) area and the working surface area. The subsurface dimensions are 0.8 m × 2.3 m × 0.6 m (2.6 ft × 7.5 ft × 2 ft) high. The working surface area is 0.8 m × 2.3 m (2.6 ft × 7.5 ft).

C.3.6.4 All fires have to be extinguished in less than 60 seconds.

C.3.6.5 Various fire scenarios are conducted to test the fine water spray system for the ventilated subsurface area. These include five pool fires (various sizes) utilizing polypropylene beads and solid coupons for fuel and at least one pool fire for each of the following flammable liquids: acetone, isopropyl alcohol (IPA), and n-heptane. The pan sizes and fire locations for the flammable liquid pool fire are at the discretion of FMRC based on observations of the fine water spray system. Obstructions are placed within the subsurface area such that approximately 50 percent of the nozzle discharge is blocked.

C.3.6.6 Two tests are conducted to determine the effectiveness of a single nozzle in an unventilated space utilizing the subsurface area as a test chamber. The first test utilizes a polypropylene pool fire, and the second test uses a flammable liquid pool fire. Pan size and flammable liquid are at the discretion of FMRC based on the outcome of the ventilated subsurface tests. Suitable barriers are placed in the test area to prevent direct impingement on the fire and to provide 50 percent blockage of the discharge.

C.3.6.7 Several fire scenarios are conducted to test the fine water spray system for the working surface area. These include five pool fires (various sizes) utilizing polypropylene beads and solid coupons for fuel and at least one pool fire for each of the following flammable liquids: acetone, isopropyl alcohol (IPA), and n-heptane. The pan sizes and fire locations for the flammable liquid pool fire are at the discretion of FMRC based on observations made of the fine water spray system. The flammable liquid fires are also tested at the minimum and maximum nozzle heights, as specified by the manufacturer. A splashing test is conducted in which a single nozzle, located at the minimum vertical height above a pan of liquid containing dye, is discharged at the maximum pressure. None of the contents of the liquid pool are splashed outside a 0.4 m (16 in.) diameter circle centered on the pool.

C.3.7 FMRC Draft Fire Test Protocol for Water Mist Systems for Local Application Protection.

C.3.7.1 The objective of this standard is to ensure that the water mist system will extinguish combustible liquid spray and pool fires. These fires can occur on printing press stands, dip tanks, quench tanks, or lube oil—conditioning systems. The standard assumes the following:

1. Room ventilation is normal.
2. Obstructions over the protected area do not exceed that tested.
C.3.7.2 The time required to extinguish the fire scenarios will be reported. The water supply required depends on the occupancy and the authority having jurisdiction.

C.3.7.3 The system is to be automatically activated by a listed heat or flame detection system.

C.3.7.4 The water mist system must extinguish the following fires at the maximum and minimum nozzle elevations and spacing. Maximum and minimum heights apply as follows:

1. For square pool fires, maximum height only for a 1 m × 1 m and 2 m × 2 m pool; maximum and minimum heights for a 3 m × 3 m pool
2. For channel fires, maximum height only for Y and 2Y lengths; maximum and minimum heights for 3Y length
3. For heptane spray fires, maximum and minimum heights
4. For combined pool and spray fires, maximum height only
5. For offset pool fire, obstructed pool fire, and spray fire with external ignition source, maximum and minimum heights

C.3.7.4.1 Pool Fires. Pool fires are to be in square shapes from 1 m², 4 m², and 9 m² (10.8 ft², 43.6 ft², and 96 ft²) in area.

C.3.7.4.2 Obstructed Pool Fires. The obstruction must be at least equivalent to a 0.6 m (2 ft) diameter drum located 0.5 m (1.6 ft) over the center of the pool.

C.3.7.4.3 Channel Fires. Channel fires are to be at the width of the channel and at lengths of one, two, and three times the width.

C.3.7.4.4 Spray Fires. Six MW heptane spray fires are conducted with the spray fire axis in the horizontal and vertical directions.

C.3.7.4.5 Spray and Pool Fires. Horizontal spray fire tests are conducted with a 6 MW diesel spray fire at two different elevations and two different locations above the surface of a 2 m × 2 m diesel pool fire. A 45-degree spray fire is conducted with a 6 MW diesel spray fire at two locations at one elevation above a 2 m × 2 m diesel pool fire.

C.3.7.4.6 Diesel Soaked Paper Dust Fire. A fire involving a quantity of diesel fuel soaked into paper dust.

C.3.7.5 The tests are conducted in enclosures large enough so that oxygen concentrations do not decrease below 20 percent.

Fluid is contained within the diked area.
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

**E.1.1 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471


Statement: Updated & editorial changes per NFPA manual of Style.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text to read as follows:

**E.1.2.5 FM Approvals Publications.** FM Approvals, 1151 Boston-Providence Turnpike, P.O. Box 9102, Norwood, MA, 02062.


Statement: Updated & editorial changes per NFPA manual of Style

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

**E.1.2.9 UL Publications.** Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.


Statement: The Technical Committee agrees to updating editorial changes for all references that are mandatory per the NFPA Manual of Style.

Public Input Response:
Supplemental Agenda October 29-30, 2012
Subject: Appeal to the NFPA Standards Council re Action of the NFPA 750 Technical Committee during the Public Proposal/Input stage
Attachments: 750_F2013_FD_ballot.pdf

September 25, 2012

Ms. Linda J. Fuller
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169

Dear Ms. Fuller,

In response to your email which addressed Mr. J. Golinveaux’s appeal request, I offer the following comments.

1. The issues addressed in Mr. Golinveaux’s appeal request were discussed at length by the NFPA 750 Technical Committee (TC) members during the committee meeting in April, 2012. Tyco was represented in the meeting and over the course of two days’ discussion, the Tyco representative presented Tyco’s position on the various issues. The committee made numerous compromises on several issues representing the various viewpoints of committee members and the proposals as noted in the first draft ballot were approved by the TC for inclusion in the ballot.

2. There is no direct conflict between NFPA 750 and NFPA 13 as the text included in NFPA 750 was copied almost word for word from NFPA 13.

3. Mr. Golinveaux suggests that the TC adopted the “concept of equivalency” in the 750 ballot documents. There were proposals submitted to the TC to adopt the term “sprinkler equivalent” in the NFPA 750 standard. Discussions among the TC resulted in the term “sprinkler equivalent” not being acceptable. Instead, the term “sprinkler alternative” was agreed to by the TC.

4. Mr. Golinveaux does not address the fact that water mist systems must be approved by a NRTL for use in sprinkler or spray applications in the same manner that sprinkler heads must be approved. Since both systems must be approved for use based on a specific test standard, there is really no debate on how the NFPA 750 text compares to NFPA 13 as the water mist products must still be approved by a NRTL to a specific test standard. A water mist product test standard could be for a light hazard or ordinary hazard application depending upon what the product has been engineered to protect. That process is the same for sprinkler heads. While TFP’s opinion might be that a light hazard water mist sprinkler head is different from a light hazard conventional sprinkler head, at the end of the day, both heads are approved by NRTL’s for light hazard occupancies. Both heads do have different areas of coverage and water delivery densities. There is no debate about that technical issue.

In summary, it is my opinion that there is no basis to approve an appeal based on Mr. Golinveaux’s request.

Please let me know if you feel further discussion is needed.

Best regards,

Larry W. Owen, CFPS
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telephone: 713-427-3155
cell: 713-817-0023
fax: 281-884-0144
NFPA 750 Chair
MEMORANDUM

TO:            NFPA Technical Committee on Water Mist Fire Suppression Systems
FROM:          Elena Carroll, Administrator, Technical Projects
DATE:          August 6, 2012
SUBJECT:       NFPA 750 First Draft Letter Ballot (F2013)

Please find the attached the First Revisions for NFPA 750. The ballot is for formally voting
whether or not you concur with the committee’s First Revisions. Reasons must accompany all
negative and abstaining votes.

Please do not vote negatively because of editorial errors. However, please bring such
errors to my attention for action.

Please complete and return your ballot as soon as possible but no later than August 20, 2012. As
noted on the ballot form, please return the ballot to Elena Carroll either via e-mail to
ecarroll@nfpa.org or via fax to 617-984-7110. You may also mail your ballot to the attention of
Elena Carroll at NFPA, 1 Batterymarch Park, Quincy, MA 02169.

The return of ballots is required, by the Regulations Governing the Development of NFPA
Standards.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Update the following references:

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

2.3 Other Publications.

2.3.1 ANSI Publications. American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.
ANSI B16.18, Cast Copper Alloy Solder Joint Pressure Fittings, 1994.

2.3.2 ASME Publications. American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.
ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings, 2012.

2.3.3 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P. O. Box C700, West Conshohocken, PA 19428-2959.
2.3.4 **AWS Publications.** American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.
AWS A5.8M/A5.8, Specification for Filler Metals for Brazing and Braze Welding.

2.3.5 **IMO Publications.** International Maritime Organization, 4 Albert Embankment, London, SEI 7SR, United Kingdom.
IMO Assembly Resolution A.800(19), Revised Guidelines for Approval of Sprinkler Systems.
IMO MSC/Circ. 668, Alternative Arrangements for Halon Extinguishing Systems in Machinery Spaces and Pumprooms.
IMO MSC/Circ. 728, Revised Test Method for Equivalent Water-Based Extinguishing Systems in Machinery Spaces of Category A and Cargo Pump-Rooms Contained in MSC/Circ. 668.
IMO MSC/Circ. 913, Guidelines for the Approval of Fixed Water-Based Local Application Fire-Fighting Systems for Use in Category A Machinery Spaces, 1999.

2.3.6 **ISO Publications.** International Organization for Standardization, 1 rue de Varembé, Case postale 56, CH-1211 Geneve 20, Switzerland.

2.3.7 **ULC Publications.** Underwriters' Laboratories of Canada, 7 Underwriters Road, Toronto, Ontario M1R 3B4, Canada.

2.3.8 **U.S. Coast Guard Publication.** 2100 Second Street, S.W., Washington, DC 20593-0001.

Title 46, Code of Federal Regulations, Parts 56.50 and 56.75, “Shipping.”
Title 49, Code of Federal Regulations, “Transportation.”

2.3.10 **Other Publications.**

2.4 **References for Extracts in Mandatory Sections.**

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**750 FR54**

**Final Action:**

**(3.3.1)**

**Submitter:** Technical Committee Water Mist Fire Suppression Systems

**Recommendation:** Add new definition as shown:

**3.3.x-1 Acceptance Test Plan.** A complete step-by-step description of the proposed acceptance test procedure that identifies all devices, controls and functions to be tested and how the test will be conducted.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing definition of Twin-fluid System in sentence as follows:

3.3.18  **Twin-Fluid System.** A water mist system in which water and an atomizing medium are separately supplied to and mixed at the water mist nozzle; the water mist nozzle utilizing a separate piping system for each medium or a single piping system for both media.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

3.3.19  **Water Mist.** A water spray for which the Dv0.99, for (the flow-weighted cumulative volumetric distribution of water droplet), is less than 1000 microns within the nozzle operating pressure range, minimum design operating pressure of the water mist nozzle.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

3.3.21.2  **Hybrid Multi-functional Water Mist Nozzles.** Nozzles capable of operation using both automatic and nonautomatic means.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Move item 3.3.3 to a sub-paragraph of 3.3.22, and modify as indicated below:

3.3.22  **Deluge Water Mist System.** A water mist system utilizing nonautomatic mist nozzles (open) attached to a piping network connected to the fluid supply(ies) through a valve controlled by an independent detection system installed in the same area as the mist nozzles.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add a new definition as follows:

3.3.22.1* Automatic Sprinkler Alternative Water Mist Systems. A water mist system utilizing automatic water mist nozzles installed in a building and designed to provide primary fire protection that is an alternative to automatic sprinkler systems.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

3.3.22.5* Pre-Engineered Water Mist Systems. Those systems having predetermined flow rates, nozzle pressures, and water quantities, pipe and tube sizes, maximum and minimum pipe lengths, number of fittings and numbers and types of nozzles, nozzle pressures, atomizing media, and water storage quantities, and which do not require additional hydraulic calculations.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

3.3.23.1* Working Pressure. The maximum anticipated static (nonflowing) or pressure applied to the system components exclusive of surge pressures.
Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Add new text as follows:

3.3.22.8 **Total Compartment Application Water Mist System.** A deluge water mist system that provides complete protection of an enclosure or space by the simultaneous operation of all nozzles in the space by manual or automatic means.

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Add new text as follows:

3.3.25.9 **Zoned Application Water Mist System.** A total compartment application water mist system utilizing nonautomatic nozzles, or intermixed nonautomatic and automatic nozzles, in which the piping network is subdivided into predetermined zones controlled by individual control valves, and which protects a predetermined portion of the compartment by the manual or automatic activation of a selected group of nozzles.

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Add definitions to read as follows:

3.3.26 **Pressure-Regulating Valve.** A valve designed for the purpose of reducing, regulating, controlling, or restricting water pressure.

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Revise text to read as follows:

3.3.27 **Pressure Relief Device.** A device designed for the purpose of preventing pressure levels in excess of the design working pressure of the system, the system components, or both.
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

3.3.28 Unloader Valve. A Pressure Regulating Valve of the type that regulates pressure by relieving excess flow. [20, Sec. 3.3.55.6-2013]

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new Chapter 5 as follows:

Chapter 5 Classification of Occupancies.
5.1* Classification of Occupancies.
5.1.1* Occupancy classifications for this standard shall relate to water mist system design, installation, and water supply requirements only.
5.1.2 Occupancy classifications shall not be intended to be a general classification of occupancy hazards.
5.2* Light Hazard Occupancies. Light hazard occupancies shall be defined as occupancies or portions of other occupancies where the quantity and/or combustibility of contents is low and fires with relatively low rates of heat release are expected.
5.3* Ordinary Hazard Occupancies.
5.3.1* Ordinary hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where combustibility is low, quantity of combustibles is moderate, stockpiles of combustibles do not exceed 8 ft (2.4 m), and fires with moderate rates of heat release are expected.
5.3.2* Ordinary Hazard (Group 2). Ordinary hazard (Group 2) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents are moderate to high, where stockpiles of contents with moderate rates of heat release do not exceed 12 ft (3.66 m) and stockpiles of contents with high rates of heat release do not exceed 8 ft (2.4 m).
5.4 Extra Hazard Occupancies.
5.4.1* Extra Hazard (Group 1). Extra hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents are very high and dust, lint, or other materials are present, introducing the probability of rapidly developing fires with high rates of heat release but with little or no combustible or flammable liquids.
5.4.2* Extra Hazard (Group 2). Extra hazard (Group 2) occupancies shall be defined as occupancies or portions of other occupancies with moderate to substantial amounts of flammable or combustible liquids or occupancies where shielding of combustibles is extensive.
5.5* Special Occupancy Requirements.
5.5.1* Water mist systems shall be permitted to be used for special occupancies provided that they have been listed for such occupancies.
5.6* Residential Occupancies up to and including Four Stories in Height.
5.6.1 Residential Occupancies up to and including Four Stories in Height. Residential Occupancies shall include the following, as defined in NFPA 101, Life Safety Code: (1) Apartment buildings, (2) Lodging and rooming houses, (3) Board and care facilities, and (4) Hotels, motels, and dormitories.
5.6.2 One- and Two-Family Dwellings.
5.6.2 One- and two-family dwellings shall be defined as any detached building, or any part of a townhouse structure that is separated from the remainder of the townhouse structure with fire resistance rated assemblies in accordance with local building code, that contains no more than two dwelling units intended to be used, rented, leased, let, or hired out to be occupied or that is occupied for habitation purposes.
**Submitter:** Technical Committee Water Mist Fire Suppression Systems  

**Recommendation:** Revise existing section as follows:

**5.6.1.2 System Design Pressure Working Pressure:**

- **6.1.2** System components shall be rated for have a design pressure equal to or greater than the maximum working pressure to which they are exposed but not less than 12.1 bar (175 psi).

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**Submitter:** Technical Committee Water Mist Fire Suppression Systems  

**Recommendation:** Revise text to read as follows:

- **5.6.2.2.1** Installation. Gas and water containers shall be designed for installation according to the manufacturer's installation manual, including provision for attachment of seismic restraint where required.

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**Submitter:** Technical Committee Water Mist Fire Suppression Systems  

**Recommendation:** Revise text to read as follows:

- **5.6.2.4** Design Pressure. The design pressure shall be based on the maximum pressure developed by the water mist system at 54 degree C (130 degree F) or a higher temperature as specified in the manufacturer's listing.

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**Submitter:** Technical Committee Water Mist Fire Suppression Systems  

**Recommendation:** Revise text to read as follows:

- **5.6.3.1.1** All wetted surfaces in piping, valves, and fittings from the system strainer to the nozzle, shall have corrosion resistance at least equivalent to that for piping as specified in Table 6.3.3.1.

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**Submitter:** Technical Committee Water Mist Fire Suppression Systems  

**Recommendation:** Revise text to read as follows:

- **5.6.3.4.2** The piping shall be in accordance with ASME B31.1, Power Piping Code or EN13480-3, Metallic Industrial Piping.
**Final Action:**

### 5.6.3.4.3

**Submitter:** Technical Committee Water Mist Fire Suppression Systems  
**Recommendation:** Revise text to read as follows:

Where using the equations provided in ASME B31.1 *Power Piping Code* or EN13480-3 *Metallic Industrial Piping Code* are used to calculate either the maximum working system design pressure ($P_w$) for a specific pipe or tube or the minimum wall thickness ($t_m$) of the pipe or tube for a specific operating pressure, a steel temperature of 54°C (130°F) or the expected ambient temperature to which the pipe or tube will be exposed, shall be used whichever is greater shall be used.

### 6.4.1.2

**Submitter:** Technical Committee Water Mist Fire Suppression Systems  
**Recommendation:** Relocate to & renumber accordingly:

Revise text to read as follows:

#### 5.6.4.1.2 Conversion Fittings

Welding and brazing alloys shall have a melting point above 538°C (1000°F).

### 6.4.1.2.2, 6.4.1.2.3

**Submitter:** Technical Committee Water Mist Fire Suppression Systems  
**Recommendation:** Revise text as follows:

A supply of minimum of one spare adapter conversion fitting of each type shall be maintained on the premises so that any adapters conversion fittings that have been damaged in any way can be promptly replaced.  

Adapter conversion fitting information shall also be maintained on the drawings.

### 6.4.3, 6.4.3.1, 6.4.3.2

**Submitter:** Technical Committee Water Mist Fire Suppression Systems  
**Recommendation:** Revise existing section and add new text as follows:

**Intermediate and High Pressure Systems.**

**5.4.3.1** Fittings shall have a minimum-rated system design working pressure equal to or greater than the maximum operating working pressure of the water mist systems at 54°C (130°F).

**5.4.3.2** For systems that employ the use a pressure regulating device in the distribution piping, the fittings downstream of the device shall have a minimum-rated system design working pressure equal to or greater than the maximum anticipated working pressure in the downstream piping.
750 FR28

Final Action:

6.5.2

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text as 6.5.2 renumber accordingly

6.5.2 Hangers used on low pressure water mist systems shall be permitted to be designed and installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

750 FR95

Final Action:

6.6.1

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section and add new text as follows:

5.6.1* Listing. Nozzles shall be listed either individually or as a part of a pre-engineered system, and the listing information shall include the following:

11. Nozzle operating pressure range Minimum and maximum rated operating pressures of nozzles

750 FR96

Final Action:

6.9.1.3.2

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:

5.6.9.1.3.2 Overpressure shall not exceed the system design working pressure of the piping system.

750 FR30

Final Action:

6.9.1.7

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

5.6.9.1.7 Unloader Valves. Unloader valves shall be listed or approved as part of the a listed or approved pump assembly. Unloader valves shall be part of a listed pump assembly or be listed separately.
750 FR6 Final Action:
(6.9.3.1)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

6.9.3.1 Listing. Controllers for pumps shall be listed fire pump controllers and or listed limited service controllers installed in accordance with NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection.

750 FR32 Final Action:
(6.10.3.4)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

5.6.10.3.4 Temperature Limitations. Devices shall be designed to function from a minimum range of 40 degrees F to 130 degrees F (4 degrees C to 54 degrees C), or devices designed to function outside of this range shall be so indicated.

750 FR33 Final Action:
(6.10.3.6.8)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add text to read as follows:

6.10.3.6.8 The requirements of 6.10.3.6 shall not apply to dry and wet pipe systems utilizing individual, thermally activated nozzles.

750 FR34 Final Action:
(7.1)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

6.4 7.1 General. Water mist systems shall be described by the following five parameters as appropriate:

(1) System application
(2) Nozzle type
(3) System operation method
(4) System media type
(5) Classification of occupancy
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

6.2 7.2 System Applications. System applications shall consist of one of the following three four categories:
1. Local-application systems
2. Total compartment application systems
3. Zoned application systems
4. Automatic sprinkler alternative water mist application systems

6.2.1 7.2.1 Local-Application Systems. Local-application systems shall be designed and installed to provide complete distribution of mist on or around the hazard or object to be protected.

6.2.2 7.2.2 Total Compartment Application Systems.
total compartment application systems are shall be designed and installed to provide complete protection of an enclosure or space.

6.2.3 7.2.3 Zoned Application Systems.
Zoned application systems are a subset of the compartment system and are designed to protect a predetermined portion of the compartment by the activation of a selected group of nozzles.

6.2.4 7.2.4 Automatic Sprinkler Alternative Water Mist Systems.
Automatic sprinkler alternative water mist systems shall be designed and installed to provide automatic fire protection throughout a building or area.

6.2.5 7.2.5 The complete protection of an enclosure or space shall be achieved by the simultaneous operation of all nozzles in the space by manual or automatic means.

7.2.3.1 Zoned application systems are a subset of the compartment system and are designed to protect a predetermined portion of the compartment by the activation of a selected group of nozzles.

7.2.3.2 Zoned application systems shall be designed and installed to provide complete mist distribution throughout a predetermined portion of an enclosure or space. This shall be achieved by simultaneous operation of a selected group of nozzles in a predetermined portion of the space by manual or automatic means.

7.2.4 Automatic Sprinkler Alternative Water Mist Systems.

7.2.4.1 Automatic sprinkler alternative water mist systems shall be designed and installed to provide automatic fire protection throughout a building or area.

7.2.4.2 Automatic sprinkler alternative water mist system devices shall be listed for the intended occupancy classification as described in Chapter 5 unless otherwise permitted in this standard.

7.2.4.3 Automatic sprinkler alternative water mist systems shall be of the wet pipe or dry pipe type.

7.2.4.4 The requirements of 6.7.2.4.3 shall not apply where environmental or operational conditions dictate whether there is a wet or dry system.

7.3 Nozzle Types. Water mist nozzles shall be classified as one of the following types: (1) Automatic, (2) Nonautomatic, (3) Hybrid Multi-functional.
Final Action:

(7.3.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Delete the following section in its entirety:

7.3.3 Pressure Rating. All system piping, tubing, and hose shall be rated for the maximum working pressure to which they are exposed.

Final Action:

(7.4.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: delete the following in its entirety:

7.4.3 Pressure Rating. All fittings shall be rated for the maximum working pressure to which they are exposed.

Final Action:

(7.4.3.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:

6.4.3.3 7.4.3.3 The pressurized piping in all preaction systems shall be supervised to ensure system integrity.

Final Action:

(7.4.4.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing text to read as follows:

6. 7.4.4.3 Standby pressure shall be monitored and/or supervised mechanically or electrically to maintain the integrity of the system. The pressurized piping in all dry pipe systems shall be supervised to ensure system integrity.

Final Action:

(8.1.2)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise section text as follows:

73.1.2 System Design and Installation Manual. Materials and devices shall be installed in accordance with the manufacturer’s system design and installation manual.
Final Action:

8.1.6 Automatic Sprinkler Alternative Water Mist Systems

8.1.6.1 Spacing and Location of Nozzles. The requirements for spacing, location and position of water mist nozzles shall be based on the following principles:

1. Nozzles shall be installed throughout the premises unless the nozzles are specifically tested and test results demonstrate that omission of water mist nozzles from certain limited areas is permissible.
2. Nozzles shall be located so as not to exceed the spacing criteria specified by the manufacturer in the system design and installation manual.
3. Nozzles shall be positioned and located so as to provide satisfactory performance with respect to activation time and distribution pattern.
4. When nozzles are specifically tested and test results demonstrate that deviations from clearance requirements to obstructions do not impair the ability of the system to control or suppress a fire, their positioning and locating in accordance with the test results shall be permitted.
5. Clearance between nozzles and ceilings exceeding the maximums specified in the standard or in the manufacturer’s system design and installation manual shall be permitted, provided that tests or calculations demonstrate comparable performance of the automatic water mist nozzles to those installed in conformance with this standard.
6. Furniture, portable wardrobe units, cabinets, trophy cases, and similar objects or features not intended for occupancy, whether freestanding or attached to the finished structure, do not require nozzles to be installed in them.

8.1.6.2 System Protection Area Limitations. The maximum area on any one floor to be protected by water mist supplied by any one water mist system riser or combined system riser shall be as follows:

1. Light hazard - 52,000 ft² (4,831 m²)
2. Ordinary hazard - 52,000 ft² (4,831 m²)
3. Extra hazard - 40,000 ft² (3,716 m²)

8.1.6.3 Mezzanines. The floor area occupied by mezzanines shall not be included in the area limits of 8.1.6.2.

8.1.6.4 Multiple Occupancies Within a Building. Where single automatic sprinkler alternative water mist systems protect extra hazard areas, covered by other NFPA standards, in addition to ordinary or light hazard areas, the extra hazard coverage shall not exceed the floor area specified for that hazard and the total area coverage shall not exceed (4831 m²), 52,000 ft².

8.1.6.5 Multiple Buildings. Multiple buildings attached by canopies, covered breezeways, common roofs, or a common wall(s) shall be permitted to be supplied by a single system riser provided that the maximum system size complies with 8.1.6.2.

Final Action:

8.3.2 Installation Standards. All water and atomizing media piping and tubing for water mist systems shall be installed in accordance with one of the following:

1. ASME B31.1, Power Piping Code
2. EN13480-3, Metallic Industrial Piping
3. Water piping only, in low pressure systems installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, Standard for the Installation of Sprinkler Systems, only for water piping in low-pressure systems.
4. Piping installed in accordance with its water mist system listing where the listing provides installation criteria are different from ASME B31.1, Power Piping Code or EN13480-3, Metallic Industrial Piping.
750     FR99
(8.5.6.2)

Final Action:

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

8.5.6.2.2 The system's design working pressure shall be in accordance with the manufacturer's listing.

750     FR42
(8.8.3, 8.8.3.1, 8.8.3.1.1)

Final Action:

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add & replace text to read as follows:

7.8.3 Pressure Regulating and Pressure Relief Valves.
7.8.3.3 Pressure Regulating Valves, Pressure Relief Valves and Unloader Valves
7.8.3.1.1 Water Pressure Regulating Valves - Valves for Use with Water.

Pressure regulating valves shall be installed in any portion of the system where the potential exists for the working system pressure to exceed the system design maximum-rated working pressure of the system, or the system components, or both.

750     FR73
(8.8.3.1.2)

Final Action:

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

7.8.3.1.2 These valves shall open when the system at a pressure reaches 95 percent of the greater than the working pressure and less than the system rated design pressure.

750     FR101
(8.8.3.1.3)

Final Action:

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

7.8.3.1.3 A relief valve of not less than 13 mm (1/2 in.) shall be provided on the discharge side of the pressure regulating valve that is set to operate at a pressure not exceeding the system rated design pressure.

750     FR31
(8.8.3.1.8, 8.8.3.1.9)

Final Action:

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new text as follows:

7.8.3.1.8 Unloader valves shall not be required to meet the requirements of 8.8.3.1.1 through 8.8.3.1.7

7.8.3.1.9 Unloader valves shall meet the requirements of NFPA 20 Chapter 8 Positive Displacement Pumps.
750 FR102 Final Action: 
(8.8.3.2.2) 

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Revise existing section as follows:  
7. 8.8.3.2.2 PRVs shall be installed where the supply pressure is higher than the system design operating pressure of the water mist system.

750 FR43 Final Action: 
(9.2.1) 

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Revise text to read as follows:  
8.2.1 Scope Listing of water mist fire protection systems or devices shall be based on a comprehensive evaluation designed to include fire test protocols, system components, and the contents of the manufacturer’s design and installation manual.

750 FR44 Final Action: 
(9.2.4.2) 

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: delete Sec. 9.2.4.2:  
The system hardware shall be listed for the intended application.

750 FR45 Final Action: 
(9.3.2) 

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Revise text to read as follows:  
8.9.3.2 Performance Objectives for Automatic Sprinkler Alternative Sprinkler Water Mist Systems  
9.3.2.1 Automatic Sprinkler Alternative Sprinkler Equivalent Water Mist Systems Automatic sprinkler alternative water mist systems designed in accordance with this standard shall meet or exceed the capabilities of a comparable sprinkler system.  
9.3.2.2 Automatic Sprinkler Alternative Sprinkler Equivalent Water Mist Systems Automatic sprinkler alternative water mist systems shall be listed for the appropriate occupancy classifications from Chapter 6.
Final Action:

(9.4.2)

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

§ 9.4.2 Fire Hazard Classification. The fire hazard shall be classified by both either the combustible loading and fuel type or by the occupancy classifications from new Chapter 56.

Final Action:

(10.1 thru 10.1.4.4 (New ))

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: add new text as follows:

**Chapter 10 Automatic Sprinkler Alternative Water Mist Systems**

**10.1 General.** The requirements of Section 10.1 shall apply to all automatic sprinkler alternative water mist systems unless modified by a specific section of this Chapter 10.

- 10.1.1 A building or portion thereof shall be permitted to be protected in accordance with any applicable design basis conforming to Section 67.2 at the discretion of the designer.
- 10.1.2 Water Demand. The water demand requirements for engineered water mist systems shall be those specified by the water mist equipment manufacturer's design and installation manual.

10.1.3 Water Supplies.

10.1.3.1 Quantity. Water supplies for water mist systems shall be in conformance with Chapter 10 of this standard and this section.

10.1.3.2 For automatic sprinkler alternative water mist systems, the minimum water demand requirements for the water mist system shall be determined by adding the hose stream allowance, if any, to the water demand for the water mist nozzles.

10.1.3.3 Duration. The minimum water supply shall be available for the minimum duration specified in Chapter 10.

10.1.3.4 Tanks shall be sized to supply the equipment that they serve.

10.1.3.5 Pumps shall be sized to supply the equipment that they serve.

10.1.4 Hose Allowance.

10.1.4.1 Where the water supply for an automatic sprinkler alternative water mist system serves concurrently as the water source for the water mist system, and as the source of water for inside or outside hoses, the concurrent hose stream allowance shall be added to the water mist system demand at the point of entry into the building, and upstream of any pumps, filters or strainers on the water mist system.

10.1.4.2 The hose stream allowance shall be in accordance with NFPA 13 Standard for the Installation of Sprinkler Systems for the occupancy being protected.

10.1.4.3 Intermediate and High Pressure Water Mist Systems. Where inside or outside hose streams are required in areas protected by an intermediate or high pressure automatic sprinkler alternative water mist system, a separate standpipe system for the hose stream shall be provided in accordance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

10.1.4.4 Low Pressure Water Mist. Where an automatic sprinkler alternative water mist system is served by a common fire pump capable of meeting the water mist system demand, and the fire standpipe demand is in conformance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems, a separate riser is not required for each system.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: add new text as follows:

9.2 10.2 Occupancy Hazard Fire Control Approach.

9.2.1 General:

9.2.1.1 10.2.1 Occupancy Classifications.

Occupancy classifications for this standard shall relate to water mist installations and their water supplies only.

9.2.1.2 10.2.1.1 Occupancy classifications shall not be used as a general classification of occupancy hazards.

9.2.1.3 10.2.1.3 Occupancies or portions of building occupancies shall be classified according to the quantity and combustibility of contents, the expected rates of heat release, the total potential for energy release, the heights of stockpiles, and the presence of flammable and combustible liquids, using the definitions contained in Section 5.2 through Section 5.4.

10.2.1.4 Classifications shall be as follows:

(1) Light hazard
(2) Ordinary hazard (Groups 1 and 2)
(3) Extra hazard (Groups 1 and 2)

9.3 Residential Occupancy Fire Control Approach.

10.3 Residential Occupancy Fire Control Approach.

10.3.1 Residential Occupancies Up To and Including 4 Stories In Height.

9.3.1 Scope:

10.3.1.1 Scope

This section shall cover the design and installation of automatic sprinkler alternative water mist systems for protection against fire hazards in residential occupancies up to and including four stories in height.

9.3.1.2 System Arrangement

In townhouse-style buildings protected in accordance with this standard, each dwelling unit shall have its own dedicated water mist system or the control valves for the water mist system shall be located outside the dwelling units or in a common area.

10.3.1.3 Listed or Labeled

Listed or labeled devices and materials shall be installed and used in accordance with the listing limitations and the manufacturers' instructions unless permitted by other sections of this document.

9.3.1.3 Nozzles

10.3.1.4 Nozzles

10.3.1.4.1 Only new listed nozzles shall be installed on a water mist system.

10.3.1.4.2 Nozzles shall be installed in accordance with their listing.

10.3.1.4.3 Nozzle Positioning

Nozzles shall be positioned in accordance with the design Installation operator manual so that the response time and discharge are not unduly affected by obstructions such as ceiling slope, beams, or light fixtures.

9.3.1.5 Painting and Finish

10.3.1.5 Painting and Finish

Nozzle painting and finish material shall only be permitted by the manufacturer. Where nozzles have had paint applied by other than the manufacturer, they shall be replaced with new listed nozzles of the same type.

9.3.1.6 Aboveground Piping and Equipment

10.3.1.6 Aboveground Piping and Equipment

10.3.1.6.1 When nonmetallic pipe is used, the pipe shall be designed to withstand a working pressure of not less than the anticipated system pressure at 120°F (49°C).

10.3.1.6.2 Pipe or tube listed for light hazard occupancies shall be permitted to be installed in ordinary hazard rooms of otherwise light hazard occupancies where the room does not exceed 400 ft² (37 m²).

9.3.1.7 Valves

10.3.1.7 Valves

10.3.1.7.1 The control valve sign shall identify the portion of the building served.
9.3.1.3.4.1 Systems that have more than one control valve that must be closed during work on a system or space shall have a sign referring to the existence and location of the other valves.

9.3.1.4 Design Criteria.

10.3.1.8 Design Criteria.

9.3.1.4.1 The system shall provide at least the flow required for the multiple and single nozzle operating criteria specified by the system listing.

9.3.1.4.2 The system shall provide at least the flow required to produce a minimum discharge density that meets the nozzle listing.

9.3.1.4.3 Number of Design Nozzles. The number of design nozzles under flat, smooth, horizontal ceilings shall include the number of nozzles within a compartment up to a maximum of four adjacent nozzles that require the greatest hydraulic demand.

9.3.1.5 Pipe Sizing. Piping shall be sized using hydraulic calculation procedures in accordance with Chapter 9 (existing).

9.3.1.6 Water Supply. Every automatic sprinkler alternative water mist system shall have at least one automatic water supply in conformance with Chapter 10 of this standard.

9.3.1.7 Minimum Duration. The water supply shall be capable of supplying the system demand for at least 30 minutes. (See Section 10.3)

9.3.1.8 Source. The water supply source shall be one of the following:

(1) A connection to a reliable waterworks system with or without a pump, as required

(2) An elevated tank

(3) A pressure tank installed in accordance with Chapter 10 and NFPA 22 Standard for Water Tanks for Private Fire Protection.

(4) A stored water source with an automatically operated pump

9.3.1.9 Fire Pump. Where a fire pump is installed, the fire pump shall be installed in accordance with Chapter 10 and NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection.

9.3.1.10 Domestic Demand. Domestic demand shall be included as part of the overall system demand for systems with common domestic/fire mains where no provisions are made to prevent the domestic waterflow upon nozzle system activation.

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750 FR115
(10.3.2 thru 10.3.2.2 (New))

Final Action:

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: add new text as follows:

9.3.2 One-and Two-Family Dwellings. This section shall cover the design and installation of automatic sprinkler alternative water mist systems for protection against fire hazards in one- and wo-family dwellings.

9.3.2.1 Scope. This section shall cover the design and installation of automatic sprinkler alternative water mist systems for protection against fire hazards in one- and wo-family dwellings.

9.3.2.1.1 The automatic sprinkler alternative water mist system shall be designed to protect against a fire originating from a single ignition location.

9.3.2.2 General. Domestic demand shall be provided in accordance with NFPA 72, National Fire Alarm and Signaling Code.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new text as follows:

9.3.2.2 System Components: **10.3.2.3 System Components.**

9.3.2.2.1 General: **10.3.2.3.1 General.** Tanks, pumps, filters, hangers, waterflow detection devices, and waterflow valves shall be in accordance with manufacturer’s requirements, but are not required to be listed.

9.3.2.2.2 Aboveground Pipe and Tube: **10.3.2.3.2 Aboveground Pipe and Tube.** Pipe or tube used in automatic sprinkler alternative water mist systems shall be of the materials specified in Table 66.3.3.1 or shall be listed for use with water mist systems at the anticipated system pressure.

9.3.2.2.3 Aboveground Fittings: **10.3.2.3.3 Aboveground Fittings.** Fittings used in automatic sprinkler alternative water mist systems shall be in accordance with Section 66.4 or shall be listed for use with water mist systems at the anticipated system pressure.

9.3.2.2.4 Pre-engineered Systems: **10.3.2.3.4 Pre-Engineered Systems.** Where listed pre-engineered systems are installed, they shall be installed within the limitations that have been established by the testing laboratories.

9.3.2.3 Installation Requirements: **10.3.2.4 Installation Requirements.**

9.3.2.3.1 Valves: **10.3.2.4.1 Valves.**

9.3.2.3.1.1 A single control valve arranged to shut off both the domestic system and the water mist system shall be installed unless a separate shutoff valve for the water mist system is installed in accordance with Section 9.3.2.4.1.2.

9.3.2.3.1.2 The water mist system piping shall not have a separate control valve installed unless supervised by one of the following methods:

(1) Central station, proprietary, or remote station alarm service
(2) Local alarm service that causes the sounding of an audible signal at a constantly attended location
(3) Valves that are locked open

9.3.2.3.2 Piping Support: **10.3.2.4.2 Piping Support.**

9.3.2.3.2.1 Listed pipe shall be supported in accordance with any listing limitations.

9.3.2.3.2.2 Pipe that is not listed, and listed pipe with listing limitations that do not include piping support requirements, shall be supported from structural members using support methods in accordance with the design installation operator manual.

9.3.2.3.2.3 Piping laid on open joists or rafters shall be supported in a manner that prevents vertical and lateral movement of the nozzle.

9.3.2.3.3 Nozzles: **10.3.2.4.3 Nozzles.**

9.3.2.3.3.1 Listed nozzles shall be used.

9.3.2.3.3.2 Nozzles shall not be used on systems other than wet pipe systems unless specifically listed for use on that particular type of system.

9.3.2.3.3.3 Nozzles shall be supported in a manner that prevents lateral and vertical movement.

9.3.2.3.3.4 Painting and Ornamental Finishes: **10.3.2.4.3.4 Painting and Ornamental Finishes.** Nozzles shall not be painted or enameled unless the finishes have been applied by the manufacturer and the nozzle has been listed with such finishes.

9.3.2.3.4 Drains and Test Connections: **10.3.2.4.4 Drains and Test Connections.**

9.3.2.3.4.1 Each water mist system shall have a drain on the system side of the control valve.

9.3.2.3.4.2 A valve shall be installed in the drain piping.

9.3.2.3.4.3 A drain shall be installed for each trapped portion of a dry system that is subject to freezing temperatures.

9.3.2.3.4.4 Where waterflow alarms are provided, inspector's test connections shall be installed at locations that allow flow testing of water supplies, connections, and alarm mechanisms.

9.3.2.3.4.5 The inspector's test connections shall contain an orifice equal to or smaller than the smallest nozzle installed in the system.

9.3.2.3.5 Pressure Gauges: **10.3.2.4.5 Pressure Gauges.**

9.3.2.3.5.1 Where a dry system is installed, a pressure gauge shall be installed to indicate system air pressure.

9.3.2.3.5.2 Where a pressure tank is used for the water supply, a pressure gauge shall be installed to indicate tank pressure.
9.3.2.3.6 Alarms. Local waterflow alarms shall be provided on all water mist systems in homes not equipped with smoke alarms or smoke detectors in accordance with NFPA 72, National Fire Alarm and Signaling Code.

9.3.2.4.4 Common Supply Pipes. 10.3.2.5.9 Common Supply Pipes.

9.3.2.4.4.4 10.3.2.5.9.1 Where common supply pipes serve both water mist and domestic use, they shall comply with Sections 9.3.2.5.4.2 and 9.3.2.5.4.3. 10.3.2.5.9.3

9.3.2.4.4.2 10.3.2.5.9.2 In common water supply connections serving more than one dwelling unit, where no provision is made to prevent flow into the domestic water system upon operation of a nozzle, 19 L/min (5 gpm) shall be added to the water mist system demand to determine the size of common piping and the size of the total water supply requirements.

9.3.2.4.4.3 10.3.2.5.9.3 A warning sign, with minimum ¼ in. letters, shall be affixed adjacent to the main shutoff valve and shall state the following:

WARNING: The water system for this home supplies water mist nozzles that require certain flows and pressures to fight a fire. Devices that restrict the flow or decrease the pressure or automatically shut off the water to the water mist system, such as water softeners, filtration systems, and automatic shutoff valves, shall not be added to this system without a review of the water mist system by a fire protection specialist. Do not remove this sign.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: 9.3.2.5 Discharge Criteria. 10.3.2.6 Discharge Criteria. 10.3.2.7 System Design. 10.3.2.7.1 Location of Nozzles. 9.3.2.6.1 Number of Design Nozzles. 10.3.2.6.1 Number of Design Nozzles. The number of design nozzles under flat, smooth, horizontal ceilings shall include all nozzles within a compartment, up to a maximum of two nozzles that require the greatest hydraulic demand.

9.3.2.6 10.3.2.6.1 The system shall provide at least the flow required for the multiple and single nozzle operating criteria specified by the nozzle listing.

9.3.2.6 System Design. 10.3.2.7 System Design

9.3.2.6.1 Location of Nozzles.

9.3.2.6.1.1 Nozzles shall be installed in all areas except where omission is permitted by Sections 9.3.2.6.1 through 9.3.2.6.1.8.
Final Action:
(11.1.2)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text as follows:
9.1.2* 11.1.2* The minimum water demand requirements for engineered water mist systems shall be determined by adding concurrent water demands, if any, to the discharge rate and operating pressure of the system determined by hydraulic calculations conforming to this chapter.

Final Action:
(11.1.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: renumber accordingly to read as follows:
9.1.23* Modifications. 11.1.23* Modifications. Where any modification is made that alters the system flow characteristics of an existing, engineered water mist system, system flow calculations shall be furnished indicating the previous design, volume, and pressure at points of connection, and calculations also shall be provided indicating the effect of the modification on the existing systems shall be provided.

Final Action:
(11.2.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:
9.2.3 11.2.3 Minimum and maximum operating pressures at each nozzle shall be within the listed operating range. Nozzles shall operate within the range of the nozzle operating pressure.

Final Action:
(12.3.1(4))

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text to Chapter as follows:
12.3.1(4) For one- and two-family dwellings, a minimum duration of 10 minutes.

Final Action:
(12.5.1.6)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing text as follows:
12.5.1.6 12.5.1.6 Filter Rating or Strainer Mesh Openings. The maximum filter rating or strainer mesh opening shall not be greater than 80 percent of the minimum nozzle waterway dimension.
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text & renumber accordingly:

12.5.2.3 Where high pressure automatic sprinkler alternative water mist systems are provided in lieu of sprinkler systems in accordance with Section 6.2.4, redundant pressure source components shall be provided and the required water mist pumps shall be arranged such that when the largest pump is out of service, the greatest demand can still be satisfied.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

12.5.2.4 The discharge piping for water mist pumps and pump assemblies for high pressure or intermediate pressure water mist systems shall be equipped with a valved test connection and provisions for the installation of a flow metering device to permit accurate measurement of the pump performance during the acceptance test and during annual testing.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:

12.5.5.1 A fire department connection shall be provided on the discharge side of the pressure source components.

12.5.5.2 For water mist systems with system design pressures less than or equal to 12 bar (175 psi), the connection of the fire department connection to the system shall be made on the upstream (supply) side of the system strainer or filter.

12.5.5.3 For water mist systems with system design pressures in excess of 12 bar (175 psi), the connection of the fire department connection to the system shall be made on the suction side of the pressure source components.
750  FR104  Final Action:
(12.5.5.4)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing sections as follows:

12.5.5.4. The following systems shall not require a fire department connection: Fire department connections shall not be required for the following water mist systems:

1. Fire department connections shall not be required for Systems protecting less than 200m² (2000sq ft).
2. Fire department connections shall not be required for Systems with design operating pressures in excess of 12 bar (175 psi) and supplied only by storage cylinders.
3. Fire department connections shall not be required for Systems where the atomizing medium is essential for fire suppression.

750  FR53  Final Action:
(14.1.1)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: add new text & renumber accordingly:

12.1.1 14.1.1 An acceptance test plan shall be approved prior to scheduling of acceptance testing.

750  FR55  Final Action:
(14.1.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new Section & renumber accordingly

14.1.3* When a water mist system operates in conjunction with other building systems, functions or components, the final testing shall be conducted simultaneously with those systems.

750  FR57  Final Action:
(14.2.1.2.1, 14.2.1.2.2,14.2.1.2.3)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows & renumber accordingly:

14.2.1.2 14.2.1.2.1 The piping network shall be free of particulate matter and oil residue before installation of nozzles or discharge devices.
14.2.1.2.2 Each pipe section shall be internally cleaned prior to installation using an acceptable method as required by the manufacturer to meet the requirements of 14.2.1.2.1.
14.2.1.2.3 Each pipe or tube section shall be cleaned inspected internally after preparation and before assembly.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation:
Revise existing section as follows:

14.2.2.2.1 All interior piping and attached appurtenances subjected to a system working pressure less than or equal to 10.4 bar (150 psi) shall be hydrostatically tested at 13.8 bar (200 psi) and shall maintain that pressure without loss for 2 hours as determined by a drop in gauge pressure or visible leakage.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation:
Add new text and new section as follows:

14.2.2.4* When subject to hydrostatic test pressures, the clapper of a differential-type valve shall be permitted to be held off its seat.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation:
Replace existing Chapter 15 with the following:

Chapter 15 System Inspection, Testing, and Maintenance

15.1 Except as specified in 15.1.1, a water mist system installed in accordance with this standard shall be inspected, tested, and maintained in accordance with NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

15.1.1 Water mist systems installed in one- and two-family dwellings shall be inspected, tested, and maintained in accordance with the requirements of Section 10.3.2.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation:
Add new text as follows:

15.3.1 Maintenance shall be performed to keep the system operable or to make repairs in conformance with this section unless as provided in Section 14.5.
750 FR87 Final Action: (15.3.5, 15.3.5.1)
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text as follows:
13.5 One- and Two- Family Dwellings
15.3.5 One- and Two- Family Dwellings
13.5.1* 15.3.5.1* The installer shall provide to the owner/occupant instructions on inspecting, testing, and maintaining the system.

750 FR106 Final Action: (16.1.12.10)
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:
14.1.12.10 16.1.12.10 Brazed joints using filler materials with melting points below 927°C (1700°F) shall be permitted in systems that comply with all of the following:
(6) Each section capable of being isolated shall be fitted with a relief valve set at a pressure greater than the working pressure and less than the design maximum working pressure of the system.

750 FR107 Final Action: (16.2.11.1)
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:
14.2.11.1 16.2.11.1 The system’s water supply and the system piping shall be capable of maintaining the minimum required nozzle operating pressure for each type of nozzle at the highest elevation of each type of nozzle.

750 FR69 Final Action: (A.3.3.24.2)
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise annex text to read as follows:
A.3.3.21.2 Hybrid Water Mist Nozzles
A3.3.24.2 Multi-functional Water Mist Nozzles. The actuation of a hybrid multi-functional water mist nozzle can be by a built-in detection and activation device and/or by an independent means of activation.
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text as follows:

A.3.3.25.1 Automatic Sprinkler Alternative Water Mist Systems. Water mist systems can be designed and installed to meet fire protection objectives in a manner equivalent to sprinkler systems.

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise text to read as follows:

A.4.1. A water mist system is a water-based fire protection system using very fine water sprays (i.e., water mist). The very small water droplets allow the water mist to control or extinguish fires by cooling of the flame and fire plume, oxygen displacement by water vapor, radiant heat attenuation, and prevention of fire spread by pre-wetting of combustibles. Water mist systems have been proved effective in controlling, suppressing, or extinguishing many types of fires. Potential applications include the following:

1. Gas jet fires
2. Flammable and combustible liquids
3. Hazardous solids, including fires involving plastic foam furnishings
4. Protection of aircraft occupants from an external pool fire long enough to provide time to escape
5. Ordinary (Class A) combustible fires such as paper, wood, textiles.
6. Occupancy classifications in accordance with new Chapter 5
7. Electrical hazards, such as transformers, switches, circuit breakers, and rotating equipment
8. Electronic equipment, including telecommunications equipment
9. Highway and railway tunnels  (See NFPA 502 Standard for Road Tunnels, Bridges, and Other Limited Access Highways.)
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new text for new Chapter 5 annex to read as follows:

A.5.1 Classification of Occupancies.

A.5.1 Occupancy. The occupancy examples in the listings as shown in the various hazard classifications are intended to represent the norm for those occupancy types. Unusual or abnormal fuel loadings or combustible characteristics and susceptibility for changes in these characteristics for a particular occupancy are considerations that should be included weighted in the selection and classification. The light hazard classification is intended to encompass residential occupancies; however, this is not intended to preclude the use of listed residential sprinklers nozzles in residential occupancies or residential portions of other occupancies.

A.5.2 Light hazard occupancies include occupancies having uses and conditions similar to the following:
(1) Animal shelters
(2) Churches
(3) Clubs
(4) Eaves and overhangs, if of combustible construction with no combustibles beneath
(5) Educational Hospitals, including animal hospitals and veterinary facilities
(6) Institutional
(7) Kennels
(8) Libraries, except large stack rooms
(9) Museums
(10) Nursing or convalescent homes
(11) Offices, including data processing
(12) Residential
(13) Restaurant seating areas
(14) Theaters and auditoriums, excluding stages and prosceniums
(15) Unused attics

Note that it is not the committee’s intent to automatically equate library bookshelves with ordinary hazard occupancies or with library stacks. Typical library bookshelves of approximately 2.4 m (8 ft) in height, containing books stored vertically on end, held in place in close association with each other, with aisles wider than 762 mm (30 in.) can be considered to be light hazard occupancies. Similarly, library stack areas, which are more akin to shelf storage or record storage, as defined in NFPA 232, Standard for the Protection of Records, should be considered to be ordinary hazard occupancies.

A.5.3 For purposes of these definitions, Class I, Class II, Class III, and Class IV commodities would be considered to have moderate rates of heat release, while Group A plastics would be considered to have high rates of heat release. Stockpiles are considered to include display merchandise (mercantile) and arrangements of combustibles ancillary to operations within the occupancy as opposed to dedicated storage areas, where the fire loading is generally more severe.

A.5.3.1 Ordinary hazard occupancies (Group 1) include occupancies having uses and conditions similar to the following:
(1) Automobile parking and showrooms
(2) Bakeries
(3) Beverage manufacturing
(4) Canneries
(5) Dairy products manufacturing and processing
(6) Electronic plants
(7) Glass and glass products manufacturing
(8) Laundries
(9) Restaurant service areas

A.5.3.2 Ordinary hazard occupancies (Group 2) include occupancies having uses and conditions similar to the following:
(1) Agricultural facilities
(2) Barns and stables
(3) Cereal mills
(4) Chemical plants ordinary
(5) Confectionery products
(6) Distilleries
(7) Dry cleaners
(8) Exterior loading docks (Note that exterior loading docks only used only for loading and unloading of ordinary combustibles should be classified as OH2. For the handling of flammable and combustible liquids, or hazardous materials, or where utilized for storage, exterior loading docks and all interior loading docks should be protected based upon the actual occupancy and the materials handled on the dock, as if the materials were actually stored in that configuration.)
(9) Feed mills
(10) Horse stables
(11) Leather goods manufacturing
(12) Libraries large stack room areas
(13) Machine shops
(14) Metal working
(15) Mercantile
(16) Paper and pulp mills
(17) Paper process plants
(18) Piers and wharves
(19) Plastics fabrication, including blow molding, extruding, and machining; excluding operations using combustible hydraulic fluids
(20) Post offices
(21) Printing and publishing
(22) Racetrack stable/kennel areas, including those stable/kennel areas, barns, and associated buildings at state, county, and local fairgrounds
(23) Repair garages
(24) Resin application area
(25) Stages
(26) Textile manufacturing
(27) Tire manufacturing
(28) Tobacco products manufacturing
(29) Wood machining
(30) Wood product assembly

A.5.4.1 Extra hazard occupancies (Group 1) include occupancies having uses and conditions similar to the following:
(1) Aircraft hangars (except as governed by NFPA 409, Standard on Aircraft Hangars)
(2) Combustible hydraulic fluid use areas
(3) Die casting
(4) Metal extruding
(5) Plywood and particleboard manufacturing
(6) Printing [using inks having flash points below 38°C(100°F)]
(7) Rubber reclaiming, compounding, drying, milling, vulcanizing
(8) Saw mills
(9) Textile picking, opening, blending, garnetting, or carding, combining of cotton, synthetics, wool shoddy, or burlap
(10) Upholstering with plastic foams

A.5.4.2 Extra hazard occupancies (Group 2) include occupancies having uses and conditions similar to the following:
(1) Asphalt saturating
(2) Flammable liquids spraying
(3) Flow coating
(4) Manufactured home or modular building assemblies (where finished enclosure is present and has combustible interiors)
(5) Open oil quenching
(6) Plastics manufacturing
(7) Solvent cleaning
(8) Varnish and paint dipping

A.5.4.3.1 A.5.5 Special occupancies include occupancies having uses and conditions similar to the following:
(1) Machinery spaces
(2) Special hazard machinery spaces
(3) Combustion turbines
(4) Wet benches and other similar processing equipment
(5) Local application
(6) Industrial oil cookers
(7) Computer room subfloors

750 FR108 Final Action:
(A.5.6.1(4))

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:

A5.6.1(4)
(4) Use a drop sizing instrument conforming to ASTM E 799, Standard Practice for Determining Data Criteria and Processing for Liquid Drop Size Analysis, to measure the drop size distribution at the point determined in Step 2. One of the outputs from such an instrument is a table of cumulative percent volume versus diameter bins, defined by the upper and lower diameters of a range of drop sizes. Using the upper bin diameter (dupper) ensures that the resulting plot can be interpreted as "R percent of the mass ... in drops of diameter 'less than' dk." These data must be input into a spreadsheet like that shown in Table A.5.6.1. Then, using the Vi, or flux density measured at the location i, and the area Ai that the measurement represents, calculate the weighted average drop size distribution, Rk. Water Discharge Distribution: Water discharge distribution in a plane 1.0 m (3.3 ft) below and perpendicular to the central axis of the nozzle using 0.305 m × 0.305 m (1 ft × 1 ft) collection pans. The water distribution measurements are to be made at the minimum- and maximum-rated nozzle operating pressures of the nozzle and over an area sufficient to collect at least 90 percent of the water discharge.

Spray Thrust Force: Spray thrust force as measured in a plane perpendicular to the central axis of the nozzle, at a distance of 0.305 m (1 ft) below the nozzle and over an area sufficient to capture at least 90 percent of the water discharge. The measurements are to be made at the minimum- and maximum rated nozzle operating pressures of the nozzle. For fire test purposes, the maximum distance from test fires should be considered as one of the following:........

750 FR22 Final Action:
(A.6.3.4.2)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation:
renumber A.5.3.4.1 to A.6.3.4.2
Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new annex text as follows:

A5.6.4.1.2.1
An example of a suitable means of identification can be a metallic tag attached to the fitting with a stainless steel wire.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

A.9.2 Results. The results of the listing testing should identify the following:

1. System flow rate (minimum and maximum)
   (a) Flow rate per unit area (if applicable)
   (b) Flow rate per unit volume (if applicable)

2. System operating pressures (minimum and maximum)
   (a) Nozzle operating pressure range
   (b) Pump/cylinder operating pressure range
   (c) Pump inlet and outlet pressure and flow rate requirements

3. General water requirements
   (a) Quantity/duration
   (b) Quality
   (c) Temperature

4. Nozzle characteristics
   (a) Type(s)/model number(s)
   (b) Flow rate (minimum and maximum)
   (c) Nozzle operating pressure range (minimum and maximum)

5. Nozzle spray characteristics
   (a) Spray angle
   (b) Drop size distribution
   (c) Momentum/velocity

6. Nozzle installation parameters
   (a) Distance above floor (minimum and maximum)
   (b) Distance below ceiling (minimum and maximum)
   (c) Distance above hazard (minimum and maximum)
   (d) Nozzle spacing (minimum and maximum)
   (e) Orientation
   (f) Minimum distance from walls
   (g) Minimum distance from obstructions

7. Activation device
   (a) Type/model number
   (b) Activation, temperature
   (c) Activation, smoke obscuration

8. General design parameters
   (a) Pipe requirements
     i. Size
     ii. Operating Design pressures/wall thickness
   (b) Fittings
     i. Type
     ii. Operating Design pressure
   (c) Pumps
     i. Valves, fittings, and filters
     ii. Power requirements
     iii. Operating pressure and flow rates
   (d) Cylinders
     i. Valves and fittings
     ii. Capacity
     iii. Operating pressures
750  FR14  Final Action:
(A.9.2.1)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Revise existing section as follows:
A.9.2.1 Requirements for performing a comprehensive evaluation of complete water mist systems, including fire test protocols, system component test procedures, and the manufacturer's design and installation manual review, have been published, can be found in ANSI/FM Approvals 5560, American National Standard for Water Mist Systems, and FM Approvals Class Number 5560, Approval Standard for Water Mist Systems. Other listing organizations would generally apply their own requirements.

750  FR71  Final Action:
(A.10.1.2)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add new text as follows:
A.9.1.2 Concurrent water demands may include domestic or process water usage, and any fire hose allowances. It is important to account for concurrent demands because they may diminish the pressure available to the water mist system pump. Water mist systems utilizing stored water from a tank or reservoir require sufficient volume of stored water to meet the water mist system discharge rate for the duration specified in Chapter 12.

750  FR79  Final Action:
(A.10.3.1.5)

Submitter: Technical Committee Water Mist Fire Suppression Systems
Recommendation: Add annex text as follows:
A.10.3.1.5 Painting can retard the thermal response of the heat-responsive element, can interfere with the movement of parts, and can render the nozzle inoperative.
Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation:  
Add new text in annex for new Chapter 10 as follows:  

A.9.3.2.2.1  
The occupants of a home with a water mist system should understand that maintaining a water mist system is mostly about common sense. Keeping the control valve open, not hanging items from the nozzles, and making sure that the nozzles do not get painted or obstructed are the most important items. It is also important to know where the control valve is located so that the water can be shut down after water mist activation to minimize water damage. The building owner or manager should understand the water mist system operation and should conduct periodic inspections and tests to make sure that the system is in good working condition. A recommended inspection and testing program includes the following:  

1. Monthly inspection of all valves to ensure that they are open.  
2. Monthly inspection of tanks, if present, to confirm they are full.  
3. Monthly testing of pumps, if present, to make sure they operate properly and do not trip circuit breakers when starting.  
4. Testing of all waterflow devices, when provided, every 6 months including monitoring service (note that notification of the monitoring service is essential to make sure that the fire department is not called due to testing).  
5. Ongoing visual inspection of all nozzles to make sure they are not obstructed and decorations are not attached or hung from them.  
6. Whenever painting or home improvements are made in the dwelling unit, special attention should be paid to ensure that nozzles are not painted or obstructed either at the time of installation or during subsequent redecoration. When painting is occurring in the vicinity of nozzles, every nozzle should be protected by covering them with a bag, which should be removed immediately after painting is finished.

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation:  
Add new text in annex for new Chapter 10 as follows:  

Although NFPA 750 does not require garages to be protected, some authorities having jurisdiction have added this requirement locally. In such circumstances, residential nozzles with a two-nozzle design in the garage with the same piping as used in the rest of the dwelling can be used. It is recognized that residential nozzles have not been tested specifically for fires in garages, but field experience has shown that having protection helps to alert occupants to the fact that there is a fire, to reduce the possibility of flashover, and to improve the chances for occupants to escape.

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation:  
Renumber existing A.9.11.1.2 to A.911.1.3
Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Add revised text in annex as follows:

A.12.5.5 It is the intention of this subsection to require a fire department connection wherever it would be of benefit. Paragraph 12.5.5.2(1) provides for local area protection where the fire department could effectively respond with small hose streams or portable fire extinguishers. Paragraph 12.5.5.2(2) provides for systems where the pressures available from fire department pumpers would not be adequate to supply the water mist system. Paragraph 12.5.5.2(3) exempts systems where the atomizing medium is essential for fire suppression and water alone would be of no benefit. See Figure A.13.1.6(j) and A.13.1.6(k).

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Add new text to annex as follows:

A.12.5.5.1 Piping diagrams showing FDC arrangements for low pressure, high, and intermediate pressure water mist systems are shown in Figure A.13.1.6(j) and A.13.1.6(k).

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: Add new annex material for the Chapter 13 as follows:

A.13.1.6 See Figure A.13.1.6(j) and A.13.1.6(k) for piping diagrams of the intended point of connection where the hose allowance should be accounted for and be protected from entry of debris by means of filters or strainers.

Submitter: Technical Committee Water Mist Fire Suppression Systems  
Recommendation: add the following figures to annex:

**********************FigA.13.1.6(j) & Fig 13.1.6(k)_FR89**********************
Figure A.11.1.6 (j). Example of a piping arrangement with fire department connection for intermediate or high pressure water mist systems with positive displacement pump or pump assembly.

Legend
1. Water supply – potable quality
2. Backflow prevention device
3. Fire department connection
4. Filters or screens with bypass
5. Standby pressure maintenance pump
6. Positive displacement pump or multi-pump assembly
7. Thermal regulator and drain
8. Pressure regulating or unloader valves with return to suction
9. Test connection with flow meter and test header
10. Water mist system zone control valves
11. Pressure relief valve

Test Header
\[ K_{test} = K_{system} \]
Figure A.11.1.6(k). Example of a piping arrangement with fire department connection for low pressure water mist systems.

Legend
1. Water supply – potable quality
2. Backflow prevention device
3. Filters or screens with bypass
4. Fire pump bypass line
5. Standard fire pump
6. Pressure relief valve
7. Standby pressure maintenance pump
8. Test connection with flow meter
9. Water Mist zone control valves
10. Strainer or filter on FDC line
11. Fire department connection for low pressure system
A.14.1.3 When a water mist system operates in conjunction with other building systems, functions or components, the final testing should be conducted simultaneously with those systems per NFPA 3, Recommended Practice on Commissioning and Integrated Testing of Fire Protection and Life Safety Systems.

A.14.1.4 The acceptance test form is provided for the Authority Having Jurisdiction. See Figure A.14.1.4. See Fig. A.12.1.3 as an example for the Authority Having Jurisdiction during acceptance testing provided for their use.

A.14.2.2.4 This practice is conducted to prevent damage to the valve during the hydrostatic test.
## Water Mist System Acceptance Test Report

### Property Information
- **Building Name:**
- **Address:**
- **Building Owner:**
- **Address:**
- **Phone/Fax/E-mail:**

### Contractor Information
- **Company Name:**
- **Address:**
- **Contact Person:**
- **Phone/Fax/e-mail:**

### System Check or Test

#### System piping flushed
- Hydraulically calculated demand rate: □ Yes □ No
- Maximum flow rate: □ Yes □ No

#### System piping cleaned prior to assembly?
- □ Yes □ No

### Hydrostatic Test

- Low pressure System – tested at 200psi for two hours
  - With no visible leakage? □ Yes □ No

- Intermediate & High Pressure system – tested at 1.5 Times the working pressure for 10 minutes and 110 minutes at working pressure ? □ Yes □ No

### Pneumatic Test

- Dry & Preaction systems – air test at 40psi for 24 hours
  - With no leakage more than 1.5psi. □ Yes □ No

#### Piping system complies with design, installation drawings and Hydraulic calculations?
- □ Yes □ No

#### Nozzle and pipe size complies with approved installation drawings?
- □ Yes □ No

#### Pipe size reductions and tee fitting position complies with design?
- □ Yes □ No

#### Piping restrained from vertical and lateral movement during discharge?
- □ Yes □ No

#### Discharge nozzle orientation produces optimum water mist application?
- □ Yes □ No

#### Water and gas storage containers located per approved drawings?
- □ Yes □ No

#### All containers mounted in accordance with manufacturers Recommendations?
- □ Yes □ No

#### All wiring installed properly in conduit and in compliance with approved drawings?
- □ Yes □ No

#### AC and DC wiring not combined in common raceway or conduit unless shielded and grounded?
- □ Yes □ No

#### All circuits free of ground faults and short circuits?
- □ Yes □ No

#### Detection devices checked for proper type and location per approved system drawings?
- □ Yes □ No

#### Detectors installed in accordance with:
  - NFPA 72 National fire Alarm and Signaling Code □ Yes □ No
  - CAN/ULC S524-06 Standard for the Installation of Fire Alarm Systems and □ Yes □ No
  - CAN/ULC S529-02 Standard for Smoke Detectors for Fire Alarm Systems □ Yes □ No

#### Manual pull stations accessible, identified and protected from Damage?
- □ Yes □ No
Abort switches are deadman type, properly installed, accessible and clearly identified? □ Yes □ No
Normal and manual emergency control overrides abort function? □ Yes □ No
Polarity verified for all polarized alarm devices and auxiliary relays? □ Yes □ No
End-of-line resistors installed across detection and alarm bell circuits where required? □ Yes □ No
Control unit checked for proper installation & accessibility? □ Yes □ No
All wiring checked for proper grounding & shielding? □ Yes □ No
Water mist system piping not used for electrical ground? □ Yes □ No
Each detector checked for proper response? □ Yes □ No

**Auxiliary Functions**
Operation of auxiliary functions verified in accordance with system requirements and design specifications:
- Alarm sounding / display devices? □ Yes □ No
- Remote annunciators? □ Yes □ No
- Air-handling shutdown? □ Yes □ No
- Power shutdown? □ Yes □ No

Manual pull station overrides abort switches? □ Yes □ No
Supervised circuits checked for trouble response? □ Yes □ No
Cross-zoned detection functions in accordance with design specifications? □ Yes □ No

**System Operational Test**
Full flow test? □ Yes □ No
Where a full flow test is not possible, water flow test from each test connection? □ Yes □ No
For multiple systems, simultaneous operational test? □ Yes □ No
All operating parts tested? □ Yes □ No
All devices function & sequenced properly? □ Yes □ No
All strainers / filters cleaned or replaced after testing? □ Yes □ No
System design information sign provided? □ Yes □ No

**Test Witnessed By:**

<table>
<thead>
<tr>
<th>Owner/authorized agent</th>
<th>Title</th>
<th>Date</th>
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<table>
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<tr>
<th>Installing Contractor</th>
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Additional comments:
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Add new annex text as follows:

A.13.5.1 A.15.3.5.1. The occupants of a home with a water mist system should understand that maintaining a water mist system is mostly about common sense. Keeping the control valve open, not hanging items from the nozzles, and making sure that the nozzles do not get painted or obstructed are the most important items. It is also important to know where the control valve is located so that the water can be shut down after water mist activation to minimize water damage. The building owner or manager should understand the water mist system operation and should conduct periodic inspections and tests to make sure that the system is in good working condition. A recommended inspection and testing program includes the following:

1. Monthly inspection of all valves to ensure that they are open.
2. Monthly inspection of tanks, if present, to confirm they are full.
3. Monthly testing of pumps, if present, to make sure they operate properly and do not trip circuit breakers when starting.
4. Testing of all waterflow devices, when provided, every 6 months including monitoring service (note that notification of the monitoring service is essential to make sure that the fire department is not called due to testing).
5. Ongoing visual inspection of all nozzles to make sure they are not obstructed and decorations are not attached or hung from them.
6. Whenever painting or home improvements are made in the dwelling unit, special attention should be paid to ensure that nozzles are not painted or obstructed either at the time of installation or during subsequent redecoration. When painting is occurring in the vicinity of nozzles, the nozzles should be protected by covering them with a bag, which should be removed immediately after painting is finished.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise existing section as follows:

C.1 General. In the absence of a generalized design method based on engineering first principles, water mist systems must be listed for specific hazards and protection objectives. It is the intent of NFPA 750 that such listings be obtained through full scale fire tests and system component evaluations conducted by internationally recognized laboratories to demonstrate that performance objectives can be met. New potential applications of water mist arise continuously, for which ad hoc test procedures have been developed. Only a limited number of such ad hoc fire test protocols meet the intent of this standard, which is as follows:

(1) Test protocols should be based on a fire protection engineering evaluation of the fire hazard, the compartment conditions, and the performance objectives for the system.

(2) Test protocols should be developed, carried out, and interpreted by internationally recognized fire testing laboratories.

Only test protocols developed in that manner are recognized as the basis of a listing. The full listing consists of an approval report describing the results of the performance-based fire testing and the component evaluations, and a manufacturer’s design installation and maintenance manual. The nozzle characteristics; spacing between nozzles; distances from ceilings, walls, or obstructions; minimum nozzle operating pressures; and water supply requirements are all established by the approval report.

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Replace existing table with the following:

***INSERT TABLE C.1.2 HERE_750_L26TbC1.2_R_revised_7_20_2012***
<table>
<thead>
<tr>
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<th>Water Mist Fire Test Protocol</th>
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<tr>
<td>1. International Maritime Organization, London, UK</td>
<td>MSC/Circ.1165, Revised guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms. Appendix B “Test method for fire testing equivalent water-based fire-extinguishing systems for machinery spaces of category A and cargo pump-rooms”, June 2005 as amended in MSC.1./Circ.1237, Amendments to the revised guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms (MSC/Circ.1165), October 2007 and in MSC.1./Circ.1269, Amendments to the revised guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms (MSC/Circ.1165), June 2008.</td>
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<td>MSC.1/Circ.1387, Revised guidelines for the approval of fixed water-based local application fire-fighting systems for use in category A machinery spaces (MSC/Circ.913), Appendix “Test method for fixed water-based local application fire-fighting systems”, December 2010.</td>
</tr>
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<td>Res. A.800, Revised Guidelines for Approval of Sprinkler Systems Equivalent to that Referred to in SOLAS Regulation II-2/12 Appendix 2 “Fire test procedures for equivalent sprinkler systems in accommodation, public space and service areas on passenger ships”, December 1995 as amended in Res.MSC.265(84) , Amendments to the revised guidelines for approval of sprinkler systems equivalent to that referred to in SOLAS regulation III-2/12 (Resolution A.800(19)), May 2008.</td>
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<td>MSC.1./Circ.1268, Guidelines for the Approval of Fixed Pressure Water-spraying and Water-based Fire Extinguishing Systems for Cabin Balconies Appendix “Test method for fixed pressure water-spraying and water-based fire-extinguishing systems for cabin balconies”, May 2008.</td>
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<td>MSC.1./Circ.1272, Guidelines for the Approval of Fixed Water-based Fire Extinguishing Systems for Ro-ro Spaces and Special Category Spaces equivalent to that referred to in Resolution A.123(1) Appendix “Test method for fixed water-based fire-fighting systems for ro-ro spaces and special category spaces”, May 2008.</td>
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<tr>
<td>Fire Tests for Water Mists Systems</td>
<td>Fire Tests for Water Mists Systems for the Protection of Combustion Turbines with Volumes Exceeding 9175 ft³ (260 m³)</td>
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<td>(d)</td>
<td>(d) Fire Tests for Water Mists Systems for the Protection of Wet Benches and Other Similar Processing Equipment</td>
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<td>(e) Fire Tests for Water Mists Systems for the Protection of Local Applications</td>
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<td>(f)</td>
<td>(f) Fire Tests for Water Mists Systems for the Protection of Industrial Oil Cookers</td>
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<tr>
<td>(g)</td>
<td>(g) Fire Tests for Water Mists Systems for the Protection of Computer Room Sub Floors</td>
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<tr>
<td>(h)</td>
<td>(h) General Requirements</td>
</tr>
<tr>
<td>(i)</td>
<td>(i) Performance Requirements (Water Mist Nozzles and System Components)</td>
</tr>
<tr>
<td>(j)</td>
<td>(j) Operations Requirements</td>
</tr>
<tr>
<td>FM Approvals Class Number 5560, Approval Standard for Water Mist Systems</td>
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<td>(a)</td>
<td>(a) Fire Tests for Water Mists Systems for the Protection of Machinery in Enclosures with Volumes not Exceeding 2825 ft³ (80 m³)</td>
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<tr>
<td></td>
<td>(l) Performance Requirements (Water Mist Nozzles and System Components)</td>
</tr>
<tr>
<td></td>
<td>(m) Operations Requirements</td>
</tr>
</tbody>
</table>

3. Underwriters Laboratories Inc., Northbrook, IL, USA

ANSI / UL 2167, Water Mist Nozzles for Fire Protection Service

[contents can be read from the standard]

4. CEN, Europe

CEN/TS 14972, Fixed firefighting systems - watermist systems - design and installation

[contents can be read from the standard]
C.2.7 Local Application Systems for Machinery Spaces.

The appendix to IMO/MSC/Circ. 913, *Guidelines for the Approval of Fixed Water-Based Local Application Fire-Fighting Systems for Use in Category A Machinery Spaces*, indicates that local application systems are intended to provide additional, localized fire suppression in areas where there is a possibility of flammable or combustible liquids contacting heated surfaces, such as the fire hazard portions of internal combustion machinery used for a ship's main propulsion and power generation, boiler fronts, the fire hazard portions of incinerators, and purifiers for heated fuel oil within Category A machinery spaces. The system is intended as a supplement to the required total flooding system and will allow immediate, manually activated fire control without the necessity of engine shutdown, personnel evacuation, shutting down of forced ventilation fans, or the sealing of the space. In the case of periodically unattended machinery spaces, the fire-fighting system shall have both automatic and manual release capabilities.

The appendix to MSC/Circ. 913 contains the fire test protocol used to evaluate the water mist nozzles for this application. The test method verifies the design criteria for vertical and horizontal grids of nozzles. The test method is intended to evaluate maximum nozzle spacing, minimum and maximum distances from the nozzle to the hazard, the minimum nozzle flow rate, and minimum and maximum nozzle operating pressures. Component testing standards are taken from those listed in IMO MSC/Circ. 1165. The fire tests are to be conducted in an open area of at least 100 m². Both 1 MW and 6 MW spray fires using light diesel oil as the fuel source are included in the protocol.

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**C.3**

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise as follows:

*****Insert Include 750_L64_Rec Here*****

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**E.1.2.9 UL Publications**

C.3 Factory Mutual Research Corporation FM Approvals Fire Test Protocols.

C.3.1 General. FM Approvals Class Number 5560, Approval Standard for Water Mist Systems, contains comprehensive test requirements for evaluating a complete water mist system, including the water mist nozzles, water mist system components: design, installation, and operations manual(s); hydraulic calculation method; and fire test protocols for the applications in C.3.2 through C.3.1.3. Similar fire test protocols can be found in ANSI/FM Approvals 5560, American National Standard for Water Mist Systems.

C.3.2 Machinery in Enclosures with Volumes Not Exceeding 80 m³ (2825 ft³). This application includes enclosures with machinery such as internal combustion engines, oil pumps, oil tanks, fuel filters, generators, transformer vaults, gear boxes, drive shafts, lubrication skids, diesel engine–driven generators, and other similar equipment using liquid hydrocarbon fuel and/or hydraulic, heat transfer, and lubrication fluids; enclosures with incidental use or storage of hydrocarbon ignitible liquids (also known as flammable liquids) of not more than two 55 gal (208 L) drums. All hazards included under the scope of this total flooding application are to be protected for a minimum of twice the longest time to extinguish the test fires, the time to shut down process equipment, or 10 minutes, whichever is greatest.

C.3.3 Combustion Turbines in Enclosures with Volumes Not Exceeding 80 m³ (2825 ft³). Combustion turbines included under the scope of this total flooding application are to be protected for a minimum of twice the longest time to extinguish the test fires, turbine rundown time (including the time that the turbine surfaces are above the auto-ignition temperature of the lubricating fluid), the time to shut down process equipment, or 10 minutes, whichever is greatest. Consultation with FM Global Property Loss Prevention Data Sheet Number 7-79, Fire Protection for Combustion Turbine Installations, is required for installation of these systems.

C.3.4 Machinery in Enclosures with Volumes Not Exceeding 260 m³ (9175 ft³). This application includes rooms with machinery such as oil pumps, oil tanks, fuel filters, generators, transformer vaults, gear boxes, drive shafts, lubrication skids, diesel engine–driven generators, and other similar machinery using fuel and/or lubrication fluids with volatilities less than or equal to light diesel. All hazards included under the scope of this total flooding application are to be protected for a minimum of twice the longest time to extinguish the test fires, the time to shut down process equipment, or 10 minutes, whichever is greatest.

C.3.5 Combustion Turbines in Enclosures with Volumes Not Exceeding 260 m³ (9175 ft³). Combustion turbines included under the scope of this total flooding application are to be protected for a minimum of twice the longest time to extinguish the test fires, turbine rundown time (including the time that the turbine surfaces are above the auto-ignition temperature of the lubricating fluid), the time to shut down process equipment, or 10 minutes, whichever is greatest. Consultation with FM Global Property Loss Prevention Data Sheet Number 7-79, Fire Protection for Combustion Turbine Installations, is required for installation of these systems.

C.3.6 Machinery in Enclosures with Volumes Exceeding 260 m³ (9175 ft³). This application includes enclosures with machinery such as internal combustion engines, oil pumps, oil tanks, fuel filters, generators, transformer vaults, gear boxes, drive shafts, lubrication skids, diesel engine–driven generators, and other similar equipment using
liquid hydrocarbon fuel and/or hydraulic, heat transfer, and lubrication fluids; enclosures with incidental use or storage of hydrocarbon ignitible liquids (also known as flammable liquids) of not more than two 208 L (55 gal) drums. All hazards included under the scope of this total flooding application are to be protected for a minimum of twice the longest time to extinguish the test fires, the time to shut down process equipment, or 10 minutes, whichever is greatest. For primary protection consideration, see Section 1.9 of FM 5560, Definitions, “Primary Protection,” and consult the FM Global Property Loss Prevention Data Sheet for the recommended protection of the specific hazard in the applicable occupancy.

C.3.7 Combustion Turbines in Enclosures with Volumes Exceeding 260 m³ (9175 ft³). Combustion turbines included under the scope of this total flooding application are to be protected for a minimum of twice the longest time to extinguish the test fires, the turbine rundown time (including the time that the turbine surfaces are above the auto-ignition temperature of the lubricating fluid), the time to shut down process equipment, or 10 minutes, whichever is greatest. Consultation with FM Global Property Loss Prevention Data Sheet Number 7-79, Fire Protection for Combustion Turbine Installations, is required for installation of these systems. For primary protection consideration, see Section 1.9 of FM 5560, Definitions, “Primary Protection.”

C.3.8 Light Hazard Occupancies. Typical light hazard occupancies within the scope of this application are defined in FM Global Property Loss Prevention Data Sheet Number 3-26, Fire Protection Water Demand for Nonstorage Sprinklered Properties. The occupancies are defined as Hazard Category 1 (HC-1). Water mist systems are not to be used to protect HC-2, HC-3, or HC-4 occupancies. The applications are limited to ceiling heights of 2.4 m (8 ft) for restricted areas and 5 m (16 ft 5 in.) for unrestricted areas (refer to Section 1.9 of FM 5560, Definitions, “Light Hazard Occupancy,” for specific descriptions of restricted and unrestricted areas). The water supply must be capable of supplying 60 minutes of water to the hydraulically most remote nine automatic nozzles or all automatic nozzles within a 1,500 ft² (140 m²) demand area, whichever is greater, for systems approved for the protection of unrestricted areas. For installations with less than 1,500 ft² (140 m²) in area, the water supply are to be capable of supplying 60 minutes of water to all nozzles in the protected area. For systems approved for the protection of restricted areas, the water supply is to be capable of supplying 60 minutes of water to all automatic nozzles within the compartment. Consultation with FM Global Property Loss Prevention Data Sheet Number 4-2, Water Mist Systems, and FM Global Property Loss Prevention Data Sheet Number 3-26, Fire Protection Water Demand for Nonstorage Sprinklered Properties, is required for installation of these systems.

C.3.9 Wet Benches and Other Similar Processing Equipment. This application includes tools that consist of ventilated and unventilated compartments, spin rinse dryers, alcohol vapor dryers, chemical and mechanical polishing tools, and step and repeat exposure systems. All hazards included under the scope of this local application are to be protected for a minimum of 10 minutes or twice the longest time to extinguish the worst-case fire scenario, whichever is greater. Consultation with FM Global Property Loss Prevention Data Sheet Numbers 4-2, Water Mist Systems, and 7-7, Semiconductor Fabrication Facilities, is required for installation of these systems.
C.3.10 Local Application Occupancies. Typical local application occupancies within the scope of this section are defined in the FM Global Property Loss Prevention Data Sheet Number 7 Series (Hazards). Consultation with these data sheets is required for installation of these systems. Water mist systems that successfully pass the local application fire scenarios are limited to protection of the following applications:

A. Ignitible liquid (also known as flammable liquid) pool fires where the liquid release can be confined to a diked area. The entire surface of the diked area is to be protected by the water mist system.
B. Ignitible liquid (also known as flammable liquid) channel fires in channels not exceeding the water mist system manufacturer's maximum specified width and with no limit to channel length.
C. Partially obstructed ignitible liquid (also known as flammable liquid) pool fires where the percentage of obstructed surface is limited to that tested.
D. Spray fires up to 6 MW fueled by ignitible liquids (also known as flammable liquids).
E. Spray and pool fire combinations where the release can be confined to a diked area.
F. Ignitible liquid (also known as flammable liquid) residues (ink and paper dust) on printing presses.

Applicants who want to protect special hazard equipment with ignitible liquids (also known as flammable liquids) with volatilities less than or equal to that of heptane will need to conduct the local application fire scenarios substituting heptane for diesel as the test fuel where appropriate. All hazards are to be protected for a minimum of twice the longest time to extinguish the test fires, time to shut down process equipment, or 10 minutes, whichever is greatest. Consultation with FM Global Property Loss Prevention Data Sheet Number 4-2, Water Mist Systems, is required for installation of these systems.

C.3.11 Industrial Oil Cookers. Application of the water mist system is limited to the protection of industrial oil cookers only and does not include the protection of other equipment, such as exhaust ducts, heaters, heat exchangers, and food processing areas, unless tested for these applications. Consideration of the application and use of nozzle protection caps to prevent or reduce the amount of nozzle contamination should be given, and the use of such caps should be included in the fire test and nozzle performance test requirement programs. This local application does not include the protection of other equipment such as exhaust air ducts, heaters, heat exchangers, and food processing or food preparation areas. Consultation with FM Global Property Loss Prevention Data Sheet Numbers 4-2, Water Mist Systems, and 7-20, Oil Cookers, is required for installation of these systems.

Industrial oil cookers typically are noninsulated conveyorized fryers or occasional batch kettles, used in food processing plants for chicken, fish, potato products (e.g., fries, chips), doughnuts, and many other food products. These cookers are extremely different in size, configuration, and construction from standard kitchen or restaurant oil cookers or fryers and require a different type of extinguishment system. Industrial oil cookers come in many sizes. They can contain up to approximately,900 L (5000 gallons) of cooking oil. Industrial oil cookers (except for some batch kettles) typically have movable covers or hoods that can be hydraulically operated.
The hood is generally in a closed position during a normal operation period but can be opened occasionally for routine maintenance. There are also exhaust stacks connected on top of the hood.

The most severe fire incident involving industrial oil cookers is a fire caused by overheating the cooking oil until it reaches its auto-ignition temperature (AIT). Installation of an interlocking system to prevent the oil from reaching its AIT is a normal practice in the industry. However, an AIT fire can still occur due to a system malfunction or simple human error. Thus, all the performance tests proposed in this document require extinguishment of an AIT fire. The AIT fire is particularly challenging because of the rapid spread of flame over the oil surface and the difficulty in extinguishing the fire because flame extinction is required over the entire surface with simultaneous rapid cooling to prevent re-ignition.

Exhaust air fans should be interlocked to automatically shut down upon fire detection or operation of the water mist system. Exhaust duct protection, as outlined in FM Global Property Loss Prevention Data Sheet Number 7-78, Industrial Exhaust Systems, is required and should be specified in the manufacturer’s design, installation, operation, and maintenance manual. (Note: Water spray protection for the ducts is required if operation of the duct system during water mist system discharge is necessary. Automatic sprinkler protection is recognized as an effective alternative to water spray.) Commonly used cooking oils, their flash points, and their AITs are listed in Table C.3.11 as a reference only. Canola oil is considered a representative vegetable oil and can be used as the testing medium in industrial oil cooker fire tests. Canola oil has a nominal density equal to 0.93 kg/L (7.8 lb/gal) and nominal specific heat equal to 2.5 kJ/kg · °C (0.59 Btu/lb · °F). Alternative cooking oils can be used based on the manufacturer’s intended applications for protection, and approval is limited to cooking oils with flash points and AITs less than or equal to the tested oil.
### Table C.3.11. Nominal Flash Points and Auto-Ignition Temperatures (AITs) of Commonly Used Cooking Oils

<table>
<thead>
<tr>
<th>Cooking Oil</th>
<th>Flash Point</th>
<th>Auto Ignition Temperature (AIT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>°C</td>
<td>°F</td>
</tr>
<tr>
<td>Canola</td>
<td>338</td>
<td>641</td>
</tr>
<tr>
<td></td>
<td>363</td>
<td>686</td>
</tr>
<tr>
<td>Corn</td>
<td>342</td>
<td>647</td>
</tr>
<tr>
<td></td>
<td>362</td>
<td>684</td>
</tr>
<tr>
<td>Cotton seed</td>
<td>334</td>
<td>633</td>
</tr>
<tr>
<td></td>
<td>366</td>
<td>690</td>
</tr>
<tr>
<td>Peanut</td>
<td>348</td>
<td>659</td>
</tr>
<tr>
<td></td>
<td>370</td>
<td>698</td>
</tr>
<tr>
<td>Soybean (soya)</td>
<td>333</td>
<td>631</td>
</tr>
<tr>
<td></td>
<td>377</td>
<td>710</td>
</tr>
<tr>
<td>Sunflower</td>
<td>340</td>
<td>644</td>
</tr>
<tr>
<td></td>
<td>359</td>
<td>678</td>
</tr>
<tr>
<td>Palm</td>
<td>328</td>
<td>623</td>
</tr>
<tr>
<td></td>
<td>377</td>
<td>710</td>
</tr>
</tbody>
</table>

The agent supply is to be capable of supplying agent to all open nozzles at the maximum rated operating pressure for a minimum of twice the total time needed to extinguish the worst-case fire scenario and subsequently cool the oil to a temperature below its flash point, as established by the testing or 10 minutes, whichever is greater.

### C.3.12 Computer Room Subfloors

Typical occupancies within the scope of this application are defined in FM Global Property Loss Prevention Data Sheet Numbers 4-2, *Water Mist Systems*, and 5-32, *Electronic Data Processing Systems*. System installations are limited to computer room subfloor areas and heights not exceeding those tested. Additionally, the equivalent opening area of the subfloor cannot exceed those tested. The agent supply should be capable of supplying agent to all nozzles at the maximum rated operating pressure for a minimum of twice the longest time to extinguish the test fires or 10 minutes, whichever is greater. This protocol evaluates only the fire extinguishment capabilities of the water mist system. An evaluation of the smoke-cleansing capabilities is not made. Consultation with FM Global Property Loss Prevention Data Sheet Numbers 4-2, *Water Mist Systems*, and 5-32, *Electronic Data Processing Systems*, is required for installation of these systems.

### C.3.13 Continuous Wood Board Presses

This application is further defined in FM Global Property Loss Prevention Data Sheet Number 7-10, *Wood Processing and Woodworking Facilities*. Application of the water mist system is limited to the protection of the continuous wood board press only and does not include the protection of other equipment unless tested for other applications. All hazards included under the scope of this application are to be protected for a minimum of twice the longest time to extinguish the test fires or 30 minutes, whichever is greater. Consultation with FM Global Property Loss Prevention Data Sheet Numbers 4-2, *Water Mist Systems*, and 7-10, *Wood Processing and Woodworking Facilities*, is required for installation of these systems.

Factory Mutual Research Corporation (FMRC) has developed the following test protocols, which are the basis for current listings of water mist systems and components [denoted by FMRC as Fine Water Spray (FWS) systems]:

1. FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Combustion Turbine Enclosures, Machinery Spaces, and Special Hazard Machinery Spaces with Volumes Not Exceeding 2825 ft³ (80 m³)
C.3.1.1 Note that the term machinery space refers to flammable liquid hazards no greater than those of diesel fuel, and the term special hazard machinery space refers to flammable liquid hazards no greater than those of n-heptane. These terms should not be confused with the term machinery space used in the International Maritime Organization (IMO) documents relating to fine water spray. They are not intended to be interchangeable.

C.3.1.2 The standards describe fire test performance criteria and methods. Because each fine water spray system is unique in its design and use of components, the component testing of each fine water spray system is evaluated on a case-by-case basis. The components are tested for functionality, performance, integrity, and reliability. The manufacturers’ design, installation, and maintenance manual(s) are reviewed for technical content and clarity. The supplied hydraulic calculations are also reviewed.

C.3.2 FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Combustion Turbine Enclosures, Machinery Spaces, and Special Hazard Machinery Spaces with Volumes Not Exceeding 2825 ft³ (80 m³).

C.3.2.1 The objective of this standard is to ensure that the fine water spray system extinguishes spray and pool fires that can occur, for example, due to breaks in lubrication, hydraulic, or fuel lines. Typically, these fires are highly shielded. While spray fires can occur only as the result of a supply line break, pool fires can occur as a result of a breakage or as a result of a small leak over a large period of time. This standard is limited to volumes not exceeding 80 m³ (2825 ft³). The FMRC standard assumes automatic interlocks for the following:

1. All fuel supply lines (for combustion turbines, bearing lubrication can be left on to allow the turbine to coast down)
2. Door closures
3. Ventilation shutdown
4. Electrical systems

C.3.2.2 The water supply required is dependent on the application. For combustion turbines, the water supply has to be sufficient to protect the turbine for the duration of its coast downtime. For machinery spaces and special hazard machinery spaces, the protection time is 10 minutes.

C.3.2.3 The detection is by means of heat detectors. The detection is so designed as to detect the fire and activate the fine water spray system within 60 seconds of the ignition.
C.3.2.4 The fine water spray system has to extinguish all spray and pool fires within 5 minutes from the time of ignition. Tests are conducted in closed enclosures as well as enclosures with natural ventilation. For optional protection of insulated combustion turbines, the insulation mat can be suppressed rather than extinguished.

C.3.2.5 In addition to the fire performance criteria, fine water spray systems used for the protection of combustion turbines cannot cause damage to the turbine by means of thermal shock or cracking of the turbine casing or induce blade rubbing. The rate of cooling of the steel test plate (1m×2m×5cm thick) must not exceed limits set by FMRC. It can be more difficult to successfully pass the cooling test than to pass the fire tests, and the results of the cooling test often indicate the number, type, and placement of the fine water spray nozzles.

C.3.3 FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Combustion Turbine Enclosures, Machinery Spaces, and Special Hazard Machinery Spaces with Volumes Not Exceeding 9175 ft³ (260 m³).

C.3.3.1 The objective of this standard is to ensure that the fine water spray system extinguishes spray and pool fires that can occur, for example, due to breaks in lubrication, hydraulic, or fuel lines. Typically, these fires are highly shielded. While spray fires can occur only as the result of a supply line break, pool fires can occur as a result of a breakage or as a result of a small leak over a large period of time. This standard is limited to volumes not exceeding 260 m³ (9175 ft³). The FMRC standard assumes automatic interlocks for the following:
(1) All fuel supply lines (for combustion turbine, bearing lubrication can be left on to allow the turbine to coast down)
(2) Door closures
(3) Ventilation shutdown
(4) Electrical systems

C.3.3.2 The water supply required is dependent on the application. For combustion turbines, the water supply has to be sufficient to protect the turbine for the duration of its coast downtime. For machinery spaces and special hazard machinery spaces, the protection time is 10 minutes.

C.3.3.3 The detection is by means of heat detectors. The detection is so designed as to detect the fire and activate the fine water spray system within 60 seconds of the ignition.

C.3.3.4 The fine water spray system has to extinguish all spray and pool fires within 5 minutes from the time of ignition. Tests are conducted in closed enclosures as well as enclosures with natural ventilation. For optional protection of insulated combustion turbines, the insulation can be suppressed rather than extinguished. In addition to demonstrating performance in volumes not exceeding 260 m³ (9175 ft³), systems also have to demonstrate the capability to perform in small [130 m³ (4590 ft³)] enclosures.

C.3.3.5 In addition to the fire performance criteria, fine water spray systems used for the protection of combustion turbines cannot cause damage to the turbine by means of thermal shock, cause cracking of the turbine casing, or induce blade rubbing. The rate of cooling of the steel test plate (1m×2m×5cm thick) cannot exceed limits set by FMRC. It can be more difficult to successfully pass the cooling test than to pass the fire tests,
and the results of the cooling test often indicate the number, type, and placement of the fine water spray nozzles.

C.3.4 FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Combustion Turbine Enclosures, Machinery Spaces, and Special Hazard Machinery Spaces with Volumes Exceeding 9175 ft³ (260 m³).

C.3.4.1 The objective of this standard is to ensure that the fine water spray system extinguishes spray and pool fires that can occur, for example, due to breaks in lubrication, hydraulic, or fuel lines. Typically, these fires are highly shielded. Although spray fires can occur only as the result of a supply line break, pool fires can occur as a result of a breakage or as a result of a small leak over a large period of time. The FMRC standard assumes automatic interlocks for the following:

1. All fuel supply lines (for combustion turbines, bearing lubrication can be left on to allow the turbine to coast down)
2. Door closures
3. Ventilation shutdown
4. Electrical systems

C.3.4.2 This standard is based on the IMO Standard for Shipboard Machinery Spaces, although the hazards discussed in both documents are different. Due to differences in system design and performance, extrapolation of results to larger room sizes is not permitted by FMRC at this time.

C.3.4.3 The water supply required is dependent on the application. For combustion turbines, the water supply has to be sufficient to protect the turbine for the duration of its coast downtime. For machinery spaces and special hazard machinery spaces, the protection time is 60 minutes. Typically, the volumes tested exceed 800 m³ (28,230 ft³).

C.3.4.4 The detection is by means of heat detectors. The detection is so designed as to detect the fire and activate the fine water spray system within 60 seconds of the ignition.

C.3.4.5 The fine water spray system has to extinguish all spray, pool, and crib fires within 30 minutes from the time of ignition. The exception is a small shielded diesel pool fire that has to be suppressed. Tests are conducted in enclosures with natural ventilation. For optional protection of insulated combustion turbines, the insulation mat can be suppressed rather than extinguished.

C.3.4.6 In addition to the fire performance criteria, fine water spray systems used for the protection of combustion turbines cannot cause damage to the turbine by means of thermal shock or cracking of the turbine casing or induce blade rubbing. The rate of cooling of the steel test plate (1 m × 2 m × 5 cm thick) cannot exceed limits set by FMRC. It can be more difficult to successfully pass the cooling test than to pass the fire tests, and the results of the cooling test often indicate the number, type, and placement of the fine water spray nozzles.

C.3.5 FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Light Hazard Occupancies.

C.3.5.1 The objective of this standard is to ensure that the fine water spray system controls fires typically found in light hazard occupancies and prevents the spread of the fire beyond the room or area of origin. These fires typically involve furnishings and wall coverings. This standard limits the heights of enclosed spaces to 2.4 m (8 ft) and the heights of unrestricted spaces to 5 m (16 ft 5 in.).
C.3.5.2 This standard is based on the IMO Standard for Shipboard Corridors, Cabins, and Public Spaces, although the hazards discussed in both documents are different.

C.3.5.3 The water supply required is 60 minutes for the most remote nine nozzles at the rated operating pressure.

C.3.5.4 The detection is by means of individual heat responsive elements on the nozzles. The nozzles should meet FMRC requirements for quick response sprinklers and are limited to a maximum nominal temperature rating of 107°C (225°F). Nozzle spacing is to be uniform with uniform spacing, preferably one-half of the standard nozzle spacing, from the wall. 

C.3.5.5 The fire performance tests consist of three test areas: small compartment, large compartment, and open space.

C.3.5.5.1 The small compartment [3 m × 4 m × 2.4 m (10 ft × 13 ft × 8 ft) high] has a door 0.8 m × 2.2 m (2 ft 6 in. × 7 ft 2 in.) high and represents a small ship cabin. The fuel package for this room consists of two bunk beds identical to the IMO specification. The purpose of this test is to delineate mist nozzles from sprinklers. The fire is ignited on the lower mattress, and the test methodology is identical to that specified in the IMO test series. Pass/fail criteria are based on damage of the lower bunk (maximum of 40 percent), ceiling surface temperature over ignition [maximum of 260°C (500°F)], and a maximum gas temperature 76 mm (3 in.) below the ceiling of 315°C (600°F).

C.3.5.5.2 The large compartment [having equal sides not exceeding 6 m (20 ft) and a height of 2.4 m (8 ft)] has two doors [each 0.8 m × 2.2 m (2 ft 6 in. × 7 ft 2 in.) high] located in diagonally opposite corners. A nozzle is placed in the doorway opposite the fuel package. The fuel package and test method are identical to the IMO specification. The heptane under the wood crib is ignited first, then followed 40 seconds later by the ignition of the excelsior. The doorway nozzles do not operate (indicating that the fire would not have spread to an adjacent area). Additional pass/fail criteria include ceiling surface temperature over ignition [maximum of 265°C (510°F)] and a maximum gas temperature 76 mm (3 in.) below the ceiling of 315°C (600°F).

C.3.5.5.3 The open space test is conducted under a ceiling with a minimum area of 80 m² (860 ft²) to simulate an uninterrupted area and a ceiling height of 5 m (16 ft 5 in.). At least 16 nozzles are installed in the ceiling and the fuel package (sofas, as outlined in the IMO specification) are to be arranged per the IMO specification. The test is conducted three times: once each with the ignition under one nozzle, between two nozzles, and between four nozzles. Pass/fail criteria are based on fewer than five nozzles operating, at least one unoperated nozzle beyond those that operate, damage of the sofa cushions (maximum of 50 percent), ceiling surface temperature over ignition [maximum of 260°C (500°F)], and a maximum gas temperature 76 mm (3 in.) below the ceiling of 315°C (600°F).

C.3.6 FMRC Draft Performance Requirements for Fine Water Spray Systems for the Protection of Wet Benches and Other Processing Equipment.

C.3.6.1 The objective is to ensure that the fine water spray system extinguishes pool fires typically found in wet benches and other similar clean room processing equipment.

C.3.6.2 The detection system has to be approved specifically for use in wet bench applications. Fine water spray systems used for this application are typically of the zoned, deluge type. Operating elements currently used in automatic sprinklers have not been shown to be sufficiently fast enough to prevent significant nonthermal damage.
C.3.6.3 The simulated clean room is 5.5m × 3.7m × 3.7m (18 ft × 12 ft × 12 ft) high with porous ceiling and floor plates. An airflow (downward) with a velocity of 0.31 m/sec (60 ft/min) is maintained throughout the test. The minimum airflow by the open face of the wet bench is 4.5 m³/min/linear m (150 ft³/min/linear ft). The wet bench measures approximately 2.3 m × 1.4 m × 0.6 m (7.5 ft × 4.5 ft × 2 ft) high. The working surface area is 0.8 m × 2.3 m × 0.6 m (2.6 ft × 7.5 ft × 2 ft) high.

C.3.6.4 All fires have to be extinguished in less than 60 seconds.

C.3.6.5 Various fire scenarios are conducted to test the fine water spray system for the ventilated subsurface area. These include five pool fires (various sizes) utilizing polypropylene beads and solid coupons for fuel and at least one pool fire for each of the following flammable liquids: acetone, isopropyl alcohol (IPA), and n-heptane. The pan sizes and fire locations for the flammable liquid pool fire are at the discretion of FMRC based on observations of the fine water spray system. Obstructions are placed within the subsurface area such that approximately 50 percent of the nozzle discharge is blocked.

C.3.6.6 Two tests are conducted to determine the effectiveness of a single nozzle in an unventilated space utilizing the subsurface area as a test chamber. The first test utilizes a polypropylene pool fire, and the second test uses a flammable liquid pool fire. Pan size and flammable liquid are at the discretion of FMRC based on the outcome of the ventilated subsurface tests. Suitable barriers are placed in the test area to prevent direct impingement on the fire and to provide 50 percent blockage of the discharge.

C.3.6.7 Several fire scenarios are conducted to test the fine water spray system for the working surface area. These include five pool fires (various sizes) utilizing polypropylene beads and solid coupons for fuel and at least one pool fire for each of the following flammable liquids: acetone, isopropyl alcohol (IPA), and n-heptane. The pan sizes and fire locations for the flammable liquid pool fire are at the discretion of FMRC based on observations made of the fine water spray system. The flammable liquid fires are also tested at the minimum and maximum nozzle heights, as specified by the manufacturer. A splashing test is conducted in which a single nozzle, located at the minimum vertical height above a pan of liquid containing dye, is discharged at the maximum pressure. None of the contents of the liquid pool are splashed outside a 0.4 m (16 in.) diameter circle centered on the pool.

C.3.7 FMRC Draft Fire Test Protocol for Water Mist Systems for Local Application Protection.

C.3.7.1 The objective of this standard is to ensure that the water mist system will extinguish combustible liquid spray and pool fires. These fires can occur on printing press stands, dip tanks, quench tanks, or lube oil–conditioning systems. The standard assumes the following:

1. Room ventilation is normal.
2. Obstructions over the protected area do not exceed that tested.
Fluid is contained within the diked area.

C.3.7.2 The time required to extinguish the fire scenarios will be reported. The water supply required depends on the occupancy and the authority having jurisdiction.

C.3.7.3 The system is to be automatically activated by a listed heat or flame detection system.

C.3.7.4 The water mist system must extinguish the following fires at the maximum and minimum nozzle elevations and spacing. Maximum and minimum heights apply as follows:

1. For square pool fires, maximum height only for 1 m × 1 m and 2 m × 2 m pools; maximum and minimum heights for the 3 m × 3 m pool
2. For channel fires, maximum height only for Y and 2Y lengths; maximum and minimum heights for 3Y length
3. For heptane spray fires, maximum and minimum heights
4. For combined pool and spray fires, maximum height only
5. For offset pool fire, obstructed pool fire, and spray fire with external ignition source, maximum and minimum heights

C.3.7.4.1 Pool Fires. Pool fires are to be in square shapes from 1 m², 4 m², and 9 m² (10.8 ft², 43.6 ft², and 96 ft²) in area.

C.3.7.4.2 Obstructed Pool Fires. The obstruction must be at least equivalent to a 0.6 m (2 ft) diameter drum located 0.5 m (1.6 ft) over the center of the pool.

C.3.7.4.3 Channel Fires. Channel fires are to be at the width of the channel and at lengths of one, two, and three times the width.

C.3.7.4.4 Spray Fires. Six MW heptane spray fires are conducted with the spray fire axis in the horizontal and vertical directions.

C.3.7.4.5 Spray and Pool Fires. Horizontal spray fire tests are conducted with a 6 MW diesel spray fire at two different elevations and two different locations above the surface of a 2 m × 2 m diesel pool fire. A 45-degree spray fire is conducted with a 6 MW diesel spray fire at two locations at one elevation above a 2 m × 2 m diesel pool fire.

C.3.7.4.6 Diesel Soaked Paper Dust Fire. A fire involving a quantity of diesel fuel soaked into paper dust.

C.3.7.5 The tests are conducted in enclosures large enough so that oxygen concentrations do not decrease below 20 percent.
Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

**E.1.1 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471
NFPA 502 *Standard for Road Tunnels, Bridges, and Other Limited Access Highways*, 2011 edition

Submitter: Technical Committee Water Mist Fire Suppression Systems

Recommendation: Revise text to read as follows:

**E.1.2.5 FM Approvals Publications.** FM Approvals, 1151 Boston-Providence Turnpike, P.O. Box 9102, Norwood, MA, 02062.
September 28, 2012

Amy B. Cronin
Secretary, NFPA Standards Council
Batterymarch Park
Quincy, MA 02169

RE: NFPA 750 – Opposition to Tyco Fire Product’s Appeal of September 5, 2012
HAI Project #1ERR00027.004

Dear Ms. Cronin:

Hughes Associates, Inc. (HAI) has reviewed the appeal submitted by Tyco Fire Products (TFP) on September 5, 2012 regarding actions taken by the NFPA 750 committee. This letter identifies why TFP’s appeal is baseless and incorrect when considering current NFPA 750 code language, TFP’s own submitted public input and examples from other NFPA codes. HAI is submitting this letter on behalf of Marioff, Inc., which is part of UTC Climate, Controls & Security, whom we are representing on this issue.

In its appeal TFP is arguing “that the committee overstepped the bounds of its responsibilities by implicitly adopting the concept of equivalency in performance and application between systems designed in accordance with NFPA 750, Standard for Water Mist Fire Protection Systems and NFPA 13, Standard for the Installation of Sprinkler Systems through the incorporation of several specific proposed revisions to the standard. Of primary concern are 750 FR9 and 750 FR45 as stated in the Report of First Revisions November 2013 document.” TFP further states that it is not within the power or responsibility of any NFPA technical committee to adopt either implicitly or explicitly the concept of equivalency in performance or application of one fire protection technology within its existing NFPA design and installation standard with any other technology governed by a separate NFPA design and installation standard.

HAI disagrees with TFP’s appeal for a number of reasons including the following:

I. **Equivalency is not new to NFPA 750 or to the NFPA in general**
   - Since 1996, NFPA 750 has explicitly included “Sprinkler Equivalent Systems”. This section was developed with the explicit intent of the committee to provide equivalent protection to that provided by automatic sprinklers. **Attachment 1** contains the relevant NFPA 750-1996 Edition criteria highlighted as follows:
     - **11-1.1 Sprinkler Equivalent Systems.** Systems protecting spaces where the predominant hazard consists of Class A combustibles. Examples include accommodation spaces, public spaces, galleys, and store rooms.

[Comment No. 1]
In general, equivalency is a principle of NFPA standards to avoid creating preferences for or barriers against new technologies and also to avoid stunting future research and development in life safety technology by stating preferences. Again quoting NFPA 750 (2010 Edition) for an example of typical language used in NFPA codes and standards:

1.5. Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

NFPA Technical Committee’s utilizing the concept of equivalency is common. NFPA Technical Committees have been recognizing exceptions, alternatives or equivalencies based on criteria adopted by other Technical Committees. Not all of the alternative protection methods have been tested to the extent to allow listing of the protection method such as is required for water mist. Examples of recognizing alternatives includes the following:

- In Section 8.15.4.1, NFPA 13 recognizes sprinklers serving as an alternative to the enclosure of vertical opening enclosure required by other codes.

- NFPA 101 provides many alternatives to address potential approaches to safety. Some of these approaches are based on NFPA 13, NFPA 220, NFPA 90A or other Standards which are the responsibility of multiple technical committees.

II. **TFP’s own submissions use language such as equivalent and alternate, as well as assert the utility of tying NFPA 13 and NFPA 750 in related areas to remove confusion.**

Though not identified in TFP’s appeals, TFP’s own submissions support the concept of equivalence and the need to utilize NFPA 13 where appropriate. Attachment 2 contains a selection of the TFP submissions. Most of TFP’s submissions are in the name of “Tyco Codes and Standards NFPA 750 Task Group.”

- **TFP’s Public Input Discusses Concept of Equivalency.** TFP submitted several Public Inputs (e.g., 750 PI#46) containing the following or similar language in its substantiation, “Water mist systems are being more readily accepted as sprinkler equivalent systems, ...” TFP was apparently comfortable citing the concept of equivalency as substantiation for their public input but now cites equivalency as an area of concern in their appeal.

- **Attachment 2** also contains several TFP proposals that equate water mist to NFPA 13 requirements and/or sprinkler equivalent systems:
PI #44 – TFP proposed that NFPA 750’s 10% safety factor for flow and pressure should be eliminated based on the fact that sprinkler systems per NFPA 13 do not have such a requirement;

PI# 45 – TFP substantiation includes that the proposal will help “maintain consistency between the standards and is now more applicable to water mist applications as they are becoming more accepted as a sprinkler equivalent system;

PI #86 — TFP proposes, among other things, the need for an overhaul of then Ch. 6 and includes a section on light and ordinary hazard occupancies, terms not defined in NFPA 750 and presumably linked to the definition in NFPA 13 or other documents;

PI #90 – TFP substantiates proposal that it “would eliminate a large amount of confusion, especially in terms of low pressure water mist technology being used in lieu of standard sprinkler systems for light and ordinary hazard occupancies;

PI# 94 – TFP proposes to use NFPA 13 for hanging and bracing requirements;

and

PI #95 – TFP proposes to incorporate NFPA 13 obstruction criteria.

III. All Equivalence to Automatic Sprinkler Language in the First Draft comes from pre-existing NFPA 750 text.

For purposes of clarity, the actual language that resulted from the committee task group which was accepted by an overwhelming vote of the entire Committee does not include the term “equivalency” and is as follows:

- 3.3.24.1* Automatic Sprinkler Alternative Water Mist Systems. A water mist system utilizing automatic water mist nozzles installed in a building and designed to provide primary fire protection that is an alternative to automatic sprinkler systems [emphasis added].

The definition lacks the word ‘equivalence.” In fact, none of TFP’s citations of “equivalence” are based on committee accepted code language but solely on the Committee Statements in the Report on the First Revision, not the actual First Draft. Again, this code language was agreed upon by the overwhelming majority of the Committee, the use of equivalency in the Committee Statements was appropriate and the concept of equivalency was extensively utilized by TFP in their proposals as discussed in Section II.
IV. Water Mist Testing and Approval Criteria is based on Performance at Least Equivalent to Automatic Sprinklers

The testing methodology employed by Underwriters Laboratories and other laboratories for the listing of water mist systems utilized as Automatic Sprinkler Alternative water mist systems has been based on a protocol that is at least equivalent, if not more stringent, than the test methodology employed for automatic sprinklers and is designed to demonstrate equivalent performance.

V. TFP has not Supported any Conflicts with NFPA 13

TFP has not supported their claim of how NFPA 750 committee actions highlighted in their appeal create a direct conflict with the upcoming NFPA 13-2013 edition new section 1.1.2. The sections highlighted in their appeal of the NFPA 750-First Draft Report do not reference NFPA 13 for any requirements for the design or installation of water mist fire protection systems.

Based on the reasons identified, TFP’s appeal is inappropriate and conflicts with many of TFP’s own positions and statements made as a participant in the NFPA 750 revision process. The appeal does not identify how the concepts highlighted by TFP create a conflict wherein the concepts in one Standard must apply to another. Granting the appeal would help preclude the adoption of technology that has proved advantageous in numerous situations and has been successfully tested based on performance equivalency to automatic sprinklers. Alternative systems with equivalent performance may improve the cost effectiveness, impact on the environment and performance of such life safety systems similar to residential sprinklers and there appear to be no procedural or technical reasons to do so.

Please note that we have limited our response to addressing the issues raised in TFP’s letter dated September 5, 2012. If the Standards Council schedules a hearing on this appeal, we wish to have the opportunity to present our position in more detail. If you require additional information, please contact us.

Sincerely,

Eric R. Rosenbaum, P.E.
Director, A&E Services
ATTACHMENT 1

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NFPA 750
Standard on
Water Mist Fire Protection Systems
1996 Edition

This edition of NFPA 750, Standard on Water Mist Protection Systems, was prepared by the Technical Committee on Water Mist Fire Suppression Systems and acted on by the National Fire Protection Association, Inc., at its Annual Meeting held May 20–23, 1996, in Boston, MA. It was issued by the Standards Council on July 18, 1996, with an effective date of August 9, 1996.

This edition of NFPA 750 was approved as an American National Standard on July 26, 1996.

Origin and Development of NFPA 750

In 1993, representatives from the research and engineering communities, water mist system manufacturers, the insurance industry, enforcement authorities, and industrial users met and organized the NFPA Technical Committee on Water Mist Fire Suppression Systems. The committee started work on developing a new NFPA document that would begin to standardize water mist technology and provide for reliable design and installation of these systems.

Water mist systems were introduced in the 1940s and were utilized for specific applications such as on passenger ferries. The renewed interest in water systems is due partially to the phasing out of Halon and their potential as a fire safety system for spaces where the amount of water than can be stored or that can be discharged is limited. In addition, their application and effectiveness for residential occupancies, flammable liquids storage facilities, and electrical equipment spaces continues to be investigated with encouraging results.

NFPA 750 will contain elements which are similar to other types of fire protection systems such as automatic sprinklers, fixed water spray, carbon dioxide, and Halon. In many ways, water mist can be thought of as a hybrid of these systems. Overall, water mist systems utilize water as the extinguishing, suppression, or control medium, but do so in a nontraditional manner. In developing this new standard, the committee addressed system components and hardware, system types, installation requirements, design objectives, hazard classifications, calculations, water supplies, atomizing media, plans, documentation, acceptance criteria, and maintenance considerations.
Chapter 11 Marine Systems

11-1 General. This chapter outlines the selections, modifications, and additions that are necessary for marine applications. All other requirements of NFPA 750, Standard on Water Mist Fire Protection Systems, shall apply to shipboard systems except as modified by this chapter.

11-1.1 The following definitions shall be applicable to this chapter.

Flammable Liquid Hazards Systems. Systems protecting spaces where the predominant hazard consists of flammable and combustible liquids. Examples include machinery spaces, ballast water storage tanks, and similar spaces.

Sprinkler Equivalent Systems. Systems protecting spaces where the predominant hazard consists of Class A combustibles. Examples include accommodation spaces, public spaces, galleys, and store rooms.

11-1.2 The efficacy and reliability of all marine water mist system arrangements and their components shall be tested in accordance with standards developed by the International Maritime Organization (IMO).

11-1.2.1 Sprinkler equivalent systems shall comply with the fire suppression and component manufacturing tests of IMO Assembly Resolution A.800(19).

11-1.2.2 Flammable liquid hazard systems shall comply with fire suppression and components manufacturing tests contained in IMO Maritime Safety Committee Circular 658, as amended by IMO NP04/08 WP.9 Annex 3, Report of the 40th Session of the Subcommittee on Fire Protection.

11-1.3 All marine water mist systems and their components shall be listed or approved.

11-1.4 The system and equipment shall be suitably designed to withstand ambient temperature changes, vibrations, humidity, shock, impact, clogging, and corrosion normally encountered in ships.

11-1.5 Equipment and piping systems mounting and hanging practices shall be in accordance with internationally recognized standards for marine applications.

11-1.6 The required water mist pumps shall be arranged such that with the largest pump out of service, the greatest system demand can still be satisfied.

11-1.7 Controls and Alarms.

11-1.7.1 Pump systems shall have the following:

(a) Automatic pump start-up; and
(b) Manual pump start and annunciator at the following locations:

1. Near the pump;
2. Engine control room; and
3. Central control station where provided.

11-1.7.2 Annunciation shall include (as applicable):

(a) Power available/power failure;
(b) Water flow and location;
(c) Pump run and alarm;
(d) Diesel driver oil pressure.

11-1.7.3 Any flow condition shall sound an alarm on the bridge or at aconstantly manned control station.

11-1.7.4 On the bridge and in the engine control room there shall be a pressure monitor consisting of one of the following:

(a) Pressure gauge;
(b) Transducer system; or
(c) High/low/OK pressure switch.

11-2 Sprinkler Equivalent Systems.

11-2.1 The system shall be automatic.

11-2.2 The water mist system shall be adequate to supply the system with fresh water for a period of at least 30 minutes. The vessel's potable water supply shall be permitted to constitute an acceptable source to satisfy the 30-minute demand period.

11-2.3 A pressure tank system shall be provided to meet the functional requirements for Safety of Life at Sea (SOLAS) Regulation 11-2/12.4.1.

11-2.4 After 30 minutes of system activation, manual intervention shall be permitted for continued operation.

11-2.5 The system shall be fitted with a permanent sea inlet and be capable of continuous operation using sea water for a period of at least 120 minutes.

11-2.6 Strainers and filters shall be provided and sized for the worst case water quality conditions expected.

11-2.7 The system shall be of the wet pipe type. Exceptions: Where environmental conditions dictate, small sections are permitted to be of another approved type.

11-2.8 The system shall be provided with main and emergency sources of power.

11-2.9 Pumps and alternate supply components shall be sized to be capable of maintaining the required flow.
11.2.10 The water supply shall be sufficient to meet the flow and pressure requirements as determined by the listing of all nozzles in the hydraulically most remote design area determined in accordance with 11-2.10.1 and 11-2.10.2.

11.2.10.1 In ordinary hazard public spaces, the design area shall be 3014 ft² (280 m²).

11.2.10.2 In light hazard public spaces and accommodation spaces, the design area shall be 1507 ft² (140 m²).

Exceptions: The water supply requirements for nozzles only shall be based upon the room that creates the greatest demand. The density selected shall be in accordance with the listing. To utilize this method, all rooms shall be enclosed with walls having a fire resistance rating equivalent to an A-15 or B-15 rating.

Minimum protection of opening shall be as follows:

Light hazard. Automatic or self-closing doors.

Exceptions: Where opening is not protected, calculations shall include the nozzle in the room plus two nozzles in the communication space nearest each unprotected opening unless the communication space has only one nozzle, in which case calculations shall be extended to the operation of that nozzle. The elevation of the room and communication space nozzles to be calculated shall be that which produces the greatest hydraulic demand.

Ordinary and extra hazard. Automatic or self-closing doors with appropriate fire resistance ratings for the enclosure.

11.2.11 The water supply shall be sufficient to meet the total flow and pressure requirements of all nozzles in the hydraulically most remote design area determined in accordance with 11-2.11.1 and 11-2.11.2.

11.2.11.1 In ordinary hazard public spaces, the design area shall be 3014 ft² (280 m²).

11.2.11.2 In light hazard public spaces and accommodation spaces, the design area shall be 1507 ft² (140 m²), plus 3 nozzles in the corridor outside the compartment.

Exceptions: In accommodation spaces consisting of small compartments and an adjacent corridor, the design area shall include all nozzles in the largest compartment plus 3 nozzles in the corridor outside the compartment, provided that the compartment boundaries (floors, walls, ceilings) meet the following conditions:

(a) Open to the weather; or
(b) Have a fire resistance rating of not less than 15 minutes; and
(c) Doors opening into adjacent spaces or onto the corridor have a fire resistance rating of not less than 15 minutes and are equipped with automatic self-closing devices designed to close the doors on receipt of a signal from the smoke alarm system or upon activation of the water mist system.

11.2.12 Spaces shall be permitted to be protected with alternate, approved fire suppression systems when such areas are separated from mist protected areas with a 1-hour rated assembly.

11.2.13 Water mist supply components shall be located outside Category A machinery spaces. This shall apply to pumps, pressure tanks, cylinder tanks, emergency power cables, and controllers.

11-3 Flammable Liquids.

11.3.1 This section applies to flammable liquid hazard systems.

11.3.2 Flammable liquid hazard systems shall be shown by test to be capable of extinguishing a variety of fires that can occur in spaces where the predominate hazard consists of flammable liquids.

11.3.2.1 Systems for machinery spaces and cargo pump rooms shall be capable of fire extinguishment as demonstrated by testing in accordance with IMO Fire Test Procedures. Systems for flammable liquid store rooms, paint lockers, and other flammable liquid hazards shall be based on tests acceptable to the authority having jurisdiction. Nozzle locations, types of nozzles, and spray characteristics shall be within the limits tested.

11.3.3* The system shall be capable of manual actuation allowing water to discharge into the protected space without the necessity of further human intervention.

11.3.3.* After 30 minutes of system activation, manual intervention shall be permitted for continued operation.

11.3.4* Where time delays are provided, audible and visual signals shall be provided throughout the protected space.

11.3 Water Supply.

11.3.5.1 The system's water supply shall be available for immediate use.

11.3.5.2 The water supply shall be based on complete protection of the space demanding the greatest quantity of water.

11.3.5.3 Pressure tank(s) shall be provided to immediately supply the system at the design flow and pressure for not less than 60 seconds.

11.3.5.4 The water supply shall be adequate to supply the system with fresh water for a period of at least 30 minutes. The vessel's potable water supply shall be permitted to constitute an acceptable source to satisfy the 30-minute demand period.

11.3.5.4.1 The fresh water supply shall meet the water quality requirements of 7-3.1.

11.3.5.5 Where the water mist system is designed for uniform cycling, the maximum-reduced discharge period is 60 seconds.

11.3.5.6* The minimum quantity of water used in uniform cycling systems shall be the maximum system flow for a 15-minute constant duration.

11.3.5.7* The system shall be fitted with a permanent sea inlet and be capable of continuous operation using sea water.

11.3.6* Power Supplies. The system shall be provided with both main and emergency sources of power and shall be provided with automatic change over. One of these sources of power shall be wholly provided from outside the protected space.

11.3.7 Pressure source components of the system shall be located outside the protected space.
11-3.8 A means to allow for periodic testing of the operation of the system for assuring the required pressure and flow shall be provided.

11-4* Human Factors. Human factors shall be considered to the extent practicable during the design of water mist systems on marine vessels.

Chapter 12 Referenced Publications

12-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

12-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.


12-1.2 Other Publications.

12-1.2.1 ANSI Publications. American National Standards Institute, 1 West 42nd Street, New York, NY 10036.

ANSI B1.20.1-85, Pipe Threads, General Purpose (inch), 1986.
ANSI B16.18-84, Cast Copper Alloy Solder Joint Pressure Fittings, 1984.

12-1.2.2 ASME Publication. American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.


12-1.2.4 AWS Publications. American Welding Society, Inc., 550 N.W. LeJeune Road, Miami, FL 33186.

12-1.2.5 CSA Publication. Canadian Standards Association, Rexdale, Ontario, Canada.


12-1.2.6 IMO Publications. International Maritime Organization, 4 Albert Embankment, London, SE1 7SR, United Kingdom.

IMO A.680(19) Assembly Resolution.
IMO Fire Test Procedures.
IMO MSC 601, Maritime Safety Committee Circular.

12-1.2.7 ULC Publications. Underwriters Laboratories Canada, 7 Countryside Road, Scarborough, ON M1R 8A9.

Title 49, Code of Federal Regulations.

Appendix A Explanatory Material

This Appendix is not part of the requirements of this NFPA document but is included for informational purposes only.

A-1.1 Other NFPA standards should be referenced for additional requirements relating to underground or lead-in connections to water mist systems from municipal or private water supplies.

A-1.1.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials, nor does it approve or
ATTACHMENT 2

Report on Public Input – November 2013

NFPA 750

750 PI# 44
(10.5.2.2)

Submitter: John Desrosier, Tyco Fire Protection Products
Recommendation: Delete Section 10.5.2.2.

10.5.2.2—Electrical or diesel-driven pumps supplying water mist systems shall be of sufficient capacity to exceed both the system flow rate and pressure demands as determined by hydraulic calculations, by a minimum of 10 percent for both flow and pressure. (A11.2)

Substantiation: Inherent in many places throughout the standard and Listing agencies safety factors are created. Also it contradicts section 7.6.1 located within NFPA 750. This additional 10 percent safety factor for flow and pressure is overkill as there are so many safety factors throughout the entire Listing and design process. In NFPA 13 there is no required safety factor for the calculations, if any cushion is required it is required by the Authority. In keeping consistency within this standard and between other standards I propose to eliminate this added cushion.

This proposal is being submitted by the Tyco Codes and Standards NFPA 750 Task Group.

Public Input Response:
There was no technical substantiation provided with this proposal to justify this deletion. A safety factor is always needed.
Report on Public Input – November 2013

750 PW-45
(3.3.23 Working Pressure)

Submitter: John Desrosier, Tyco Fire Protection Products

Recommendation: Revise text to read as follows:

3.3.23 System Working Pressure. The maximum anticipated static (nonflowing) or flowing pressure applied to the system components exclusive of surge pressures and exclusive of pressure from the fire department.

Substantiation: The recommendation to change 3.3.23 is to maintain consistency between the standards and is now more applicable to water mist applications as they are becoming more accepted as a sprinkler equivalent system, where an FDC may be installed.

This proposal is being submitted by the Tyco Codes and Standards NFPA 750 Task Group.

Public Input Response:
See FR 13.

Printed on: 8/26/2012
Report on Public Input – November 2013

750 PI# 46
(3.3.22 Water Mist System)

Submitter: John Desrosier, Tyco Fire Protection Products
Recommendation: Revise text to read as follows:

3.3.22 Water Mist System. A distribution system connected to a water supply or water atomizing media supplies that is equipped with one or more nozzles capable of delivering water mist intended and that has been demonstrated to meet the performance requirements of its listing and this standard. For fire protection purposes, an integrated system of piping designed in accordance with fire protection engineering standards intended to control, suppress, or extinguish fires, which has been demonstrated to meet the performance requirements of its listing and this standard. The installation includes a supply, a network of piping, a series of strainers, nozzles and a device for actuating an alarm when the system is in operation. The water mist system includes at least one automatic water supply or water atomizing media, which supplies one or more water mist zones. The water mist system includes a network of specially sized or hydraulically designed piping installed in a building, structure or area, and to which a water mist nozzle or nozzles are attached to provide a systematic discharge pattern of water mist.

Add the following new definition:

3.3.XX Water Mist Zone. The portion of piping and components between the zone control valve and one or more water mist nozzles, which may be located upstream or downstream of the system strainer, and is designed to supply water to a specific portion of a water mist system.

Revise text to read as follows:

3.X.X System Strainer. The strainer located after the last component in a water mist system that is constructed of a non-corrosive resistant material.

Substantiation: As water mist technology is growing and encompassing more applications, the definition of Water Mist System must also adapt to clearly encompass all water mist technologies. Water mist systems are being more readily accepted as sprinkler equivalent systems. This must be better aligned with the NFPA 13 definition of a sprinkler system while still encompassing all other applications of water mist. As the technology becomes more accepted and widely used, clearly defining certain portions of the water mist system will help facilitate the correlation with other systems not specifically for water mist systems. Although the maintenance of water mist systems is covered in NFPA 25, I feel that it is important to define these portions of the system so that other committees not intimately familiar with water mist systems can appropriately describe the correct actions when it comes to inspection testing and maintenance.

This proposal is being submitted by the Tyco Codes and Standards NFPA 750 Task Group.

This is not original material; its reference/source is as follows:

To better align the definition of Water Mist Systems with NFPA 13 portions of section 3.3.16 form NFPA 13 2010 were utilized.

Public Input Response:
The suggested revision was not made in the First Draft because there was no technical substantiation provided with this proposal to justify this added definition to the standard.
Report on Public Input – November 2013

NFPA 750

750 PI#: 86
(6.1 through 6.6)

Submitter: Zachary L. Magnone, Tyco Fire Protection Products

Recommendation: Reorganize chapter 6 as follows, and include specific requirements:

6. System Requirements
6.1 General Water mist systems shall be described by the following:
   (1) Closed Nozzle System
   (2) Open Nozzle System
   (3) Multi-Functional Nozzle System
6.2.1 Fire Department Connection
6.1.3 Water flow switches
6.1.4 Control Valves
6.2 Closed Head Systems. Closed head systems are activated by an automatic means,
6.2.1 General Requirements
6.2.2 Wet Systems
6.2.3 Dry Systems
6.2.3.1 Fluid Delivery Time
6.2.3.2 Listing
6.2.4 Pre-Action Systems
6.2.4.1 Fluid Delivery Time
6.2.4.2 Listing
6.2.5 Local Application
6.2.5.1 Local Application systems shall follow the requirements of 6.2.2, 6.2.3, or 6.2.4 depending if the system is wet, dry or pre-action.
6.2.6 Control Mode Systems for the Protection of Light and Ordinary Occupancies
6.2.6.1 Control Mode Systems for the Protection of Light and Ordinary systems shall follow the requirements of 6.2.2, 6.2.3, or 6.2.4 depending if the system is wet, dry or pre-action.
6.3 Open Head System. Open head systems have an open nozzle where the water is held back by a control valve.
6.3.1 General Requirements
6.3.1.1 Detection for open head systems must be accepted by the AHJ and also must be per the manufacturer recommendations, if specifically stated in the installation instructions
6.3.2 Local Application
6.3.3 Total Flooding
6.3.4 Zoned System
6.4 Multi-Functional Nozzle System
6.4.1 General Requirements
6.5 Additive Systems
6.6 Media System Types. Water mist systems shall be classified by two media system types:
   (1) Single fluid
   (2) Twin fluid

Substantiation: In its current form, Chapter 6 (System Requirements) only contains information regarding the classification of water mist systems into different categories, and does not address any specific minimum “requirements” for their proper application. In order to ensure a minimum level of a safety and dependability of the system, specific minimum requirements need to be included in the standard. Different applications will have different specific minimum requirements. For example, there is currently no mention of any requirements regarding the minimum required fluid delivery time or maximum allowable system volumes for dry and preaction systems, and water mist system for the protection of light and ordinary hazard occupancies are not even mentioned in the chapter at all. Unfortunately, the current structure of the chapter does not allow for the easy incorporation of these types of new specific requirements into the existing text; therefore, it is proposed that the chapter be extensively reorganized to allow for easier incorporation of specific system requirements for particular applications. The current proposal includes a suggested outline of how the new chapter could be structured to help facilitate this process.

This proposal is being submitted by the Tyco Codes and Standards NFPA 750 Task Group.

Public Input Response:
The suggested revision was not made in the First Draft because the TC has formed a Task Group to work on the re-write of this Chapter between now and the comment period.

Printed on 8/29/2012 32
750. Pw 90
(3.3.11 Intermediate Pressure System and 3.3.12 Low Pressure System)

Submitter: Zachary L. Magnone, Tyco Fire Protection Products
Recommendation: Revise definitions to read as follows:

3.3.11 Intermediate Pressure System. A water mist system where the distribution system piping is exposed to pressures greater than 42.1 bar (600 psi) 17.2 bar (250 psi) but less than 34.5 bar (500 psi).

3.3.12 Low Pressure System. A water mist system where the distribution piping is exposed to pressures of 42.1 bar (600 psi) 17.2 bar (250 psi) or less.

Substantiation: When looking at the technology used in common sprinkler systems—especially pumps, piping, valves, and other components—it would seem that the 12.1 bar (175 psi) threshold is somewhat arbitrary. Under the assumption that the "low pressure system" definition is in many ways used to define a water mist system operating within the pressure range of typical sprinkler and fixed water spray systems, the pressure range should be increased from 21.1 bar (175 psi) to 17.2 bar (250 psi) to be in line with the typical pressure ratings of standard sprinkler and water spray system components. In addition, the majority of manufacturers who currently offer low pressure water mist technologies utilize nozzles rated and listed for use up to 250 psi. This change would eliminate a large amount of confusion, especially in terms of low pressure water mist technology being used in lieu of standard sprinkler systems for light and ordinary hazard occupancies.

Public Input Response:
The suggested revision was not made in the First Draft because based upon other documents 175 PSI is the basis. It allows a low pressure system to be installed in compliance with NFPA 13 & NFPA 14 without using higher pressure components.
Report on Public Input – November 2013

NFPA 750

750. PM 9x
(3.5.x (New))

Submitter: Zachary L. Magnone, Tyco Fire Protection Products

Recommendation: Add new sub-section to item 5.5 as follows:

5.5.x. Hangers used on low pressure water mist systems shall be permitted to be designed and installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

Substantiation: One of the common questions that comes up during the design and installation of low pressure water mist systems is the type of hangers and bracing to use on the system piping. Considering that low pressure water mist systems operate in similar pressure and flow ranges to standard sprinkler and fixed water spray systems, it would seem reasonable to allow the same hanging and bracing requirements to apply per standard industry practice. The hanging and bracing requirements in NFPA 13 are extremely detailed, and are more than adequate to cover the range of applications in which low pressure mist systems are utilized. This would also greatly simplify the process of inspection, testing, and maintenance of low pressure systems.

This proposal is being submitted by the Tyco Codes and Standards NFPA 750 Task Group.

Public Input Response:
See FR 28
Report on Public Input – November 2013

NFPA 750

750 PI# 95
(7.2.5 and A.7.2.5)

Submitter: Zachary L. Magnone, Tyco Fire Protection Products

Recommendation: Add new sub-paragraphs into section 7.2.5 as follows:

7.2.5 Obstructions to Nozzle Discharge: The location of nozzles with respect to continuous or discontinuous obstructions shall be in accordance with the manufacturer’s listing.

7.2.5.1 Delay Systems: The location of nozzles with respect to continuous or discontinuous obstructions shall be in accordance with the manufacturer’s listing.

A.7.2.5 A.7.2.5.1 Spray that strikes obstructions too close to the nozzles.

7.2.5.2 Control Mode Protection of Light and Ordinary Hazard Occupancies: The location of nozzles with respect to continuous or discontinuous obstructions shall be in accordance with 7.2.5.2.1 and 7.2.5.2.2 unless otherwise specified as part of the manufacturer’s listing.

7.2.5.2.1 Pendent and Upright Water Mist Nozzles: Insert obstruction criteria from NFPA 13, 2010 edition, section 8.6.5 in its entirety.

Substantiation: The current language included in section 7.2.5 and annex note A.7.2.5 require that obstruction criteria be developed as part of the manufacturer’s listing. This places an unnecessarily heavy burden on the manufacturer to provide detailed information that is not accounted for in any existing water mist test protocol. While the wide variety of spray patterns generated by different mist technologies may warrant this type of approach, it is proposed that a possible solution would be to split the section up into sub sections related to the specific types of applications they are applicable for. In addition, obstruction criteria is arguably more important for water mist systems used in lieu of sprinkler systems for light and ordinary hazard applications, as the wetting of Class A combustibles is a critical mechanism to provide fire control. As a result, it is suggested that and adequate starting point would be to incorporate the existing obstruction criteria for extended coverage pendent, upright, and sidewall sprinklers from NFPA 13. This is considered to be a conservative approach, as the smaller droplets contained in water mist spray patterns are less likely to be adversely affected by obstructions than typical sprinkler sprays.

This proposal is being submitted by the Tyco Codes and Standards NFPA 750 Task Group.

Public Input Response:
Criteria of obstructions for sprinkler systems is not the same as the criteria for obstructions in water mist systems. Water Mist systems use small water droplets versus water volume from the sprinkler. The submitter does not add any technical substantiation to justify this added text.
NFPA 750 Appeal by Tyco Fire Protection Products
NFPA 13 CC and TC Response

The members of the NFPA 13 Technical Committees (TC) and the Correlating Committee (CC) were sent a copy of the “NFPA 750 Appeal” submitted by Tyco Fire Protection Products (TFPP). The TC and CC members were given an opportunity to provide their thoughts and opinions on this appeal, which can best be summarized in the following statements:

1. The NFPA 13 TC and CC members are in support of the appeal submitted by Tyco Fire Protection (no comments received in opposition to the appeal).

2. The NFPA 13 CC and TC's do not feel it is appropriate for a design and installation standard to identify what systems they are equivalent or an alternative to.

3. Water mist systems have not been proven to provide an equivalent level of protection as automatic sprinkler systems and therefore should not be considered an alternative to them.

In looking at the appeal to NFPA 750, there are two separate issues, one of which is a procedural issue dealing with scope and the other is a technical issue.

The first issue is whether or not a design and installation standard has the ability, through their TC or document scope, to state what they are an equivalent to or an alternative to. The design and installation standards have historically been viewed as the “how to” documents in the NFPA system, while the codes tell you “when” a system is needed. When it is determined by a code, be it NFPA 5000, NFPA 101 or NFPA 1, that a system is required for a specific structure or occupancy, one would go to the referenced design and installation standard to determine “how” to install the system. If the changes made to NFPA 750 are approved and published in the next edition, it would represent a shift in this philosophy. It would allow the design standard to start writing their own scoping criteria. It allows the design standard to state when that system can be used as an alternative to a different system required by a code. This would be akin to NFPA 13 creating language to say where a sprinkler system can be used as an alternative to a fire wall or fire alarm system that is required by a code or standard. This seems contrary to the direction taken by dozens of design and installation standards, however if this language is permitted it will establish a dangerous precedent that will allow standards to start stating indirectly where their system is appropriate and will result in confusion by the public, as well as conflicts and correlation issues between NFPA Codes and Standards.

The second issue is a technical issue in that water mist systems have not been proven to be equivalent (and therefore not an alternative to) sprinkler systems. The committees responsible for the sprinkler projects (NFPA 13, 13R and 13D) recognize that water mist systems have their uses (marine applications, tunnels...etc), however there is no technical data that confirms that mist systems will function in the same capacity as a sprinkler system.

The primary fire suppression mechanisms of a water mist system are very different from a sprinkler system. Water mist systems are performance based where the application is derived from meeting the specific requirements of a fire test protocol based on the intended hazard. This specific hazard testing approach came about due to the wide variation in water mist nozzle design specifications and system design differences between each manufacturer that prevented the use of common design criteria. In contrast, sprinkler designs are based upon a prescriptive approach where, through prior testing, the waterfall, sprinkler spacing and discharge characteristics specified in the Standard will provide proper protection for the hazard.

While water mist systems may be appropriate for situations where they have been listed and the installation conforms to the listing (and in many of these cases sprinkler protection criteria is also available), a blanket
statement that equates water mist system performance to fire sprinkler system performance or the allowance to use water mist as an alternative to sprinklers is not appropriate.

This work by the NFPA 750 committee was prompted by a series of proposals by a manufacturer of water mist systems that is part of a much broader approach within the NFPA system to get water mist systems accepted as just another type of fire sprinkler system. Changes were submitted in the most recent cycles of NFPA 13, NFPA 13R, NFPA 13D, NFPA 101, NFPA 5000 and NFPA 1, all with a similar theme, to allow water mist systems to be used to satisfy the requirements for a fire sprinkler system. Yet, with all of these proposals, no actual data showing equivalent performance has been presented. These proposals were rejected by the NFPA 13 TC’s and the TC on Sprinkler System Installation Criteria modified the Scope of the 2013 edition which states: “1.1.2 This standard shall not provide requirements for the design or installation of water mist fire protection systems, which are not considered fire sprinkler systems and are addressed by NFPA 750.”

One of the reasons that fire sprinkler systems are so effective is that fire sprinklers develop water droplets in three different groups of sizes (small, medium, and large for lack of a better set of terms) that all perform different jobs during the process of fire control or suppression. Small droplets absorb heat from the fire and stay up near the ceiling to provide cooling of structural members while medium size droplets pre-wet adjacent combustibles making it more difficult for the fire to spread beyond its area of origin. Large droplets generate enough momentum to travel long distances vertically (in spaces with tall ceilings) to penetrate the fire plume and get to the seat of the fire to begin suppression. With residential sprinklers, we find that we don’t need as many large water droplets, since the space is usually not so tall vertically, but the development of some medium size water droplets is still necessary to overcome some of the ventilation conditions that occur in compartments. During the development of the residential sprinkler, early prototypes were very similar to water mist nozzles, creating a large number of small water droplets and almost no medium or large size droplets. During fire tests with windows open in living rooms and bedrooms, it was determined that the sprinklers did not create water droplets with sufficient momentum to achieve fire control. The manufacturers of residential sprinklers had to go back to the drawing board and develop a sprinkler with more medium size droplets in order to control the fires. The product standards eventually contained both fire tests and water distribution tests to make sure that the right quantity of droplets was being developed from the residential sprinkler and that the water was going in the correct location. These product standards have proven to be very effective at developing residential sprinklers that work well in the real world where conditions in the room of fire origin won’t always be sealed up like a test lab.

Based on the information submitted to the NFPA 13 TCs, there is no technical data that supports the notion that water mist systems and automatic sprinkler systems are equivalent or that a water mist system is an alternative to a sprinkler system. We ask that the Standards Council act favorably to the NFPA 750 Appeal and remove the references to “automatic sprinkler alternative water mist systems” from NFPA 750.

Regards,

CC Chair Kenneth Linder
10/12/12
MEMORANDUM

To: NFPA Technical Committee on Water Mist Fire Suppression Systems
From: Elena Carroll, Administrator, Technical Projects
Date: September 6, 2012
Subject: NFPA 750 First Draft TC FINAL Ballot Results (F2013 Cycle)

According to the final ballot results, all ballot items received the necessary affirmative votes to pass ballot.

30 Members Eligible to Vote
4 Not Returned (Devlin, Froh, Reilly, Stilwell)
18 Affirmative on All
8 Negatives on one or more first revision: (Houin, Hubert, Kasiski, Magnone, Owen, Puchovsky, Stubblefield, Wiegand)
0 Abstentions on one or more first revision

The attached report shows the number of affirmative, negative, and abstaining votes as well as the explanation of the vote for each first revision.

There are two criteria necessary for each first revision to pass ballot: (1) simple majority and (2) affirmative \(\frac{2}{3}\) vote. The mock examples below show how the calculations are determined.

(1) Example for Simple Majority: Assuming there are 20 vote eligible committee members, 11 affirmative votes are required to pass ballot. (Sample calculation: 20 members eligible to vote \(\div 2 = 10 + 1 = 11\))

(2) Example for Affirmative \(\frac{2}{3}\): Assuming there are 20 vote eligible committee members and 1 member did not return their ballot and 2 members abstained, the number of affirmative votes required would be 12. (Sample calculation: 20 members eligible to vote – 1 not returned – 2 abstentions = 17 x 0.66 = 11.22 = 12)

As always please feel free to contact me if you have any questions.
NFPA 750 FD BALLOT – FINAL REPORT

NFPA 750 (F2013)

30 Members Eligible To Vote

4 Not Returned (Devlin, Froh, Reilly, Stilwell)

18 Affirmative on All

8 Negative on one or more First Revisions (Houin, Hubert, Kasiski, Magnone, Owen, Puchovsky, Stubblefield, Wiegand)

0 Abstentions

NFPA 750 FR9

Eligible To Vote: 30 Affirmative: 22 Negative: 4 (Kasiski, Magnone, Puchovsky, Wiegand) Abstain: 0

Not Returned: 4

Not Returned: Devlin, Froh, Reilly, Stilwell

Kasiski: The category would be best identified as "Open space/compartment water mist systems" not "Automatic Sprinkler Alternative Water Mist Systems". Usage of this terminology will cause confusion to the end-user.

Magnone: The lengthy history of successful real world applications of automatic sprinklers provides significant support for the benefits, tradeoffs, and savings provided in the building codes when automatic sprinkler systems are installed. By defining a water mist system designed in accordance with NFPA 750 as an alternative to a sprinkler system designed in accordance with NFPA 13, the implication is that it provides an equivalent level of performance to a sprinkler system for the same application. The obligation in claiming “equivalency” is to demonstrate “equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed” by NFPA 13 (see NFPA 13 1.5 “Equivalency” definition). The submitter of the proposals for NFPA 750 does not provide adequate technical data or substantiation to meet the above definition of “equivalency”.

The public consensus process used to develop the prescriptive standard for design and installation of automatic sprinklers (NFPA 13) provides for oversight and criticism of the details of the design and installation process. Water mist technology and its governing performance based standard NFPA 750 are fundamentally different than that of sprinkler technology. Therefore, water mist technology should be applied on its own technological merits - not those of another technology covered by a separate NFPA standard. Mirroring the approach already utilized by NFPA 13, the generic technical definitions of wet pipe, dry pipe, and deluge water mist systems would be more the adequate to properly define the various types of systems than what has been proposed.

Puchovsky: This term and definition are not necessary. They will add confusion regarding the consideration and use of water mist systems. Any water mist system could be considered as an alternative to a sprinkler system. It is also not clear why there is a need to associate water mist systems with sprinkler systems. Why does a complete building water mist system need to be referred to as an alternative to a sprinkler system? Such systems will have there own performance and evaluation criteria which in certain cases might exceed...
or be more appropriate than those of other systems. The appropriateness and effectiveness of water mist systems need to be established on their own merits.

**Wiegand**: Building code trade-offs that have been established for fire sprinkler systems are based on the reliability and field experience of fire sprinkler systems in a wide variety of real world situations that are very different from laboratory conditions. The safety factors involved in sprinkler system design, while not easily quantifiable, have proven to be affective for more than 100 years. Water mist systems, while successful in laboratory testing, do not have quantifiable safety factors nor to do they have the field experience to show equivalency with fire sprinklers. Field conditions such as ventilation, commodity arrangement, and protection gaps caused by nozzle failure.

In addition fire sprinkler systems are given credit for cooling surfaces near fires by direct water spray and for creating water curtains to prevent the travel of heat and smoke. Water mist systems have not proven to provide this same level of protection. As such many of the trade ups that are allowed by the building code for sprinkler systems would not necessarily be appropriate for water mist systems.

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**NFPA 750 FR10**

**Eligible To Vote:** 30  **Affirmative:** 24  **Negative:** 2 (Houin, Hubert)  **Abstain:** 0  **Not Returned:** 4

**Not Returned:** Devlin, Froh, Reilly, Stilwell

**Houin:** Prior to this revision Water Mist Systems were approved as "Pre-Engineered" where hydraulic calculations were required to ensure the proper flow and pressure at the nozzles because the pipe sizing and fittings allowed, provided too many (thousands) of combinations of them that would provide the required (Approved) pressure at the nozzle. Changing this would eliminate the current use of some presently approved Systems by requiring increases in Air and Water quantities available by a factor of six (6).

**Hubert:** There are currently FM approved "pre-engineered" water mist systems with pre-determined maximum protected hazard volumes with maximum heights and areas, fixed nozzles with fixed pressures, orifices (and obviously, flow rates) and locations, along with established water storage quantities, that are allowed to have variable pipe sizes and arrangements verified to meet performance criteria via friction loss calculations by either applying the Hazen-Williams or Darcy-Weisbach calculation method. The hazard protection criteria is fixed and therefore considered "pre-engineered" but does apply hydraulic calculations.

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**NFPA 750 FR13**

**Eligible To Vote:** 30  **Affirmative:** 26 (w/comment: Bell, Wiegand)  **Negative:** 0  **Abstain:** 0  **Not Returned:** 4

**Not Returned:** Devlin, Froh, Reilly, Stilwell

**Bell:** The term defined should be for “Design Pressure” rather than “System Design Pressure”.

**Wiegand:** The term defined should be for "Design Pressure" rather than "System Design Pressure". The definition is meant to pertain to components of systems as well as whole systems. Hence the subcommittee in its original submittal had used the term "Design Pressure".
NFPA 750 FR16

Eligible To Vote: 30  Affirmative: 24  Negative: 2 (Kasiski, Wiegand)  Abstain: 0  Not Returned: 4

Not Returned:  Devlin, Froh, Reilly, Stilwell

Kasiski: Inclusion of [5.3.2] Ordinary Hazard (Group 2) and [5.4] Extra Hazard Occupancies infers water mist systems can provide protection for these occupancies. There are neither water mist systems listed for these classifications of occupancy nor testing criteria/requirements established to validate their performance.

Wiegand: These hazard classifications are the NFPA 13 hazard classifications for fire sprinkler systems. Water mist systems are not designed specifically to these hazards. There are other variables involved in designing a water mist system. When an area is of a light hazard classification, a specific water density can be supplied to a fire sprinkler system and it will be effective. Room volume, air movement, room height, and other variables aside from combustible loading also affect design requirements for a water mist system. So to provide classifications solely based on fire loading is not beneficial for classifying water mist systems and could lead to confusion between water mist systems and fire sprinkler systems. Also some of the occupancy classification rules for fire sprinkler systems would not be applicable to water mist systems. For instance, an area where there is significant shielding is considered an extra hazard group two occupancy. This is appropriate for a fire sprinkler system, but does not necessarily have any correlation to water mist systems.

NFPA 750 FR28  Eligible To Vote: 30  Affirmative: 25  Negative: 1 (Owen)  Abstain: 0  Not Returned: 4

Not Returned:  Devlin, Froh, Reilly, Stilwell

Owen: Water mist piping should be rigidly secured rather than being supported with hangers. Water mist systems typically have more nozzle pressure and reactive forces than sprinkler systems.

NFPA 750 FR26

Eligible To Vote: 30  Affirmative: 26 (w/ comment: Hubert)  Negative: 0  Abstain: 0  Not Returned: 4

Not Returned:  Devlin, Froh, Reilly, Stilwell

Hubert: We recognize that there is a complete section 6.4.1.2 (new numbering) on Conversion Fittings but recommend that a definition for “conversion fittings” also be added.

NFPA 750 FR94

Eligible To Vote: 30  Affirmative: 26 (w/comment: Bell)  Negative: 0  Abstain: 0  Not Returned: 4

Not Returned:  Devlin, Froh, Reilly, Stilwell

Bell: For both 6.4.3.1 and 6.4.3.2, the term "system design working pressure" should be "design pressure".
NFPA 750 FR34

Eligible To Vote: 30  Affirmative: 25  Negative: 1 (Wiegand)  Abstain: 0  Not Returned: 4

Not Returned:  Devlin, Froh, Reilly, Stilwell

Wiegand: These hazard classifications are the NFPA 13 hazard classifications for fire sprinkler systems. Water mist systems are not designed specifically to these hazards. There are other variables involved in designing a water mist system. When an area is of a light hazard classification, a specific water density can be supplied to a fire sprinkler system and it will be effective. Room volume, air movement, room height, and other variables aside from combustible loading also affect design requirements for a water mist system. So to provide classifications solely based on fire loading is not beneficial for classifying water mist systems and could lead to confusion between water mist systems and fire sprinkler systems. Also some of the occupancy classification rules for fire sprinkler systems would not be applicable to water mist systems. For instance, an area where there is significant shielding is considered an extra hazard group two occupancy. This is appropriate for a fire sprinkler system, but does not necessarily have any correlation to water mist systems.

NFPA 750 FR35

Eligible To Vote: 30  Affirmative: 22  Negative: 4 (Kasiski, Magnone, Puchovsky, Wiegand)  Abstain: 0  Not Returned: 4

Not Returned:  Devlin, Froh, Reilly, Stilwell

Kasiski: NFPA 750 is deficient in identifying a category for light hazard and ordinary hazard (Group 1). The category would be best identified as "Open space/compartment application systems" not "Automatic Sprinkler Alternative Water Mist Systems".

Magnone: While I agree with the notion that building or occupancy protection is well within the capabilities of water mist systems that are designed, tested, and listed to do so, I disagree with the method that has been used to implement this concept within the document for the reasons discussed in my commentary on FR9. It would be more appropriate to utilize text such as “7.2.4 water mist systems for the protection of buildings or occupancies.” In place of what has been listed here.

Puchovsky: It is not clear why there is a need to associate water mist systems with sprinkler systems. Why does a complete building water mist system need to be referred to as an alternative to a sprinkler system? Such systems will have their own performance and evaluation criteria which in certain cases might exceed or be more appropriate than those of other systems. The appropriateness and effectiveness of water mist systems need to be established on their own merits.

Wiegand: Building code tradeoffs that have been established for fire sprinkler systems are based on the reliability and field experience of fire sprinkler systems in a wide variety of real world situations that are very different from laboratory conditions. The safety factors involved in sprinkler system design, while not easily quantifiable, have proven to be effective for more than 100 years. Water mist systems, while successful in laboratory testing, do not have quantifiable safety factors nor to do they have the field
experience to show equivalency with fire sprinklers. Field conditions such as ventilation, commodity arrangement, and protection gaps caused by nozzle failure.

In addition fire sprinkler systems are given credit for cooling surfaces near fires by direct water spray and for creating water curtains to prevent the travel of heat and smoke. Water mist systems have not proven to provide this same level of protection. As such many of the trade ups that are allowed by the building code for sprinkler systems would not necessarily be appropriate for water mist systems.

NFPA 750 FR38

**Eligible To Vote:** 30  **Affirmative:** 22  **Negative:** 4 (Kasiski, Magnone, Puchovsky, Wiegand)  **Abstain:** 0
**Not Returned:** 4

_Not Returned:_ Devlin, Froh, Reilly, Stilwell

**Kasiski:** Inclusion of area limitations for Ordinary Hazard (Group 2) and Extra Hazard Occupancies infers water mist systems can provide protection for these occupancies. There are neither water mist systems listed for these classifications of occupancy nor testing criteria/requirements established to validate their performance.

NFPA 750 is deficient in identifying a category for light hazard and ordinary hazard (Group 1). The category/section title would be best identified as “Open space/compartment application systems” not “Automatic Sprinkler Alternative Water Mist Systems”.

**Magnone:** The lengthy history of successful real world applications of automatic sprinklers provides significant support for the benefits, tradeoffs, and savings provided in the building codes when automatic sprinkler systems are installed. By defining a water mist system designed in accordance with NFPA 750 as an alternative to a sprinkler system designed in accordance with NFPA 13, the implication is that it provides an equivalent level of performance to a sprinkler system for the same application. The obligation in claiming “equivalency” is to demonstrate “equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed” by NFPA 13 (see NFPA 13 1.5 “Equivalency” definition). The submitter of the proposals for NFPA 750 does not provide adequate technical data or substantiation to meet the above definition of “equivalency”.

The public consensus process used to develop the prescriptive standard for design and installation of automatic sprinklers (NFPA 13) provides for oversight and criticism of the details of the design and installation process. Water mist technology and its governing performance based standard NFPA 750 are fundamentally different than that of sprinkler technology. Therefore, water mist technology should be applied on its own technological merits - not those of another technology covered by a separate NFPA standard. It is our opinion that significantly more technical justification is necessary in order to adopt many of the concepts that are included as part of this proposal.

**Puchovsky:** It is not clear why there is a need to associate water mist systems with sprinkler systems. Why does a complete building water mist system need to be referred to as an alternative to a sprinkler system? Such systems will have their own performance and evaluation criteria which in certain cases might exceed or be more appropriate than those of other systems. The appropriateness and effectiveness of water mist systems need to be established on their own merits.
Wiegand: Building code tradeoffs that have been established for fire sprinkler systems are based on the reliability and field experience of fire sprinkler systems in a wide variety of real world situations that are very different from laboratory conditions. The safety factors involved in sprinkler system design, while not easily quantifiable, have proven to be effective for more than 100 years. Water mist systems, while successful in laboratory testing, do not have quantifiable safety factors nor do they have the field experience to show equivalency with fire sprinklers. Field conditions such as ventilation, commodity arrangement, and protection gaps caused by nozzle failure.

In addition fire sprinkler systems are given credit for cooling surfaces near fires by direct water spray and for creating water curtains to prevent the travel of heat and smoke. Water mist systems have not proven to provide this same level of protection. As such many of the trade ups that are allowed by the building code for sprinkler systems would not necessarily be appropriate for water mist systems.

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**NFPA 750 FR42**

**Eligible To Vote:** 30  **Affirmative:** 26 (w/comment: Bell, Wiegand)  **Negative:** 0  **Abstain:** 0  **Not Returned:** 4

**Not Returned:** Devlin, Froh, Reilly, Stilwell

**Bell:** The term "system design pressure" should be "design pressure"

**Wiegand:** The term defined should be for "Design Pressure" rather than "System Design Pressure". The definition is meant to pertain to components of systems as well as whole systems. Hence the subcommittee in its original submittal had used the term "Design Pressure".

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**NFPA 750 FR73**

**Eligible To Vote:** 30  **Affirmative:** 26 (w/comment: Bell, Owen)  **Negative:** 0  **Abstain:** 0

**Not Returned:** 4

**Not Returned:** Devlin, Froh, Reilly, Stilwell

**Bell:** The term "system design pressure" should be "design pressure"

**Owen:** Change text to read, .."less than or equal to the system design pressure." Some relief valves are set to the maximum design pressure rather than less than the maximum pressure.

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**NFPA 750 FR45**

**Eligible To Vote:** 30  **Affirmative:** 23  **Negative:** 3 (Magnone, Puchovsky, Wiegand)  **Abstain:** 0  **Not Returned:** 4

**Not Returned:** Devlin, Froh, Reilly, Stilwell
Maggione: See my commentary on FR38 in addition to the following:
The stated proposal implies, particularly in 9.3.2.1, that the requirements of NFPA 13 should apply to water mist systems used to protect buildings or occupancies. It is the opinion of TFP that it is not within the power or responsibility of any NFPA technical committee to adopt either implicitly or explicitly the concept of equivalency in performance or application of one fire protection technology within its existing NFPA design and installation standard with any other technology governed by a separate NFPA design and installation standard. Doing so creates a conflict wherein the requirements of one standard must apply to the other, whilst each standard is represented by a separate technical body, and may or may not be on a separate revision cycle. Each technology should be governed by its own respective design and installation standard, and the related requirements should be supported by the sole technical merits of said technology alone. This approach will preserve the integrity of each standard, eliminate the potential for conflicts between the actions of separate technical committees, and minimize confusion in the industry regarding the application of each standard in practice.

Puchovsky: It is not clear why there is a need to associate water mist systems with sprinkler systems. Why does a complete building water mist system need to be referred to as an alternative to a sprinkler system? Such systems will have their own performance and evaluation criteria which in certain cases might exceed or be more appropriate than those of other systems. The appropriateness and effectiveness of water mist systems need to be established on their own merits.

Wiegand: Building code tradeoffs that have been established for fire sprinkler systems are based on the reliability and field experience of fire sprinkler systems in a wide variety of real world situations that are very different from laboratory conditions. The safety factors involved in sprinkler system design, while not easily quantifiable, have proven to be effective for more than 100 years. Water mist systems, while successful in laboratory testing, do not have quantifiable safety factors nor do they have the field experience to show equivalency with fire sprinklers. Field conditions such as ventilation, commodity arrangement, and protection gaps caused by nozzle failure.

In addition fire sprinkler systems are given credit for cooling surfaces near fires by direct water spray and for creating water curtains to prevent the travel of heat and smoke. Water mist systems have not proven to provide this same level of protection. As such many of the trade ups that are allowed by the building code for sprinkler systems would not necessarily be appropriate for water mist systems.

These hazard classifications are the NFPA 13 hazard classifications for fire sprinkler systems. Water mist systems are not designed specifically to these hazards. There are other variables involved in designing a water mist system. When an area of a light hazard classification, a specific water density can be supplied to a fire sprinkler system and it will be effective. Room volume, air movement, room height, and other variables aside from combustible loading also affect design requirements for a water mist system. So to provide classifications solely based on fire loading is not beneficial for classifying water mist systems and could lead to confusion between water mist systems and fire sprinkler systems. Also some of the occupancy classification rules for fire sprinkler systems would not be applicable to water mist systems. For instance, an area where there is significant shielding is considered an extra hazard group two occupancy. This is appropriate for a fire sprinkler system, but does not necessarily have any correlation to water mist systems.
NFPA 750 FR46

Eligible To Vote: 30  Affirmative: 25  Negative: 1 (Wiegand)  Abstain: 0  Not Returned: 4

Not Returned:  Devlin, Froh, Reilly, Stilwell

Wiegand: These hazard classifications are the NFPA 13 hazard classifications for fire sprinkler systems. Water mist systems are not designed specifically to these hazards. There are other variables involved in designing a water mist system. When an area is of a light hazard classification, a specific water density can be supplied to a fire sprinkler system and it will be affective. Room volume, air movement, room height, and other variables aside from combustible loading also affect design requirements for a water mist system. So to provide classifications solely based on fire loading is not beneficial for classifying water mist systems and could lead to confusion between water mist systems and fire sprinkler systems. Also some of the occupancy classification rules for fire sprinkler systems would not be applicable to water mist systems. For instance, an area where there is significant shielding is considered an extra hazard group two occupancy. This is appropriate for a fire sprinkler system, but does not necessarily have any correlation to water mist systems.

NFPA 750 FR113

Eligible To Vote: 30  Affirmative: 23 (w/comment: Kasiski)  Negative: 3 (Magnone, Puchovsky, Wiegand)  Abstain: 0  Not Returned: 4

Not Returned:  Devlin, Froh, Reilly, Stilwell

Kasiski: NFPA 750 is deficient in identifying a category for light hazard and ordinary hazard (Group 1). The category would be best identified as "Open space/compartment application systems" not "Automatic Sprinkler Alternative Water Mist Systems".

Magnone: A more appropriate course of action would be to remove all references to sprinkler systems in the text, and re-title the chapter to more accurately meet the stated intent - e.g. "Water mist systems for the protection of buildings or occupancies." Water mist technology should be applied on its own technological merits - not those of another technology covered by a separate NFPA standard.

For more information see FR9, FR38, and FR45.

Puchovksy: It is not clear why there is a need to associate water mist systems with sprinkler systems. Why does a complete building water mist system need to be referred to as an alternative to a sprinkler system? Such systems will have their own performance and evaluation criteria which in certain cases might exceed or be more appropriate than those of other systems. The appropriateness and effectiveness of water mist systems need to be established on their own merits.

Wiegand: Building code tradeoffs that have been established for fire sprinkler systems are based on the reliability and field experience of fire sprinkler systems in a wide variety of real world situations that are very different from laboratory conditions. The safety factors involved in sprinkler system design, while not easily quantifiable, have proven to be affective for more than 100 years. Water mist systems, while successful in laboratory testing, do not have quantifiable safety factors nor to do they have the field experience to show equivalency with fire sprinklers. Field conditions such as ventilation, commodity arrangement, and protection gaps caused by nozzle failure.
In addition fire sprinkler systems are given credit for cooling surfaces near fires by direct water spray and for creating water curtains to prevent the travel of heat and smoke. Water mist systems have not proven to provide this same level of protection. As such many of the trade ups that are allowed by the building code for sprinkler systems would not necessarily be appropriate for water mist systems.

NFPA 750 FR114

Eligible To Vote: 30  Affirmative: 24  Negative: 2 (Kasiski, Wiegand)  Abstain: 0  Not Returned: 4

Not Returned:  Devlin, Froh, Reilly, Stilwell

Kasiski: This is not the same Proposal sent on 6-August, 2012. Section 10.2.1.4 was included and not included in this document. Which is correct? Inclusion of Section 10.2.1.4 identifies Ordinary Hazard (Group 2) and Extra Hazard Occupancies which infers water mist systems can provide protection for these occupancies. There are neither water mist systems listed for these classifications of occupancy nor testing criteria/requirements established to validate their performance.

Wiegand: These hazard classifications are the NFPA 13 hazard classifications for fire sprinkler systems. Water mist systems are not designed specifically to these hazards. There are other variables involved in designing a water mist system. When an area is of a light hazard classification, a specific water density can be supplied to a fire sprinkler system and it will be effective. Room volume, air movement, room height, and other variables aside from combustible loading also affect design requirements for a water mist system. So to provide classifications solely based on fire loading is not beneficial for classifying water mist systems and could lead to confusion between water mist systems and fire sprinkler systems. Also some of the occupancy classification rules for fire sprinkler systems would not be applicable to water mist systems. For instance, an area where there is significant shielding is considered an extra hazard group two occupancy. This is appropriate for a fire sprinkler system, but does not necessarily have any correlation to water mist systems.

NFPA 750 FR115

Eligible To Vote: 30  Affirmative: 23  Negative: 3 (Magnone, Puchovsky, Wiegand)  Abstain: 0  Not Returned: 4

Not Returned:  Devlin, Froh, Reilly, Stilwell

Magnone: See FR113

Puchovsky: It is not clear why there is a need to associate water mist systems with sprinkler systems. Why does a complete building water mist system need to be referred to as an alternative to a sprinkler system? Such systems will have their own performance and evaluation criteria which in certain cases might exceed or be more appropriate than those of other systems. The appropriateness and effectiveness of water mist systems need to be established on their own merits.

Wiegand: Building code tradeoffs that have been established for fire sprinkler systems are based on the reliability and field experience of fire sprinkler systems in a wide variety of real world situations that are
very different from laboratory conditions. The safety factors involved in sprinkler system design, while not easily quantifiable, have proven to be affective for more than 100 years. Water mist systems, while successful in laboratory testing, do not have quantifiable safety factors nor to do they have the field experience to show equivalency with fire sprinklers. Field conditions such as ventilation, commodity arrangement, and protection gaps caused by nozzle failure.

In addition fire sprinkler systems are given credit for cooling surfaces near fires by direct water spray and for creating water curtains to prevent the travel of heat and smoke. Water mist systems have not proven to provide this same level of protection. As such many of the trade ups that are allowed by the building code for sprinkler systems would not necessarily be appropriate for water mist systems.

**NFPA 750 FR53**

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<th>Negative: 1 (Owen)</th>
<th>Abstain: 0</th>
<th>Not Returned: 4</th>
</tr>
</thead>
</table>

**Not Returned:** Devlin, Froh, Reilly, Stilwell

**Owen:** Getting the AHJ to approve a test plan prior to scheduling of acceptance is not always practical due to the project completion schedule. The wording should be “An acceptance test plan should be submitted to the AHJ prior to scheduling of acceptance testing.”

**NFPA 750 FR72**

<table>
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<th>Eligible To Vote</th>
<th>Affirmative: 23</th>
<th>Negative: 3 (Hubert, Owen, Stubblefield)</th>
<th>Abstain: 0</th>
<th>Not Returned: 4</th>
</tr>
</thead>
</table>

**Not Returned:** Devlin, Froh, Reilly, Stilwell

**Owen:** Deleting Chapter 15, System Inspection, Testing, and Maintenance as it is currently included from NFPA 750 will cause system users confusion as water mist systems are specialized systems, just as gaseous systems are specialized systems and should be covered by a specific standard. Changing the inspection, Testing and Maintenance to another standard will also result in cost to the manufacturers as their Design, Inspection and Maintenance manuals reference NFPA 750 not NFPA 25.

**Hubert:** Removal of the inspection, testing and maintenance of water mist systems from NFPA 750 and the relocation of the same in NFPA 25 removes all decision making from the committee of +/- 25 technical experts on NFPA 750 and allows the committee of +/- 30 technical experts (of other than water mist systems) make decisions for what they believe “might” be the best for water mist systems. Currently, we only recognize four committee members on NFPA 25 that have expertise in water mist. Due to the overwhelming majority of committee members on NFPA 25 that have minimal or no expertise in regards to water mist systems, it can be predicted that in any contentious situation that might be “politically” driven and voted upon, there could be unsuitable results when compared to valid technical justification offered by the experts of water mist, who are the minority. Secondarily, by making the change, the NFPA 750 TC will now have to be responsible for the entire NFPA 25 and NFPA 750.
Stubblefield: Water Mist System inspection, testing, and maintenance criteria should be developed, evaluated, and maintained by a committee knowledgeable in water mist technology. Vendors and owners of water mist systems should not be required to purchase additional NFPA documents to test and maintain these systems. Water mist experts and proponents may be under-represented in committees other than the Technical Committee on Water Mist Systems. NFPA 20 Technical Committee should assign a liaison to the Water Mist Technical Committee to coordinate issues that are common to both technologies rather than the opposite; thereby, leaving this information in NFPA 750.

NFPA 750 FR70

Eligible To Vote: 30  Affirmative: 22  Negative: 4 (Kasiski, Magnone, Puchovsky, Wiegand)

Abstain: 0  Not Returned: 4

Not Returned: Devlin, Froh, Reilly, Stilwell

Kasiski: NFPA 750 is deficient in identifying a category for light hazard and ordinary hazard (Group 1). The category would be best identified as "Open space/compartment application systems" not "Automatic Sprinkler Alternative Water Mist Systems". Usage of this terminology will cause confusion to the end-user.

Magnone: See FR38, and FR45.

Puchovsky: It is not clear why there is a need to associate water mist systems with sprinkler systems. Why does a complete building water mist system need to be referred to as an alternative to a sprinkler system? Such systems will have their own performance and evaluation criteria which in certain cases might exceed or be more appropriate than those of other systems. The appropriateness and effectiveness of water mist systems need to be established on their own merits.

Wiegand: Building code tradeoffs that have been established for fire sprinkler systems are based on the reliability and field experience of fire sprinkler systems in a wide variety of real world situations that are very different from laboratory conditions. The safety factors involved in sprinkler system design, while not easily quantifiable, have proven to be affective for more than 100 years. Water mist systems, while successful in laboratory testing, do not have quantifiable safety factors nor to do they have the field experience to show equivalency with fire sprinklers. Field conditions such as ventilation, commodity arrangement, and protection gaps caused by nozzle failure.

In addition fire sprinkler systems are given credit for cooling surfaces near fires by direct water spray and for creating water curtains to prevent the travel of heat and smoke. Water mist systems have not proven to provide this same level of protection. As such many of the trade ups that are allowed by the building code for sprinkler systems would not necessarily be appropriate for water mist systems.
**NFPA 750 FR60**

**Eligible To Vote:** 30  **Affirmative:** 25 (w/comment: Hubert)  **Negative:** 1 (Wiegand)  **Abstain:** 0

**Not Returned:** 4

**Hubert:**  FSSA agrees with the opinion that hybrid systems are outside the current scope of NFPA 750 since a primary extinguishing mechanism of the hybrid technology is oxygen reduction by the inert gas component - not “a specific water spray (mist) that absorbs heat, displaces oxygen, or blocks radiant heat” as required under NFPA 750. However, lack of a national standard covering hybrid systems (which currently meet the performance criteria established in NFPA 750 and maintain FM Approval) both hampers the use of such systems even when the hybrid system provides the best option for fire extinguishment in a given hazard area. Further lack of guidance for use of hybrid systems leaves the authorities who wish to utilize the hybrid technology without the definitive guidance provided by a national recognized consensus standard.

For the above reasons, the FSSA requests that the NFPA 750 Technical Committee include in their justification for the rejection of the proposal submitted by Mr. William Reilly, Victaulic Company of America, label Log # 102 prior to "First Draft", the recommendation that the Standards Council and NFPA establish a new committee project to write a standard covering hybrid systems that use a combination of inert gas and very fine water droplets to extinguish fire.

**Wiegand:** These hazard classifications are the NFPA 13 hazard classifications for fire sprinkler systems. Water mist systems are not designed specifically to these hazards. There are other variables involved in designing a water mist system. When an area is of a light hazard classification, a specific water density can be supplied to a fire sprinkler system and it will be affective. Room volume, air movement, room height, and other variables aside from combustible loading also affect design requirements for a water mist system. So to provide classifications solely based on fire loading is not beneficial for classifying water mist systems and could lead to confusion between water mist systems and fire sprinkler systems. Also some of the occupancy classification rules for fire sprinkler systems would not be applicable to water mist systems. For instance, an area where there is significant shielding is considered an extra hazard group two occupancy. This is appropriate for a fire sprinkler system, but does not necessarily have any correlation to water mist systems.

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**NFPA 750 FR17**

**Eligible To Vote:** 30  **Affirmative:** 24  **Negative:** 2 (Kasiski, Wiegand)  **Abstain:** 0  **Not Returned:** 4

**Not Returned:**  Devlin, Froh, Reilly, Stilwell

**Kasiski:** Inclusion of Ordinary Hazard (Group 2) and Extra Hazard Occupancies infers water mist systems can provide protection for these occupancies. There are neither water mist systems listed for these classifications of occupancy nor testing criteria/requirements established to validate their performance.

**Wiegand:** These hazard classifications are the NFPA 13 hazard classifications for fire sprinkler systems. Water mist systems are not designed specifically to these hazards. There are other variables involved in designing a water mist system. When an area is of a light hazard classification, a specific water density can
be supplied to a fire sprinkler system and it will be affective. Room volume, air movement, room height, and other variables aside from combustible loading also affect design requirements for a water mist system. So to provide classifications solely based on fire loading is not beneficial for classifying water mist systems and could lead to confusion between water mist systems and fire sprinkler systems. Also some of the occupancy classification rules for fire sprinkler systems would not be applicable to water mist systems. For instance, an area where there is significant shielding is considered an extra hazard group two occupancy. This is appropriate for a fire sprinkler system, but does not necessarily have any correlation to water mist systems.
Item 12-10-12
Ms. Amy Cronin  
Secretary  
Standards Council  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02069  

RE: D#12-4 – Issuance of NFPA 1124  

Dear Ms. Cronin,

As you know, upon receipt of the Short Decision the American Pyrotechnics Association (APA) filed a Notice of Intent to File a Petition regarding the Standards Council Decision D#12-4. The APA did not challenge the issuance of NFPA 1124, 2013 Edition; but rather the “Directions for further processing”, herein after referred to as the “Directions”, that were included in the Decision by the Council to issue the document.

The first option identified in the Directions is to process a TIA incorporating provisions based upon data from full scale fire tests for sprinkler design criteria. The Council Directions provide approximately one year for the processing of the TIA. On August 29th, the Foundation conducted a conference call with parties identified by the APA as potentially interested in the outcome of the full scale fire tests. During the call, AON (the Foundation’s consultant) indicated that the project would need to commence no later than September 1st if the Council’s deadline was to be met. The estimate was based upon a four week time period to process the TIA and unknown estimates as to product availability. During the call the APA consultant noted four weeks would most likely not be enough time to process a TIA and requested that AON provide a detailed schedule for the test program. The schedule was provided to the APA in an email dated September 5, 2012. Follow-up information that was referenced in the September 5th email was provided on September 14th.

On September 12th, the APA conducted a conference call with interested parties to fill in the timeframes identified in the September 5th email as “TBD by Fireworks Industry.” The attached schedule provides a reasonable timeframe for conducting the test program based upon input from AON (through the Foundation) and the fireworks industry. It should be noted that the schedule indicates that it may take 69-76 weeks from the time the Foundation authorizes the project to proceed until the TIA is ready for processing by the Council. This schedule does include the time for balloting and public comment on the proposed TIA.

The APA was confident that the one year time period proposed in the Decision would not be adequate based upon prior estimated timeframes to perform the testing. It was for that reason that the Notice of Intent to Fire a Petition was submitted. In the Notice, the APA proposed an alternative means of resolving the issue; that being reconsideration of the timeframe by the Council. The purpose of this letter is to provide the Council with a more realistic timeframe for processing the TIA in hopes that the Directions will be modified accordingly.

The APA also notes that the recently issued Final Decision contains a revision to NFPA 1124 that was not previously indicated. In the Decision there are comments about the processing of the ninth subject, the sprinkler discharge criteria. For the record, the APA would like to note the following:
• As noted in the Decision, a motion passed during the ROP meeting of the Sprinkler Discharge Criteria Committee for a Comment to be submitted to revise NFPA 1124 by deleting the reference to specific sprinkler system design criteria.

• During the ROC meeting of the Sprinkler Discharge Criteria Committee, the APA consultant raised the issue with the Committee regarding the Comment and noted that a Comment had not been submitted to the NFPA 1124 Committee. The APA consultant agreed to prepare two comments for consideration by PYR as a possible Committee Comment. Copies of the draft comments are attached.

• While the PYR revised the original draft comments it should be noted that due to the retroactivity clauses in both NFPA 1124 and NFPA 13, the revisions to retain existing language regarding criteria for existing systems made little to no change from the language originally proposed by the APA consultant. As such, it is surprising that the Council overturned the recommendation of the NFPA codes and standards development process without a clear and substantial basis to do so and with no communication with the responsible Technical Committee.

In summary, while the APA disagrees that the revision made by the Council is necessary or appropriate, we are not appealing that issue. Instead, and in an attempt to keep efforts moving forward in a positive manner, the APA has provided detailed information regarding a realistic schedule for the test program. The APA respectfully requests that the Council modify the Directions to include a more realistic timeframe for processing the TIA. It should also be noted that a favorable decision by the Council regarding this request will result in the APA withdrawing the Notice of Intent to File a Petition.

It should also be noted that the PYR Committee is meeting on November 1st and it would be helpful if the Committee could receive at least a preliminary indication of the Council’s decision regarding the APA request for consideration at the meeting.

Respectfully submitted,

Julie L. Heckman
Executive Director

Cc: G. Colonna
    N. Pearce
    R. Robbins
<table>
<thead>
<tr>
<th>Activity</th>
<th>Source</th>
<th>Weeks</th>
<th>Total Wks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gather product data for analysis from the industry</td>
<td>APA</td>
<td>1-2</td>
<td>1-2</td>
</tr>
<tr>
<td>Review of Chemical Data for products</td>
<td>AON</td>
<td>4</td>
<td>5-6&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Gather product for calorimeter testing/modify product with fuse covers</td>
<td>APA</td>
<td>10-12&lt;sup&gt;2&lt;/sup&gt;</td>
<td>15-18</td>
</tr>
<tr>
<td>Complete calorimeter testing</td>
<td>AON</td>
<td>6-8</td>
<td>21-26</td>
</tr>
<tr>
<td>Product analysis/determine product for full scale testing</td>
<td>AON</td>
<td>4</td>
<td>25-30</td>
</tr>
<tr>
<td>Gather product for full scale testing</td>
<td>APA</td>
<td>24&lt;sup&gt;3&lt;/sup&gt;</td>
<td>49-54</td>
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<tr>
<td>Complete full scale fire tests</td>
<td>AON</td>
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</tr>
<tr>
<td>TIA processing time</td>
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<td>8</td>
<td>69-76</td>
</tr>
</tbody>
</table>

<sup>1</sup> Simultaneous with this activity the industry will be looking to secure material that meets the fuse cover standard.
<sup>2</sup> AON has indicated that existing product without the appropriate fuse covers may be used. The industry would like to use fuse covers that meet the new standard. It is possible to modify existing products with fuse covers that should meet the new standard. If testing is required to confirm compliance with new fuse cover standard add 4-6 weeks to the schedule. The timeframe provided assumes product can be pulled from existing inventory in the USA. If not, approximately 2 additional months needs to be added to the schedule.
<sup>3</sup> This is most likely a minimum timeframe depending on the product that is required to be tested.
FORM FOR COMMENT ON NFPA REPORT ON PROPOSALS
All Comments Must Be Received by 5:00 pm EST/EDST
on the Published Comment Closing Date

For further information on the standards-making process, please contact the Codes
and Standards Administration at 617-984-7249 or visit www.nfpa.org/codes.
For technical assistance, please call NFPA at 1-800-344-3555.

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Date Rec’d: ______________________

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Please indicate organization represented (if any)

1. (a) NFPA Document Title ______ NFPA No. & Year ______ 1124
(b) Section/Paragraph ______ 6.5.1.1

2. Comment on Proposal No. (from ROP): ______ 1124-21

3. Comment Recommends (check one): ☒ new text ☐ revised text ☐ deleted text

4. Comment (include proposed new or revised wording, or identification of wording to be deleted): [Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (deleted wording).]

Delete existing paragraph and replace with the following:

6.5.1.1* Reserved

A 6.5.1.1 Appropriate sprinkler system design criteria should be determined based upon an engineering analysis prepared by a fire protection engineer.

5. Statement of Problem and Substantiation for Comment: (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Comment, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

During a meeting of the NFPA Technical Committee on Automatic Sprinkler Discharge Criteria the Committee noted that the sprinkler design criteria in NFPA 1124 has not been adequately substantiated. As such the Committee voted to request that the criteria be deleted and replaced with the proposed Annex note.

6. Copyright Assignment

(a) ☐ I am the author of the text or other material (such as illustrations, graphs) proposed in the Comment.
(b) ☒ Some or all of the text or other material proposed in this Comment was not authored by me. Its source is as follows: (please identify which material and provide complete information on its source)

NFPA Technical Committee on Automatic Sprinkler Discharge Criteria

I hereby grant and assign to the NFPA all and full rights in copyright in this Comment and understand that I acquire no rights in any publication of NFPA in which this Comment in this or another similar or analogous form is used. Except to the extent that I do not have authority to make an assignment in materials that I have identified in (b) above, I hereby warrant that I am the author of this Comment and that I have full power and authority to enter into this assignment.

Signature (Required) __________

PLEASE USE SEPARATE FORM FOR EACH COMMENT
Mail to: Secretary, Standards Council · National Fire Protection Association
1 Batterymarch Park · Quincy, MA 02169-7471 OR
Fax to: (617) 770-3500 OR Email to: proposals_comments@nfpa.org

October 24, 2012
Supplemental Agenda October 29-30, 2012
Delete existing paragraph A.7.5.1.1 and replace with the following:

A.7.3.6  Appropriate sprinkler system design criteria should be determined based upon an engineering analysis prepared by a fire protection engineer.

**During a meeting of the NFPA Technical Committee on Automatic Sprinkler Discharge Criteria the Committee noted that the sprinkler design criteria in NFPA 1124 has not been adequately substantiated. As such the Committee voted to request that the criteria be deleted and replaced with the proposed Annex note.**
At its meeting of August 7-9, 2012, the Standards Council considered issuance of proposed 2013 edition of NFPA 1124, *Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*. Consideration was conducted in light of the directions set forth in previous Standards Council Decision #08-19 (Standards Council Agenda Item #08-7-28, July 24, 2008) (hereafter, the 2008 Decision).

**Background**

In the 2008 Decision, the Standards Council discussed in detail the history of NFPA standards development activities concerning the storage and retail sales of consumer fireworks. As discussed in that decision, the NFPA has long opposed the use of fireworks by the consumers and other members of the general public. Nevertheless, despite that opposition, and because the use of consumer fireworks was allowed in most states, the NFPA Board of Directors, in 1999, authorized the development of standards concerning the retail sale of consumer fireworks. This led eventually to the incorporation of consumer storage and retail sales provisions (hereafter, the “consumer fireworks provisions”) into an expanded Chapter 6 and a new Chapter 7 of the 2003 edition of NFPA 1124 and, later, of a revised 2006 edition.

Throughout these standards development activities described above, the Standards Council expressed concerns about the technical substantiation for the consumer fireworks provisions. These concerns were confirmed in October 2007, when the Fire Protection Research Foundation issued a report authored by Jonathan Perricone, P.E., Schirmer Engineering Corporation, entitled *Fire Safety in Consumer Fireworks Storage and Retail Facilities – Hazard Assessment* (hereafter, the “Research Foundation Report”). This report raised serious concerns regarding the technical basis for the consumer fireworks provisions and, in the view of the Council, “called into question whether sufficient research and other technical substantiation exists to support meaningful standards development in this area.” (See 2008 Decision at p. 2.) Based upon the findings presented in the report, the Council indicated that it was considering whether NFPA standards on the storage and retail sales of consumer fireworks should continue to be developed. The Council then solicited written submissions and convened a lengthy hearing on this subject held at the June 2008 NFPA World Safety Conference and Exposition. (See 2008 Decision at pp. 2-3.)
The Council then proceeded to weigh the factors for and against the continued development of the consumer fireworks provisions. The Council cited a number of factors weighing against continued development. The Council, however, was mindful of countervailing views expressed, most importantly, by the enforcement community. (See 2008 Decision at pp. 3-4.) Said the Council:

[The enforcement community and others] urge that the retail storage and sales provisions of NFPA 1124, even though imperfect, are essential to their enforcement activities as these provisions establish some undeniably important limits on the storage and retail sale of consumer fireworks. Indeed, this has been the argument that caused the Council and the NFPA Board to even entertain the possibility of having NFPA develop standards in this area despite the strong institutional policy against the use of consumer fireworks. (See 2008 Decision at p. 4.)

The Council stressed that it did not subscribe to the view that the development of a standard by the NFPA is invariably better than no NFPA standard. Indeed, said the Council:

It is possible that a standard set at a low level and without adequate support can, at some point, impede rather than promote progress and safety. NFPA does not wish to be associated with sustaining a weak standard, without limit, based solely on the argument that it is better than nothing. (Id.)

It concluded, however, that it might still be possible to materially improve and validate the standards:

Nevertheless, based on all that has been presented before it, the Council believes that it may still be possible to materially improve and validate standards for the storage and retail sale of consumer fireworks and that, given the expressed need for such standards and the expressed desirability of having them produced through the NFPA standards development system, it is premature to end NFPA standards development efforts in this area. (Id.)

The Council, therefore, decided to allow the consumer fireworks provisions to remain in place in NFPA 1124, extending no further than the 2012 Annual Revision Cycle. In doing so, however, the Council prescribed special conditions for the processing of the consumer fireworks provisions through the next revision cycle of NFPA 1124. The prescribed conditions are set forth in detail in the 2008 Decision and will not be repeated here, but in brief, the Council identified, based primarily on the Research Foundation Report, nine subject areas of concern regarding the consumer fireworks provisions. The Council directed the Pyrotechnics Committee to develop and properly substantiate relevant provisions in NFPA 1124 concerning each of those nine subject areas. For each of the nine subject areas, the Council designated an NFPA technical committee with relevant expertise to act as an "Approval Committee." It then directed the Pyrotechnics Committee to correlate with these Approval Committees during the revision cycle. By
the end of the cycle, the provisions proposed for each subject area had to be formally approved by the designated Approval Committee. (See 2008 Decision at pp. 5-12.)

Finally, the Council indicated that, should the processing of the next edition of NFPA 1124, including compliance with the special conditions, not be completed by the close of the 2012 Annual Revision Cycle, further NFPA standards development activities concerning the storage and retail sales of consumer fireworks would cease and, the Council would take the following actions:

- Revise the scope of the Technical Committee on Pyrotechnics so that it no longer covers the storage and retail sales of consumer fireworks, and
- Take steps to revise the scope of NFPA 1124 to exclude the storage and retail sales of consumer fireworks and delete chapter 6 and chapter 7 from NFPA 1124. (See 2008 Decision at p. 6.)


The proposed 2013 edition of NFPA 1124 has now been processed through the Annual 2012 Revision Cycle and has been presented to the Standards Council for issuance, and the Council must now determine whether the special conditions of the 2008 Decision have been met.

A review of the record reveals that, in large part, the approvals process has functioned as the Council intended. With respect to eight of the nine subject areas, the relevant provisions of the proposed new edition of NFPA 1124 were, as directed in the 2008 Decision, approved through letter ballot of the designated Approval Committee. These approvals provide reasonable assurance that the relevant subject areas have received adequate technical review and consideration, and that, while all technical issues may not have been completely resolved, measurable progress was achieved.

In the ninth subject area, however - the important subject of sprinkler design criteria - the processing and technical substantiation has not, in the Council’s view, been adequate. As this decision now discusses, the Standards Council has voted to issue the 2013 edition of NFPA 1124, as modified in one respect related to the sprinkler design criteria. In addition, however, the inadequate treatment of the sprinkler design criteria necessitates further action of the Council, which is set forth below.

The Sprinkler Design Criteria

Citing the Research Foundation Report, the 2008 Decision found that the existing NFPA 1124 sprinkler design criteria for storage and retail sales facilities lacked supporting test data or other technical substantiation. (See 2008 Decision at p.p. 11-12.) The 2008 Decision then designated the NFPA 13 Technical Committee on Sprinkler System Discharge Criteria (hereafter, the “Discharge Committee”) as the Approval Committee for sprinkler design criteria, and directed that "sprinkler system design and installation provisions for both the storage and retail sales of consumer fireworks be developed and adequately substantiated and that supporting testing, data, and other relevant studies be...
submitted and referenced." (Id. at p. 12.) It further directed that "approval of these provisions and the associated substantiation must be obtained by the [Discharge Committee]." (Id. at p. 12.) As with all the nine subject areas, the Approval Committee was not to provide its approval if the relevant provisions were not supported by the necessary technical substantiation. Rather, "[t]he default recommendation in that case [would] be that standards development on this subject be suspended until further research is conducted to support such standards development." (Id. at p. 5.)

Given the lack of needed data identified in the Research Foundation Report and elsewhere, it was clear that a test program would be needed in order to develop sprinkler discharge criteria based on the testing and other technical substantiation required by the 2008 Decision. The consumer fireworks industry did not take up this challenge immediately. Some considerable time later, however, the industry through American Pyrotechnics Association initiated the development of a testing plan by the Fire Protection Research Foundation. In September of 2011, more than three years after the 2008 Decision, the Research Foundation issued its test plan report authored by Aon Fire Protection Engineering Corp., and entitled Sprinkler Protection Criteria for Consumer Fireworks Storage in Retail Facilities: Concept Test Plan (hereafter, the “Test Plan Report”).

Meanwhile, no test plan yet available and no testing having begun, the Pyrotechnics Committee slipped from the Annual 2010 Revision Cycle into the Annual 2012 Revision Cycle and started work on its Report on Proposals. Committee Proposals were drafted proposing hazard classifications and other sprinkler design criteria. (See Committee Proposal Nos. 1124-21 and 1124-32.) These proposals were reported to the Discharge Committee at its meeting of February 10-11, 2011. Although no letter ballot was conducted, the Discharge Committee disapproved these proposals in a meeting vote. In addition, as recorded in the minutes of that meeting, the Discharge Committee directed the submission of a Comment deleting the existing sprinkler design criteria and inserting annex material addressing the fact that “the existing sprinkler protection criteria is not adequately substantiated and the appropriate fire protection criteria needs to be determined after a careful analysis is conducted by a fire protection engineer.” It added that: “This will be the recommendation until there is some testing/documentation provided to substantiate the protection criteria based upon technical data such as fire testing.”

Given the Discharge Committee’s disapproval, the Pyrotechnics Committee, citing that disapproval, rejected Committee Proposal Nos. 1124-21 and 1124-32. The Pyrotechnics Committee also noted in their Committee Statements on the Proposals that testing through the auspices of the Fire Protection Research Foundation was needed in order to substantiate adequate sprinkler criteria and that such testing should be implemented so as to have results available for use during the Comment Stage of the revision cycle.

It was not until the Comment Stage had begun that the Research Foundation, in September 2011, issued the Test Plan Report, referenced above. Presentations on the Test Plan Report were made at a September 2011 Discharge Committee meeting. The minutes of that meeting indicated that “the Committee anticipates that the testing will be conducted in the near future, but will most likely not be finished by the time the next editions of NFPA 13 and 1124 are released.” It further indicated that a consultant would
be “addressing the [Pyrotechnics] Committee with an interim solution that requires a
design professional to produce a performance-based design plan for these occupancies, as
no adequately justified prescriptive design criteria exists at this time.”

The Pyrotechnics Committee, at its Report on Comments meeting in October 2011,
proceeded to adopt an interim solution in the form of the engineering analysis
recommended by the Discharge Committee at its September 2011 meeting. Specifically,
the Pyrotechnics Committee submitted and accepted Committee Comment Nos. 1124-4,
1124-5 and 1124-6, which proposed the following sprinkler criteria for the proposed new
edition of NFPA 1124:

Comment 1124-4
6.5.1.1* Reserved

  A.6.5.1.1 Appropriate sprinkler system design criteria should be
determined based upon an engineering analysis prepared by a fire
protection engineer.

Comment 1124-5
A.7.5.1.1 For existing buildings, existing sprinkler systems
designed for an Ordinary Hazard, Group 2 occupancy should be
sufficient.

Comment 1124-6
A.7.3.6 Appropriate sprinkler system design criteria should be
determined based upon an engineering analysis prepared by a fire
protection engineer.

A.7.3.7 See A.7.3.6.

As the substantiation in Committee Comment 1124-4 makes clear, this engineering
analysis approach contained in the Comments was intended to be an interim step “until
such time as research for the purposes of determining sprinkler discharge design criteria
has been conducted and criteria developed.”

As there were no Amending Motions submitted on NFPA 1124, the proposed new 2013
edition, including the sprinkler provisions set forth above, was forwarded directly to the
Standards Council for its consideration.

**The Council’s Decision and Directions for Further Processing**

In the 2008 Decision, the Council indicated its intention to withdraw and cease
developing storage and retail sales provisions for consumer fireworks unless technical
substantiation was provided and all Approval Committee approvals obtained by the end
of the Annual 2012 Revision Cycle. As the proposed new edition of NFPA 1124 now
comes to the Council, these approvals have been obtained with respect to eight of the
nine subject areas.

The treatment of the ninth subject, the sprinkler discharge criteria, however, has, as
summarized above, been insufficient. Procedurally, the record concerning review by the
Discharge Committee is difficult to follow. The record does show that the Pyrotechnics Committee consulted with the Discharge Committee, and that the Discharge Committee identified the completion of a test program as a necessary and missing step in the development and substantiation of sprinkler criteria. It also appears that, given the lack of test data, the Discharge Committee agreed that, at least through the Proposal stage and strictly as an interim measure, the Pyrotechnics Committee could substitute prescriptive sprinkler criteria with a provision requiring an engineering analysis prepared by a fire protection engineer (hereafter, the “engineering analysis provision”). Whether the Discharge Committee held to that position at the conclusion of the process is difficult to determine from the record since, unlike the other Approval Committees and contrary to the 2008 Decision, no letter ballot of the Discharge Committee was conducted to approve the Pyrotechnics Committee’s work.

More significant than the procedural difficulties, however, is failure of the industry or others with an interest in selling consumer fireworks to have the necessary testing program initiated and completed within the time period allowed by the 2008 Decision. Four years have passed since the issuance of the 2008 Decision, and the Test Plan Report was issued a year ago. Yet, there appears to have been no steps taken to conduct any tests and no justification for delay offered.

The inadequacies just described form a sufficient basis for the Council to conclude, in accordance with the 2008 Decision, that the NFPA should not continue to develop standards for the storage and retail sales of consumer fireworks. These inadequacies aside, however, the Council is mindful of the efforts that have gone into the processing of the consumer fireworks provisions. These efforts have resulted in approvals in accordance with the 2008 Decision for eight of the nine subject areas. The consumer fireworks provisions of proposed new edition of NFPA 1124 clearly constitute a significant step forward. Moreover, the Discharge Committee regarded an engineering analysis as an acceptable interim measure for some period of time until test data was available, and a test plan to develop that data has been developed by the Research Foundation and is ready for implementation. These circumstances have persuaded the Council to issue the 2013 edition of NFPA 1124, including the new consumer fireworks provisions, with one revision noted below. The consumer fireworks provisions, however, will remain in place for no longer than one year, unless testing according to the Research Foundation Test Plan has been completed and new sprinkler criteria developed. More specifically, the Council has decided as follows:

**A. The Issuance of the 2013 edition of NFPA 1124 with a revision to A.7.5.1.1**

The Council has voted to issue the proposed 2013 edition of NFPA 1124, including the consumer fireworks provisions, but with the deletion and replacement of the text of A.7.5.1.1. As discussed above, this new edition addresses sprinkler protection for consumer fireworks through the use of an engineering analysis prepared by a fire protection engineer, and the record shows that the Discharge Committee allowed this as an interim measure. (See A.6.5.1.1 [storage] and A.7.3.6 [sales]). With respect to existing sprinkler systems, however, the engineering analysis provision in A.7.3.6, was effectively modified, for the subchapter 7.5 on stores, by the inclusion of annex provision A.7.5.1.1, which states that: “For existing buildings, existing sprinkler systems designed...”
for an Ordinary Hazard Group 2 occupancy should be sufficient.” There is no evidence in the record that the Discharge Committee either saw or approved of this provision, and there is no technical substantiation supporting it. Accordingly, the Council is issuing NFPA 1124 with the text of A.7.5.1.1 deleted and replaced with the engineering analysis provision, as follows:

A.7.5.1.1 For existing buildings, existing sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy should be sufficient.

A.7.5.1.1 For existing buildings, appropriate sprinkler system design criteria should be determined based upon an engineering analysis prepared by a fire protection engineer.

B. Directions for further processing.

The Council directs that the Pyrotechnics Committee complete one of the following two options for Council consideration no later than the Council’s August 2013 meeting:

1. Process a Tentative Interim Amendment (TIA) incorporating provisions derived from data from full scale fire tests for sprinkler design criteria.

The Research Foundation Test Plan Report shall be used to complete full scale fire tests. The results shall be used to formulate requirements for sprinkler system design and installation for both the storage and retail sales of consumer fireworks. After the material is successfully balloted as a TIA through the Pyrotechnics Committee, the changes shown in the TIA must then be submitted to the Discharge Committee for approval by letter ballot in accordance with the 2008 Decision. This option will depend on the timely completion of full scale fire tests in accordance with the Research Foundation Test Plan Report.

2. Process a TIA to limit the threshold of all permanent Consumer Fireworks Retails Sales (CFRS) facilities and stores to below 3000 ft² for new buildings and 7500 ft² for existing buildings (i.e., the threshold below which automatic sprinkler systems are not required in accordance with Section 7.3.6).

Section 7.3.6 of the new edition of NFPA 1124 establishes threshold limits for sprinkler protection and was approved by the Fire Code Technical Committee acting as the Approval Committee in accordance with the 2008 Decision. This section provides as follows:

7.3.6 An automatic sprinkler system designed and installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, shall be provided throughout permanent CFRS facilities and stores in which CFRS are conducted in the following buildings:

(1) New buildings greater than 3000 ft² (278.7 m²) in area
(2) Existing buildings greater than 7500 ft² (694 m²) in area
Absent full scale fire test data to substantiate sprinkler criteria, facilities and stores that require sprinkler protection in accordance with 7.3.6 should no longer be permitted by NFPA 1124. Accordingly, a TIA should be processed limiting permanent CFRS facilities and stores to new buildings that are less than 3000 ft² (278.7 m²) in area and to existing buildings that are less than 7500 ft² (694 m²) in area, or, in other words, to buildings that are below the threshold limits for sprinkler protection set forth in 7.3.6.

**Further Standards Council Action**

Should neither option be presented to the Standards Council by its August 2013 meeting, it is the intention of the Standards Council at that time to issue a TIA to revise the scope of NFPA 1124 to exclude the storage and retail sales of consumer fireworks and to delete Chapters 6 and 7 and related material throughout NFPA 1124. In addition, the Standards Council will also withdraw two test method standards that were developed for reference in NFPA 1124. (See Standards Council Decision #10-24, Agenda Item #10-10-19, October 20, 2010 [noting that the issuance of these two test standards was contingent on the continuance of the consumer fireworks provisions of chapters 6 and 7 of NFPA 1124.] ) These standards, which have been issued today in minute item nos. 12-8-14 and 12-8-15 are: PYR 1128, *Standard Method of Fire Test for Flame Breaks*; and PYR 1129, *Standard Method of Fire Test for Covered Fuse on Consumer Fireworks.*
This decision concerns the question whether NFPA should continue to develop standards provisions for the retail sale and storage of consumer fireworks. NFPA began, amid some controversy to do so beginning in 1999. We begin with a summary of the history of that activity.

I. Background

NFPA, as a safety organization, has since at least the early Twentieth Century, and continues to have, a long-standing advocacy position opposing, on well-documented safety grounds, any use of fireworks by consumers or other members of the general public. In light of that policy, the Standards Council did not allow any standards development activities related to the use of fireworks by the general public until 1995. (See, e.g., Agenda Item 93-98, Standards Council Meeting of October 14-15, 1993; Agenda Item 94-125, Standards Council Meeting of October 13-14, 1994.) In 1995, however, the Standards Council, based on requests from the Technical Committee on Pyrotechnics, began to question whether it might, consistent with the NFPA policy against the use of consumer pyrotechnics, nevertheless have the authority to allow standards to be developed for the storage and retail display and sale of consumer fireworks. (See Agenda Item 95-48, Standards Council Meeting of October 18-21, 1995.) This led to a review of NFPA policy concerning consumer fireworks by the NFPA Board of Directors. A task group of the Board was split 3-2 in favor of permitting the development of NFPA standards on the retail sale and storage of consumer fireworks. The majority emphasized that, despite NFPA’s opposition to the use of fireworks by consumers, 40 states at that time allowed such use, and enforcement authorities in those states needed the guidance that NFPA standards could provide on the retail sale of consumer fireworks. The minority doubted the efficacy of such an activity and feared that it would undercut the push for prohibition of consumer use of fireworks and the NFPA message against the use of such fireworks. The Board of Directors, weighing these countervailing factors, decided that, on balance, the Standards Council should be given the authority to authorize the development of standards on the retail sale of consumer fireworks and effectuated this decision through its November 14, 1999, Board of Directors meeting through revisions to its Standing Rule 88-002, as revised through November 14, 1999.

Following the Board action, the Standards Council authorized standards development activities that initially led to provisions concerning the retail sales and storage of consumer fireworks being developed in NFPA 1, Fire Prevention Code (2000 edition), and subsequently, with jurisdiction clearly and, after some controversy, definitively assigned to the Technical Committee on Pyrotechnics (hereafter, the Technical Committee), with the incorporation of consumer retail storage and sales provisions into an expanded chapter 6 and new chapter 7 of NFPA 1124, Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnics Articles (2003 edition).
Without further recounting the entire detailed and sometimes contentious history of those activities, it is significant for these purposes to note that, from its inception, the Council has continually confronted difficulties engendered in significant part by a lack of adequate technical justification for provisions or proposed provisions concerning the regulation of retail sales of consumer fireworks. This has included disagreements between Technical Committee projects over the extent and type of regulation appropriate for the storage and retail sales of consumer fireworks. (See Standards Council Decision #00-1 [Agenda item 001/99-100, January 13, 2000].) In addition, it has posed difficulties for the Council itself in resolving appeals as the Council has strained to rationalize, revise, or, in some cases, reject actions of the Technical Committee on Pyrotechnics related to the consumer provisions. [See, e.g., Standards Council Decision #03-13 [Agenda item 03-1-10-a, January 17, 2003] [rejecting Technical Committee position exempting existing facilities from certain requirements, based on various complications and concerns, including “the Council’s own concerns whether the safety issues with respect to exempting new facilities from . . . have been given adequate consideration”]; Standards Council Decision #03-14 [Agenda item 03-1-10-d, January 17, 2003] [rejecting as technically unjustified the Technical Committee’s recommended 12,000 square foot area threshold for requiring an automatic sprinkler system in permanent retail sales facilities, noting the lack of adequate large scale fire testing to justify the effective treatment of consumer fireworks as an ordinary hazard occupancy as defined by NFPA 13, Standard for the Installation of Sprinkler Systems, and accepting instead a 6,000 square foot area threshold]; Standards Council Decision #04-05 [Agenda item 04-4-13/14/15/16, April 15, 2004] [accepting a Tentative Interim Amendment extending the area threshold for automatic sprinkler requirements to 7,500 square feet for existing permanent facilities, but noting further review and consideration should be forthcoming during the full revision cycle]; Standards Council Decision #06-04 [Agenda item 06-3-11, March 21, 2006] [rejecting Technical Committee request to enter three new draft fire test standards on packaging, covered fuses, and flame breaks used in the retail sale and display of consumer fireworks where “little if any research or testing was produced to support the draft standards and there is no clear prospect that the standards development process, once begun, would be supported by adequate technical substantiation”].)

Against this background of concern with the technical adequacy of the provisions concerning the retail storage and sale of consumer fireworks, the Fire Protection Research Foundation, on October 1, 2007, issued a report, authored by Jonathan Perricone, P.E., Schirmer Engineering Corporation, entitled Fire Safety in Consumer Fireworks Storage and Retail Facilities — Hazard Assessment (hereafter, the Research Foundation Report). Subsequently, the Standards Council considered this report and concluded that it raised serious concerns regarding the technical basis for the retail sales provisions of NFPA 1124 and “calls into question whether sufficient research and other technical substantiation exists to support meaningful standards development in this area.” (See Standards Council Agenda Item #08-1-8, January 10, 2008 [revising previous minute item #07-10-35, October 3-4, 2007].) Based upon the findings presented in the report, the Council indicated that it was contemplating the following actions:

- Revising the scope of the Technical Committee on Pyrotechnics so that it no longer covers the retail sale of consumer fireworks, and
- Taking steps to revise the scope of NFPA 1124 to exclude the retail sales of consumer fireworks and to delete chapter 7 from NFPA 1124.

Prior to making a final decision on the issue, the Council gave notice that it would conduct a hearing and receive written submissions on the Council’s contemplated course of action or on other proposed courses of action that may be submitted for the Council’s consideration. A public
II. Discussion

Now having the benefit of the Council’s own knowledge of the history of the treatment of standards development concerning the storage and retail sales of consumer fireworks and the Research Foundation Report, as well as the full record, including the hearing and the written submissions filed in response to the Council’s request for public input, the Council must decide whether NFPA standards development in the area of storage and retail sales of consumer fireworks should continue.

In this regard, the Council places significant weight on the conclusions of the Research Foundation Report. That report identified numerous and serious inadequacies or lack of sufficient technical basis to support the storage and retail sales provisions in NFPA 1124. The testimony at the hearing and the written submissions did not detract from those conclusions or give the Council comfort that a serious effort to find answers was forthcoming. In this regard, the Council was particularly disappointed by the response of the representatives of the consumer pyrotechnics industry. Despite the efforts of the Research Foundation to solicit all available research relevant to its literature review and hazard assessment and despite the requests of the Council before, during, and after the June hearing, representatives of this industry have yet to submit for scrutiny the full reports of tests that they assert have been conducted and completed.

In considering the appropriate course of action, it is important to acknowledge that the absence of full technical knowledge and reliable data to fully support all aspects of a standard is not, in the abstract, a reason to forego the development of standards. The Council recognizes that standards development processes generally rely on available outside input to provide standards bodies with information, experience, data, and research to inform their activities. Frequently, standards developers must act in the absence of full knowledge, either because of the lack of research or because the state of the science in a particular area is insufficiently developed. In such cases, standards developers must draw approximate lines based on judgment and the information that is available. To do so, even in the absence of full knowledge, can be important for promoting safety as it provides a basis to regulate hazardous activities.

Nonetheless, there may be situations that arise in which the state of knowledge is so deficient that the Standards Council, exercising its jurisdictional authority, may be compelled to conclude that standards development activities in a given area are not appropriate and may even impede the promotion of safety. Such a situation would be rare, indeed, but declining to issue a standard based on lack of adequate technical validation is not without precedent. (See Standards Council Decision # 99-14 [Agenda item 99-62(a)(b), July 22, 1999] [air purifying respiratory protective escape devices]; Standards Council Decision # 00-13 [Agenda item 98-113, April 28, 2000] [early streamer emission lightning protection systems].)

In this instance, a number of factors raise questions about the continued viability of NFPA’s consumer pyrotechnics activity.

* The Research Foundation Report identified the serious lack of data and clear scientific or technical basis underlying many of the retail sale and storage provisions in NFPA 1124. (See, especially, the nine specific areas of concern identified in the Research Foundation Report and discussed in greater detail below.)
The strong NFPA policy disapproving the use of consumer fireworks made the NFPA Board of Directors and this Council reluctant in the first place to embark on the development of storage and retail sales requirements for consumer fireworks lest it be seen as undercutting the important safety message to consumers. NFPA was persuaded to go forward because it was argued that such standards were needed to assist enforcers in those many jurisdictions that allowed the sale and use of consumer fireworks. Such arguments, however, begin to lose their force if the standards that are developed lack adequate and sufficient basis in the form of meaningful research, testing, and other technical substantiation.

As documented earlier in this decision, the lack of adequate supporting data has led to chaotic processing, including jurisdictional and substantive disputes between the NFPA 1 and NFPA 1124 technical committees and complicated appeals where the Council itself has had to develop solutions and/or call for further review and substantiation. The Council is concerned that the lack of adequate technical data at some point leads to arbitrary decision making that can undermine confidence in the consensus standards development process.

As suggested earlier, the industry, despite claims to the contrary, has shown little inclination to devote the energy and resources to filling in the technical gaps in knowledge concerning the safe storage and sale of consumer pyrotechnics. They have even failed to provide research data and reports which they claim exist. Indeed, at the hearing on this matter, an oral presentation concerning recent testing at Southwest Research Institute (SwRI) was presented to the Council without supplying the actual report itself. Given the notice provided by the Council and the seriousness of the inquiry that it was undertaking, this failure, which persists to this day, is inexplicable.

All of the above factors lead the Council toward a serious inclination to end the standards development activities in the area of storage and retail sales of consumer pyrotechnics. The Council, however, is highly mindful of the countervailing views expressed by the Technical Committee on Pyrotechnics and others, including, most significantly, the enforcement community. They urge that the retail storage and sales provisions of NFPA 1 124, even though imperfect, are essential to their enforcement activities as these provisions establish some undeniably important limits on the storage and retail sale of consumer fireworks. Indeed, this has been the argument that caused the Council and the NFPA Board to even entertain the possibility of having NFPA develop standards in this area despite the strong institutional policy against the use of consumer fireworks. The Council does not subscribe to the view, without qualification, that the development of a standard by the NFPA is invariably better than no NFPA standard. Indeed, it is possible that a standard set at a low level and without adequate support can, at some point, impede rather than promote progress and safety. NFPA does not wish to be associated with sustaining a weak standard, without limit, based solely on the argument that it is better than nothing.

Nevertheless, based on all that has been presented before it, the Council believes that it may still be possible to materially improve and validate standards for the storage and retail sale of consumer pyrotechnics and that, given the expressed need for such standards and the expressed desirability of having them produced through the NFPA standards development system, it is premature to end NFPA standards development efforts in this area.

III. The Council’s decision and directions for further processing
The Council, therefore, based on the record before it, has concluded the 2006 edition of NFPA 1124 should remain issued for the present in its current form and that standards for the retail storage and sale of consumer pyrotechnics in NFPA 1124 should not be eliminated at this point. However, the Council is directing that standards development activities in this area should proceed through one additional revision cycle, extending no further than the Annual 2012 revision cycle, in line with the guidance set forth as follows.

A. Procedures for correlation and input from other Technical Committees

The Council notes that a number of key safety concerns, as identified below, must be resolved and properly addressed prior to the publication of the next edition of NFPA 1124. The nine safety concerns are gathered largely from the Research Foundation Report and overlap to a certain degree with the scope of other NFPA Technical Committees. Because it has been demonstrated that the resources necessary to adequately address the concerns extend beyond those of the Technical Committee on Pyrotechnics, the Council is seeking additional input and judgment from other Technical Committees to establish the appropriate level of safety concerning the storage and retail sale of consumer pyrotechnics.

The Council has put forth the following procedure to ensure that those provisions in the next edition of NFPA 1124 concerning the nine safety concerns are adequately addressed. The Council directs that the Technical Committee on Pyrotechnics develop and properly substantiate the relevant provisions in NFPA 1124 concerning the nine safety concerns. A pre-ROP ballot of the Technical Committee on Pyrotechnics will be conducted, in accordance with the general rules of NFPA, to obtain the position of the Technical Committee on Pyrotechnics on these provisions. The provisions and substantiation put forth by Technical Committee on Pyrotechnics will then be forwarded to other NFPA Technical Committees, referred to here as Approval Committees, for approval.

The Approval Committees will hold either a physical meeting or a conference call meeting to discuss the provisions and substantiation put forth by the Technical Committee on Pyrotechnics and take one of the following actions:

1) Accept the provisions and substantiation put forth by the Technical Committee on Pyrotechnics; or

2) Indicate that the provisions are not supported by the substantiation and recommend that the Technical Committee on Pyrotechnics develop other provisions based upon the substantiation and/or other information the Approval Committee has available for review; or

3) Indicate that the provisions are not supported by the substantiation and recommend other provisions that are supported by the substantiation and/or other information the Approval Committee has available to it; or

4) Indicate that the provisions are not supported by the substantiation submitted or any other information available to the Approval Committee. The default recommendation in that case will be that standards development on this subject be suspended until further research is conducted to support such standards development.
The Approval Committees will secure their position via letter ballot after the completion of their meetings or conference calls. A two-thirds affirmative vote of the Approval Committees, in accordance with NFPA rules, will be necessary to obtain the position of the Approval Committees. Where the Approval Committees cannot obtain the necessary two-thirds vote, the Approval Committees must continue addressing the matter until a two-thirds majority letter ballot vote of the committees is obtained. Following a two-thirds affirmative vote, the Technical Committee on Pyrotechnics will consider the position of the Approval Committees.

Where new provisions are put forth by the Approval Committees, as indicated in item [3] above, the Technical Committee on Pyrotechnics will be balloted to determine if it is in agreement with the new provisions. If such a ballot is not successful, the Technical Committee on Pyrotechnics will need to reconsider the matter, and if it develops revised provisions, as could also be the case in item [2] above, these revised provisions will need to be submitted for approval by the Approval Committees. The process will continue until agreement between the Technical Committee on Pyrotechnics and the Approval Committees is obtained. Once such agreement is obtained, the Technical Committee on Pyrotechnics can move forward with the publication of its Report on Proposals (ROP) for the next edition of NFPA 1124. Where the Approval Committees accept the provisions and substantiation put forth by the Technical Committee on Pyrotechnics as indicated in item [1], a follow-up ballot of the Technical Committee on Pyrotechnics is not necessary and the Pyrotechnics committee can continue with the publication of its ROP.

The same process will occur for the Report on Comments (ROC) stage of the process. The Technical Committee on Pyrotechnics and the Approval Committees will need to be in agreement on any provisions pertaining to the nine concern areas below or other issues raised by the Approval Committees in order for the ROP and ROC to move forward.

The Council notes that NFPA 1124 has been entered into the Annual 2010 revision cycle. The Council anticipates that obtaining agreement among the affected committees can require significant time and effort but expects that all work can be completed in time for the Annual 2012 cycle. If such agreement among the affected committees is not obtained by the Annual 2012 cycle, meaning that the next edition of NFPA 1124 cannot be developed in that time period, the Council will take the following actions:

- Revise the scope of the Technical Committee on Pyrotechnics so that it no longer covers the storage and retail sale of consumer fireworks, and
- Take steps to revise the scope of NFPA 1124 to exclude the storage and retail sales of consumer fireworks and delete chapter 6 and chapter 7 from NFPA 1124.

### B. Specific areas of concern for further investigation, substantiation, and processing

The nine safety concerns and the Approval Committees that must approve the associated provisions for the next edition of NFPA 1124 are identified below. In addressing these nine areas of concern, the Technical Committee on Pyrotechnics needs to consider the range of consumer pyrotechnics involved, including aerial devices, as well as the storage and retail sale of such consumer pyrotechnics in tents and stands.

1. **Threshold Values for Application of NFPA 1124.** Paragraphs 6.1.3 and 7.3.1 of NFPA 1124 state that the requirements of chapters 6 and 7 do not apply to consumer fireworks retail sales (CFRS) facilities or stores where the consumer fireworks are in packages and where the total quantity of consumer fireworks on hand does not exceed 125 lb (net) [56.8 kg] of pyrotechnic composition, or in a building protected...
throughout with an approved automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, with not more than 250 lb (net) [113.6 kg] of pyrotechnic composition on hand. The Research Foundation Report indicates that “while it is clearly reasonable to exempt small amounts of commodity from more robust protect ion requirements, the exact limit and the dependence of this limit on sprinkler protection is still not well understood. Preliminary bench-scale experiments conducted by Battelle revealed that under certain conditions, as little as 5 cases of consumer fireworks (tanks, rockets, ground spinners, fountains and roman candles) produced an overwhelming fire scenario for a space equipped with a NFPA 13 wet pipe sprinkler system. Although this is only one result, it underscores the need for a more scientific basis to support criteria for exempt amounts.” (Research Foundation Report at p. 65, footnote omitted) The Council directs that the 125 lb and the 250 lb threshold limits be further investigated and adequately substantiated and that supporting testing, data, and other relevant studies be submitted and referenced. Approval of these provisions and associated substantiation must be obtained by the Technical Committee on Fire Code (NFPA 1).

2. **Threshold Limits for Sprinkler Protection.** Section 7.3.6 of NFPA 1124 requires that an automatic sprinkler system designed and installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, be provided throughout permanent CFRS facilities and stores in which CFRS are conducted in the following buildings: (1) new buildings greater than 6000 ft² (557.2 m²) in area; and (2) existing buildings greater than 7500 ft² (694 m²) in area. The Research Foundation Report indicates that “the basis for the limits of 6000 ft² for new buildings and 7500 ft² for existing buildings is unclear. For perspective on this issue, consider that these limits are not significantly below the floor area of the Ohio River Fireworks Store where the most relevant loss history for this commodity was established. Also, these criteria do not consider factors as significant as fuel loading within the space.” (Research Foundation Report at p. 65) The Council directs that the threshold limits of 6000 ft² and 7500 ft², or any other similar proposed thresholds regarding the need for sprinkler protection, be adequately substantiated and that supporting testing, data, and other relevant studies be submitted and referenced. Approval of these provisions and associated substantiation must be obtained by the Technical Committee on Fire Code (NFPA 1).

3. **Height and Area Limitations.** Section 7.2.3 of NFPA 1124 requires that any building or structure used for the retail sales of consumer fireworks, including their related storage, comply with NFPA 101, *Life Safety Code*, for mercantile occupancies, except as provided in this code. These provisions address building height and area limitations based upon occupancy type and construction type. NFPA 101 provides additional sub classification of the mercantile occupancy group in Classes A, B, and C stores distinguished on the basis of height and area.

The Research Foundation Report indicates that “this analogy [reference to NFPA 101 height and area limitations] is potentially incomplete in a fundamental way. As previously referenced in the analysis of analogous hazards in this report [Research Foundation Report], the fundamental concept of the balance between allowable height and area with type of construction is based upon fuel loading. Fuel loading is implied by the intended use of occupancy of the space in question. For hydrocarbon-based fuels, the maximum severity of an enclosure fire is limited by ventilation into the space. As a result, there is an intended balance between size of the space, type of construction, and fuel loading. This balance is disturbed when additional oxidizers are present within the enclosure. In the case of consumer fireworks, this may lead to
maximum gas temperatures within the space that exceed ventilation-limited values. This is not to say that fire protection for consumer fireworks retail sales facilities should not be similar to those of mercantile facilities; however, such specificity may be worthy of further evaluation in light of the previous discussion.” (Research Foundation Report at p. 65)

The Council directs that the limits pertaining to size of space, type of construction, and fuel loading as addressed by chapter 7 of NFPA 1124 and as represented by the Mercantile Occupancy classification be adequately substantiated and that supporting testing, data, and other relevant studies be submitted and referenced. Approval of these provisions and associated substantiation must be obtained by the Technical Committee on Building Construction (NFPA 5000).

4. **Means of Egress Provisions.** Section 6.8 and paragraphs 7.3.14 and 7.4.8 of NFPA 1124 address means of egress provisions.

With regard to storage facilities (chapter 6 provisions), the Research Foundation Report indicates that “coordination with the Life Safety Code requires identification of an occupancy type as well as the relative hazard level of contents. Specific guidance on this issue is sparse. As a result, there is a certain level of ambiguity associated with judging compliance with NFPA 101. Requirements are provided in NFPA 1124 with respect to doors, aisles, egress travel distance, exit signs and emergency lighting; however, the basis for these requirements (particularly aisles and travel distance) is unclear.

With regard to retail sales facilities (chapter 7 provisions), the Research Foundation Report indicates that “means of egress requirements specific to egress travel distance and capacity of egress components are essentially based on a simplified evacuation model where flow to and through exits is simply a product of exiting speed and capacity. In reality, the exiting speed will be governed largely by awareness of the rate of hazard development. The speed of hazard development is a key issue with respect to consumer fireworks and existing research yields conflicting results. Experiments conducted by Wyle Laboratories, CHAF and the State of Washington all suggest a relatively slow developing hazard with ample time provided for egress for a light occupant load within a small facility. However, results of the Battelle test series illustrated severe conditions occurring over a significantly more condensed timeframe. Such an occurrence could conceivably result in an overloading of exit capacity due to a corresponding increase in crowd speed. In other words, analysis of the speed of hazard development is essential to deriving appropriate means of egress requirements. To date, no experiments specific to egress from consumer fireworks retail sales facilities have been conducted. Furthermore, only 2 full-scale test efforts specific to retail sales facilities are known (Washington and Battelle). The conflicting nature of their results necessitates more focused research in this area.” (Research Foundation Report at p. 65, footnotes omitted)

The Council directs that the means of egress provisions of chapters 6 and 7 be adequately substantiated and that supporting testing, data, and other relevant studies be submitted and referenced. Approval of these provisions and associated substantiation must be obtained by the Technical Committee on Means of Egress (NFPA 101, NFPA 5000).

5. **Smoke and Heat Venting.** Paragraph 7.3.10.1 of NFPA 1124 requires that smoke and heat vents designed and installed in accordance with NFPA 204, *Standard for Smoke
and Heat Venting, be provided in the CFRS area of new permanent CFRS facilities or stores where the ceiling height is less than 10 ft (3.05 m) and the travel distance to reach an exit is greater than 25 ft (7.6 m). Similarly, paragraph 6.5.3 requires smoke and heat vents designed and installed in accordance with NFPA 204 to be provided in consumer fireworks storage buildings exceeding 50,000 ft² (4644 m²) in undivided area.

With regard to retail sales (chapter 7 provisions), the Research Foundation Report indicates that “conceptually, this criterion is based on the idea of the total duration of egress occurring prior to deterioration of tenability within the space due to a descending smoke layer. However, smoke and heat venting was not a strategy employed in any of the known experimental efforts involving fire in consumer fireworks facilities. The only known experimental data with regard to smoke control for such facilities is in reference to the Battelle experiments in Ohio where forced ventilation was used and failed to achieve its objective of maintaining a clear tenable layer of air for egress purposes. Further more, given that the results of this particular testing program suggest the implementation of ESFR automatic sprinkler protection, the compatibility of smoke and heat vents with this technology must be questioned as the standard is developed.” (Research Foundation Report at p. 66) With regard to storage facilities (chapter 6 provisions), the Research Foundation Report indicates that “the author of this review [Research Foundation Report] was unable to locate any data for consumer fireworks fire related hazards in the built environment in spaces of this size. Additionally, smoke and heat venting was not a strategy employed in any of the known experimental efforts involving fire in consumer fireworks storage facilities.”

The Council directs that the application and use of smoke vents as currently required by chapters 6 and 7 of NFPA 1124 be adequately substantiated and that supporting testing, data, and other relevant studies be submitted and referenced. Approval of these provisions and associated substantiation must be obtained by the Technical Committee on Smoke Management Systems (NFPA 204).

6. Flame Breaks. Paragraphs 7.3.15.3, 7.3.15.4, and 7.3.15.5 of NFPA 1124 address flame breaks and packaging of fireworks. The Research Foundation Report indicates that:

A potentially promising method for achieving fire control is provided in the form of requirements for flame breaks in Section 7.3.15.3. Conceptually, flame breaks are designed to limit fire area. Toward this objective, they should be designed as noncombustible thermally robust barriers allowing minimal heat conduction to the unexposed side and extending beyond the shelving to limit potential convective and/or radiant heat exposure. Minimizing heat conduction may be accomplished by selecting a material either with the appropriate balance between thermal conductivity, thermal diffusivity and thickness. Requirements for flame breaks in the current standard are geared more toward slowing flame spread than halting it altogether. A total of 11 materials and associated thicknesses are specified in Section A.7.3.15.3 of the standard as being acceptable for use as flame breaks. It should be noted that materials such as 0.25 mm thick sheet aluminum would likely behave as thermally thin solids thereby offering little thermal protection to the unexposed side.

The approach of incorporating more mass into the overall storage arrangement is certainly effective in slowing the propagation of an accelerating reaction (i.e.,
high energy explosives); however, objectives for fire protection of consumer fireworks facilities are fundamentally different. If consumer fireworks retail sales facilities are to be treated as traditional mercantile occupancies with respect to NFPA 101 (which is thus far an incomplete analogy), fire protection objectives in these spaces must necessarily be consistent with either fire suppression or fire control as defined in NFPA 13. Fire control as defined in NFPA 13 is intended to correspond with confining flame spread to a design area (i.e., halting growth rather than simply slowing it). This may be accomplished with the use of thermally thick barriers within a shelving unit. It is important to recognize that thermally thin materials will not truly halt fire growth, but rather slow its spread over a relatively short time frame. Depending on the design, this time frame may not be sufficient to make an appreciable difference in prolonging tenable conditions within the space as currently asserted by the standard.

Consider also that the interior of the shelving unit will likely be partially shielded from automatic sprinkler protection at the ceiling level. Therefore, flame breaks will be exposed to a significant heat load, which may locally resemble an unsprinklered fire. For perspective, recall that the heat load produced by the 150 case full scale test conducted by Battelle severely deformed the gondola shelving and even melted smoke detectors prior to sprinkler intervention. All things considered, selection and design of flame break materials should be a major focus of future research as certain methods potentially offer a very practical means for achieving fire control.

Tests conducted by Wyle Labs and the State of Washington reveal that the final packaging of consumer fireworks may play an important role in slowing fire growth beyond its incipient stage. In part, it is this observation that may lead to the hypothesis that thermally thin flame breaks will be particularly effective in slowing fire growth. However, there are a few important issues with respect to the global fire dynamics that must be considered. During the incipient stage, the total heat flux to exposed materials is quite low, thereby maximizing the insulating quality of relatively thin packaging. As illustrated in the Washington test, if the enclosure fire fails to grow beyond its incipient stage prior to utilizing the available ventilation within the space, the duration of the fire event will be significantly prolonged. In this case, the burning packaging requires ventilation to sustain combustion. As a result, with limited or no ventilation, the heat load generated by the smoldering packaging will remain low thereby minimizing the involvement of fireworks. However, for a case where fire progresses to a more robust stage of growth, as observed eventually in the Washington test and immediately in the Battelle tests, the insulating quality of thermally thin solids (i.e., packaging and thin flame breaks) becomes far less important.

To date, there is no known research focusing on designing flame breaks for maximum efficiency for fires in consumer fireworks retail sales applications. Nonetheless, very specific design criteria are provided in NFPA 1124. The scientific basis for these criteria, whether theoretical or experimental, should be referenced in the appendix of the standard. (Research Foundation Report at pp. 66-67, footnotes omitted)

The Council directs that the provisions for flame breaks in chapter 7 of NFPA 1124 be adequately substantiated and that supporting testing, data, and other relevant studies be submitted and referenced. Approval of these provisions and associated substantiation must be obtained by the Technical Committee on Fire Code (NFPA 1).
7. **Separation Distances.** Paragraphs 6.4.7 and 7.4.7 of NFPA 1124 address separation distances. The Foundation Report indicates that “minimum separation distances for temporary consumer fireworks retail sales facilities include distances to nearby buildings, combustibles, other tents, vehicle parking, other stands and storage of consumer fireworks. Minimum distances range from 5-20 feet depending upon the application. The basis for this range of distances is unclear, particularly given the results of the Washington test which officially concluded a minimum separation distance on the order of 40 feet would be appropriate for many of the listed applications, despite projectiles traveling greater distances during the test. Providing a discussion of the rationale behind specific separation distance requirements in the appendix of the standard may alleviate such apparent discrepancies between existing provisions and known experimental results.” (Research Foundation Report at p. 67, footnote omitted)

The Council directs that the separation distances be adequately substantiated and that supporting testing, data, and other relevant studies be submitted and referenced. Approval of these provisions and the associated substantiation must be obtained by the Technical Committee on Building Construction (NFPA 5000).

8. **Construction Materials.** Paragraphs 6.4.2 and 7.4.3 (1) indicate that buildings having an area up to and including 8000 ft² (743 m²) are permitted to be constructed of any approved construction materials. The Research Foundation Report indicates that “the basis for selecting this critical area is unclear” and that “further research regarding the balance between fuel loading, sprinkler protection and structural protection is necessary before such a specific criteria can be reasonably implemented.” (Research Foundation Report at pp. 63-64)

The Council directs that further research be conducted in this regard and that the 8000 ft² or any other similar proposed threshold regarding construction materials be adequately substantiated. Supporting testing, data, and other relevant studies are to be submitted and referenced. Approval of these provisions and the associated substantiation must be obtained by the Technical Committee on Building Construction (NFPA 5000).

9. **Sprinkler Design Criteria.** Paragraph 6.5.1.1 requires that an automatic sprinkler system be designed using the following criteria for the areas in which the consumer fireworks are stored in DOT-approved packaging:

   (1) Consumer fireworks stored in DOT-approved packaging shall be considered as a Class IV commodity.

   (2) Consumer fireworks stored to a height not greater than 10 ft (3 m) in racks or 12 ft (3.7 m) otherwise shall be classified as an Ordinary Hazard (Group 2) occupancy.

   (3) Consumer fireworks stored to a height not greater than 12 ft (3.7 m) in racks but greater than 10 ft (3 m) shall be classified as an Extra Hazard (Group 1) occupancy.

   (4) Consumer fireworks stored to a height greater than 12 ft (3.7 m) shall be protected by an automatic sprinkler system designed using a fire control approach or a special design approach in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*. 

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**Attachment 12-10-12**

**Page 24 of 259**

October 24, 2012

Supplemental Agenda October 29-30, 2012

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The Research Foundation Report indicates that “based upon the research explored in this literature review, there appears to be no basis for any of these very specific design requirements. If data exists which suggests that consumer fireworks stored in DOT-approved packaging exhibit similar burning behavior to a Class IV commodity, then it should be referenced in the standard so that the basis for this requirement is clear. Similarly, the rationale for using requirements related to occupancy classification on the basis of storage height should be detailed in the appendix of the standard. If further testing is necessary for such justification, this testing should be performed or the specific requirements removed from the standard. Currently, it appears that sprinkler protection is provided solely upon the hazard posed by packaging; however, supporting data for this strategy is inadequate at best.” (Research Foundation Report at p. 64)

In this regard the Council further notes that subsection 6.5.1, subsection 7.3.6 and paragraph A.7.5.1.1 of NFPA 1124 require sprinkler systems to be designed and installed in accordance with NFPA 13. However, NFPA 13 contains no design or installation provisions that address consumer fireworks.

The Council directs that sprinkler system design and installation provisions for both the storage and retail sale of consumer pyrotechnics be developed and adequately substantiated and that supporting testing, data, and other relevant studies be submitted and referenced. Approval of these provisions and the associated substantiation must be obtained by the Technical Committee on Sprinkler System Discharge Criteria (NFPA 13).

IV. Conclusion

In concluding that the 2006 edition of NFPA 1124 should remain in place for the present, as issued, and that standards development for the storage and retail sale of consumer fireworks should continue for the period designated and in the manner prescribed in this decision, the Council has been greatly influenced by the powerful presentation of the enforcement community urging NFPA to retain and continue to improve the existing storage and retail sales standards. The Council also believes that, with the establishment of clear guidelines made possible by the Research Foundation Report and discussed in this decision, the industry and other participants now have clear and specific guidance as to the questions that need to be answered. In addition, marshaling the full capabilities of the NFPA standards development process, through procedures outlined herein, can improve the quality of and confidence in the storage and retail sales provisions. In this regard, the effectiveness of NFPA’s standards development efforts in this area can be maximized by utilizing other technical committee projects with clear interest and expertise in areas critically related to storage and retail sales facilities. Ultimately, of course, producing acceptable standards within the time framework set forth in this decision will require a concerted commitment of the industry or others to fund and implement reliable and reviewable research and testing. It is hoped that such a commitment together with the energy and dedication of the participants in the NFPA standards development process will result in enhanced standards in the interests of public safety.
TC on Sprinkler System Discharge Criteria
ROP Meeting
Savannah Riverfront Marriott
100 General McIntosh Blvd
Savannah, GA
February 10-11, 2011

Attendees:

See attached sign-in sheet.

1. Ken Linder called the meeting to order at 8:00 am and began introductions.

2. The December 2010, Pre-ROP minutes were approved.

3. Richard Bielen gave the staff report and a presentation on the meeting procedures. He also reviewed the dates of the cycle.

4. Ken Linder then discussed the logistics for the meeting and his process to complete the ROP.

5. The committee then processed the proposals. See the ROP for the official actions on the proposals.

6. Old business. Extract Task Group: A. Christine LaFleur reported that there are many questionable extracts. She solicited assistance to go over all the extracts and update as necessary. Richard Pehrson offered to assist where he could. Annex D.1 was identified as being out of date.

The Pyrotechnics Task Group: Jerald Farley, representing the Pyrotechnics Committee reported on the proposed action on NFPA 1124. Mr. Farley reported that the Pyrotechnics committee drafted two committee proposals, CP#11 and CP#12. These committee proposals changed the hazard classification in 6.5.1.1, added a new section 7.3.6.1 for sprinkler design criteria and deleted section A.7.5.1.1. The Pyrotechnics committee voted to reject CP#11 and CP#12. The Technical Committee on Sprinkler Discharge Criteria made a motion to support the rejection of CP#11 and CP#12. The TC will be balloted on this action.

The Technical Committee on Sprinkler Discharge Criteria also made a motion to submit a public comment to the Pyrotechnics Committee to delete section 6.5.1.1 (replace with “Reserved”) and delete A.7.5.1.1 of NFPA 1124 and to add new annex material to sections A.6.5.1.1 and A.7.3.6. The two new annex sections will address the fact that the existing sprinkler protection criteria is not adequately substantiated and the appropriate fire protection criteria needs to be determined.
after a careful analysis is conducted by a fire protection engineer. The committee realizes there are different scenarios and the protection criteria may be different for each. This will be the recommendation until there is some testing/documentation provided to substantiate the protection criteria based upon technical data such as fire testing.

HVLS Task Group: Garner Palenske reported to the committee on this project. There are a few code changes necessary such as defining a fan diameter. Mr. Palenske will send the final report to staff by Monday, February 14, 2011.

Metric Task Group: Bo Hjorth reported on this task group. He reviewed the rules for conversions and rounding. He also discussed nominal values and how and when to use these numbers. (See attachment B)

7. New business. The committee discussed the commentary in the NFPA Handbook. Section 3.3.4, Ceiling Pocket commentary is not correct and needs to be revised.

8. The ROC meeting is scheduled for September 22-23, 2011 in Newport Beach, CA

9. Meeting adjourned at 2:30 pm.
MEETING MINUTES

1. **Call to Order.** TC Chair Ken Linder called the meeting to order at 8:00 (9/22/11).

2. **Self-Introductions of members and guests.** Members of the committee introduced themselves and reviewed the contact information. The meeting attendance list is attached to these minutes.

3. **Review of Distributed Meeting Materials.** Staff Liaison Matt Klaus provided an overview of the agenda materials that were sent to the committee and posted on the committee web page.

4. **Approval of A12-ROP Draft Meeting Minutes.** The minutes of the A12-ROP Meeting were reviewed and approved without modification.

5. **Review of Meeting Procedures and Revision Process.** Matt Klaus gave a presentation on the overall meeting guidelines and the NFPA Regulations Governing TC operations.

6. **FPRF Presentation.** NFPA 1124 Pyro Presentation – Garner Palenske, Aon

   Garner Palenske presented Aon's research on pyrotechnic storage arrangements and sprinkler protection. Garner presented a proposed testing plan that could be used to develop sprinkler requirements for pyrotechnic storage/display. The TC anticipates that the testing will be conducted in the near future, but will most likely not be finished by the time the next editions of NFPA 13 and 1124 are released. Bill Koffel will address the NFPA 1124 TC with an interim solution that requires a design professional to produce a performance-based design plan for these occupancies, as no adequately justified prescriptive design criteria exists at this time.

7. **Work Load.** TC Chair Ken Linder discussed the logistics for the meeting and the process to complete the ROC meeting.
8. **Public and Committee Comments.** The committee then processed the comments. See the ROC for the official actions on the proposals.

9. **New Business:**

   a. The TC discussed forming a task group with the SSI TC to review requirements for open grating.

10. **Adjournment.** Meeting adjourned at 7:30 pm (9/23/11).
Delete existing paragraph and replace with the following:

Reserved

Appropriate sprinkler system design criteria should be determined based upon an engineering analysis prepared by a fire protection engineer.

Substantiation: During a meeting of the NFPA Technical Committee on Automatic Sprinkler Discharge Criteria the Committee noted that the sprinkler design criteria in NFPA 1124 has not been adequately substantiated. As such the Committee voted to request that the criteria be deleted and replaced with the proposed Annex note, until such time as research for the purposes of determining sprinkler discharge design criteria has been conducted and criteria developed. The coordination between the AUT-SSD and PYR-AAA committees is being maintained as outlined in the Standards Council Decision (D#08-19) of October 2008 where the Sprinkler Discharge Criteria Committee serves as an approval committee for any sprinkler design requirements to be included in NFPA 1124.

Committee Meeting Action: Accept
Number Eligible to Vote: 32
Ballot Results: Affirmative: 29
Ballot Not Returned: 3 Grucci, P., Shatzer, D., Stine, B.

For existing buildings, existing sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy should be sufficient.

The Committee is retaining the language related to existing buildings from the existing A.7.5.1.1 in order to provide guidance for sprinkler systems in existing buildings. The application of the retroactivity provision in 1.4 makes the revision of this annex text for A.7.5.1.1 necessary in light of the new annex note in A.7.3.6.

Committee Meeting Action: Accept
Number Eligible to Vote: 32
Ballot Results: Affirmative: 29
Ballot Not Returned: 3 Grucci, P., Shatzer, D., Stine, B.
Report on Comments – June 2012

1124-6 Log #CC2
(A.7.5.1.1 and A.7.3.6) Final Action: Accept

Submitter: Technical Committee on Pyrotechnics,
Comment on Proposal No: 1124-32
Recommendation: Delete existing paragraph A.7.5.1.1 and replace with the following annex now to paragraph 7.3.6:

A.7.3.6 Appropriate sprinkler system design criteria should be determined based upon an engineering analysis prepared by a fire protection engineer.
Add Annex 7.3.7 as shown:

A.7.3.7 See A.7.3.6.

Substantiation: During a meeting of the NFPA Technical Committee on Automatic Sprinkler Discharge Criteria the Committee noted that the sprinkler design criteria in NFPA 1124 has not been adequately substantiated. As such the Committee voted to request that the criteria be deleted and replaced with the proposed Annex note, until such time as research for the purposes of determining sprinkler discharge design criteria has been conducted and criteria developed. The coordination between the AUT-SSD and PYR-AAA committees is being maintained as outlined in the Standards Council Decision (D#08-19) of October 2008 where the Sprinkler Discharge Criteria Committee serves as an approval committee for any sprinkler design requirements to be included in NFPA 1124.

Committee Meeting Action: Accept
Number Eligible to Vote: 32
Ballot Results: Affirmative: 29
Ballot Not Returned: 3 Grucci, P., Shatzer, D., Stine, B.
MEMORANDUM

From: G. Colonna, Staff Liaison, Technical Committee on Pyrotechnics
To: Secretary, Standards Council
Date: July 23, 2012
Subject: NFPA 1124 (A12 cycle) – overview of Council Decision D08-19 action items

This memo has been prepared by staff for the purpose of providing background for the discussion of the A2012 revision of NFPA 1124 by the Standards Council.

1. Council decision

October 2008 – Council Decision D08-19 enumerates 9 areas in which further work by the Technical Committee on Pyrotechnics is required in order to substantiate requirements in NFPA 1124 – 2006 edition related to consumer fireworks storage (Chapter 6) and consumer fireworks retail sales facilities (Chapter 7) both in the 2006 edition and going forward with the proposed 2013 edition.

The 9 items are linked to 5 NFPA Technical Committees identified as “approval committees” and all changes to requirements related to these 9 items must be coordinated with the approval committees and approved by them in letter ballot. The approval committees are: NFPA 1 (3 items), NFPA 5000 (3 items), NFPA 101 (1 item), NFPA 13 (1 item), and NFPA 204 (1 item).

2. Approval Committee process - ROP

During meetings of the Committee on Pyrotechnics in 2009 and 2010, 3 Task Groups developed straw man language responsive to 8 of the 9 issues that were then reviewed by joint task groups of the approval committees or by the full committees during presentations from the Pyrotechnics Task Group representatives to establish general acceptance of the concepts for changes or identified additional technical issues to be resolved in subsequent discussions. Committee on Pyrotechnics then approved the draft changes (developed as prospective Committee Proposals for the A12 revision cycle for NFPA 1124) through letter ballot. Once approved by Committee on Pyrotechnics the draft CP and letter ballot results were sent to the respective approval committees via the appropriate Staff Liaison for review and approval.
Approval committees approved the draft CP through letter ballot as well. In some instances, ballots were not secured on first pass, so feedback from the approval committee came through staff and/or joint task groups so that Committee on Pyrotechnics and relevant Pyrotechnics Task Group could reevaluate and resubmit amended draft Committee Proposal. An additional letter ballot for Pyrotechnics Committee was completed and once again materials were forwarded to the approval committee for reconsideration.

As of the end of 2010/beginning of 2011, the approval committees had approved Draft Committee Proposals for 8 of the 9 items from the Council Decision D08-19. Each of the approved committee proposals were acted on formally by the Committee on Pyrotechnics in February 2011 and can be found in the A2012 ROP for NFPA 1124. Substantiation for each of these items indicates that they have been developed in response to the Council direction in the decision and notes that they have gone through the approval committee review process.

At the time of the NFPA 1124 ROP, only Item #9 of the decision, requirements for automatic sprinkler protection for both storage (Chapter 6) and consumer fireworks retail sales facilities (Chapter 7) remained open and not resolved. At the recommendation of the Sprinkler System Discharge Criteria Committee (AUT-SSD) the Committee on Pyrotechnics included placeholder Committee Proposals (trial balloon proposals – see A12 ROP proposals 1124-21 and 1124-32) in the ROP for NFPA 1124, but rejected them, so that Public Comment could be submitted if additional information became available that could answer the remaining questions that relate to determining how to classify consumer fireworks as a commodity and in both storage and retail sales applications how to design automatic sprinkler protection. These two issues require full scale testing to be completed; to date none has been completed that is capable of answering these questions.

3. FPRF Project – Concept Test Plan, Sprinkler Protection Criteria for Consumer Fireworks Storage in Retail Facilities (September 2011)

The Fire Protection Research Foundation responded to a request of both the Committee on Pyrotechnics and the Automatic Sprinkler Systems Committee and established a project on sprinkler protection criteria for consumer fireworks storage in retail sales facilities. The program scope was as follows:

Objective:
To conduct/oversee a field survey of the configurations of firework storage in retail facilities to develop a design basis for hazard assessment
To develop a research plan with associated preliminary cost estimate to evaluate required sprinkler design criteria for consumer fireworks storage in these facilities.

Tasks:
1 Field Survey – develop a plan for a field survey of retail facilities with sufficient breadth to provide an appropriate basis for hazard assessment and implement the plan.
2 Research Plan – develop a comprehensive testing plan to develop recommended sprinkler design criteria for protection of this commodity. (Implementation of this plan will take place in a subsequent phase of the project).
3 Presentation – Present these findings at a meeting of industry stakeholders for review and comment.
4 Report – Provide a report of all findings

The contractor completed Task 1 and presented an outline of Task 2 on August 12, 2011. The report was completed in mid-September 2011 and findings from the project were presented to both the Automatic Sprinkler Committee during their ROC meetings the week of 19 September 2011 and the Pyrotechnics Committee October 4 – 5, 2011 respectively.

4. Approval Committee process - ROC

Actual testing per the plan was not feasible to be completed in time for data to be presented for inclusion as part of the ROC for NFPA 1124. For that reason, at the direction of the AUT-SSD Committee, Comments were developed by the Pyrotechnics Committee at the ROC stage of the next revision processing for NFPA 1124 that remove the current (2006 edition) language from Chapter 6 and 7 pending completion of research. As noted in the substantiation for Comments 1124-4 and 1124-6,

“During a meeting of the NFPA Technical Committee on Automatic Sprinkler Discharge Criteria the Committee noted that the sprinkler design criteria in NFPA 1124 has not been adequately substantiated. As such the Committee voted to request that the criteria be deleted and replaced with the proposed Annex note, until such time as research for the purposes of determining sprinkler discharge design criteria has been conducted and criteria developed. The coordination between the AUT-SSD and PYR-AAA committees is being maintained as outlined in the Standards Council Decision (D#08-19) of October 2008 where the Sprinkler Discharge Criteria Committee serves as an approval committee for any sprinkler design requirements to be included in NFPA 1124.”

Based on discussion I had with Julie Heckman of APA week of 21 May 2012, APA has been negligent in contacting FPRF regarding the research study, but planned to over the next couple of months (a meeting was held between FPRF, APA, and AON during NFPA C&E in Las Vegas on June 12). As a guidance tool through the 9 items and the approval process between PYR-AAA and five approval TCs, I have attached the following table that has been used to provide periodic updates during the ongoing process of responding to the Standards Council decision; the table includes reference to the item number from the October 2008 decision, which approval TC and document apply to the specific item number, the number(s) of Draft Committee Proposals developed pre-ROP by the Pyrotechnics Committee and ultimately forwarded for concurrent approval by the approval TC, and in the final column, the ROP or ROC proposal or comment number reflecting the published action resulting from the development during pre-ROP stage. The Draft CP numbers in the 3rd column refer only to the preliminary stage tracking between the
Pyrotechnics Committee and relevant approval committees and have no further use once the ROP or ROC phase occurred. Following the table, excerpts from the minutes of ROP and ROC for AUT-SSD regarding their direction to PYR-AAA are included and I have also shown the text for Chapter 6 and Chapter 7 as it has been proposed to appear based on the Item 9 outcome from the sprinkler discussions.

Here is the updated table:

<table>
<thead>
<tr>
<th>Council Decision Item No.</th>
<th>Approval TC/document</th>
<th>SC Issue summary, PYR action, and Approval TC Action</th>
<th>A12 ROP and ROC actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FCC-AAA/NFPA 1</td>
<td>Threshold Values for Application of NFPA 1124.</td>
<td>1124-30 (Log#CP16)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Approval TC approved Draft CP#1 by letter ballot; CP 1 became 1124-30 in A12 ROP.</td>
<td></td>
</tr>
</tbody>
</table>

It is proposed that paragraph 7.3.1.1 be amended and new paragraphs 7.3.1.2 and 7.3.1.2.1 be added to read as follows:

7.3.1 Exempt Amounts.

7.3.1.1 The requirements of this chapter shall not apply to permanent CFRS facilities and Class A and Class B stores where the consumer fireworks are in packages, there are no quantities of aerial devices meeting the descriptions in C.3.1.2, and where the total quantity of consumer fireworks on hand does not exceed 125 lb (net) [56.8 kg] of pyrotechnic composition or, in a building protected throughout with an approved automatic sprinkler system installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, 250 lb (net) [113.6 kg] of pyrotechnic composition.

7.3.1.2 The requirements of this chapter shall not apply to temporary CFRS facilities and Class C stores where the consumer fireworks are in packages and where the total quantity of consumer fireworks on hand does not exceed 125 lb (net) [56.8 kg] of pyrotechnic composition or, in a building protected throughout with an approved automatic sprinkler system installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, 250 lb (net) [113.6 kg] of pyrotechnic composition, except as specified in 7.3.1.2.1.

7.3.1.2.1 Where the quantity of consumer fireworks on hand includes any quantity of aerial devices meeting the descriptions in C.3.1.2 in any quantity not exceeding the quantities specified in 7.3.1.2, temporary CFRS facilities and Class C stores shall only be required to comply with the following sections as applicable:

1) 7.2.3 (Mercantile occupancies per NFPA 101)
2) 7.3.8 Portable Fire Extinguishers
3) 7.3.11 No Smoking Signs
4) 7.3.14.1.1 (Minimum number of exits)
5) 7.3.14.2 Egress Travel Distance
6) 7.3.14.3.2.4 (Dead end aisles)
7) 7.3.14.4 Doors and Doorways
### 2. FCC-AAA/NFPA 1

**Threshold Limits for Sprinkler Protection.**

Approval TC, FCC-AAA, approved the amended Draft CP#2 by letter ballot; CP2 became 1124-31 in A12 ROP.

1124-31 (Log#CP17)

7.3.6 An automatic sprinkler system designed and installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, shall be provided throughout permanent CFRS facilities and stores in which CFRS are conducted in the following buildings:

1. New buildings greater than 3000 ft² (278.7 m²) 6,000 ft² (557.2 m²) in area.
2. Existing buildings greater than 7,500 ft² (694 m²) in area

### 3. BLD-BLC/NFPA 5000

**Height and Area Limitations.**

Approval TC, BLD-BLC, approved the amended Draft CP# 4 by letter ballot; CP4 became 1124-20 in A12 ROP.

1124-20 (Log#CP18)

#### 6.4.1 Buildings and Structures.

Consumer fireworks shall be stored only in the following buildings or structures, provided that the building or structure does not exceed one story in height and does not contain a basement:

1. Buildings or structures constructed in accordance with the building code enforced by the AHJ
2. Buildings or structures in jurisdictions that have not adopted a building code where such buildings or structures comply with the following construction requirements: constructed in accordance with 6.4.3
   a. Buildings having an area not greater than 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials.
   b. Buildings having an area greater than 8000 ft² (743 m²) shall be constructed in accordance with one of the following:
      i. Buildings shall be constructed of noncombustible or limited-combustible materials.
      ii. Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.
(3) Magazines meeting the requirements in Chapter 4

(4) Trailers, semitrailers, and metal shipping containers that are separated by at least 20 ft (6.1 m) from any building or structure other than trailers, semitrailers, or metal shipping containers

6.4.2 Construction Materials. The following construction requirements shall apply to consumer fireworks storage buildings in jurisdictions that have not adopted a building code:

(1) Buildings having an area not greater than 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials. (2) Buildings having an area greater than 8000 ft² (743 m²) shall be constructed in accordance with one of the following:

(a) Buildings shall be constructed of noncombustible or limited-combustible materials.

(b) Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.

(c) Roof coverings for any building shall have a minimum rating of Class C as determined in accordance with NFPA 256, Standard Methods of Fire Tests of Roof Coverings.

In addition, it is proposed that paragraph 7.3.5 and 7.4.3 be revised to read as follows:

7.3.5 Construction of Buildings and Structures. Consumer fireworks shall only be permitted to be sold at retail in any of the following buildings or structures, provided that any new building or structure does not exceed one story in height and does not contain a basement:

(1) Permanent buildings or structures constructed in accordance with the building code enforced by the AHJ

(2) Tents, canopies, or temporary membrane structures complying with NFPA 102, Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures

(3) Temporary structures constructed in accordance with this chapter

(4) Temporary CFRS stands greater than 800 ft² (74 m²) in area that also meet the requirements for a permanent structure

(5) Vehicles, such as vans, buses, trailers, recreational vehicles, motor homes, travel trailers, trucks, and automobiles, complying with the applicable requirements for CFRS stands

7.4.3 Construction Materials. The following construction materials requirements shall apply
to new permanent CFRS facilities in jurisdictions that have not adopted a local building code, provided that any new building or structure does not exceed one story in height and does not contain a basement:

1) Buildings having an area up to and including 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials.

2) Buildings having an area greater than 8000 ft² (743 m²) shall be constructed in accordance with one of the following:

(a) Buildings shall be constructed of noncombustible or limited-combustible materials.

(b) Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.


Revise Table A.7.1.1, notes as shown:

*Sales conducted within 1 year prior to the effective date of this code.

†Sales not conducted within 1 year prior to the effective date of this code.

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Approval TC approved Draft CP#9 and 10 by letter ballot; CP9 and CP10 became 1124-24 and 1124-40, respectively, in the A12 ROP.

1124-25 (Log#CP22) and 1124-40 (Log#CP23)

It is proposed that Section 6.8 be amended to read as follows:

6.8 Means of Egress.

6.8.1 Means of egress in permanent consumer fireworks storage or work buildings or areas shall comply with the applicable requirements of NFPA 101, Life Safety Code.

6.8.2 Temporary trailers, semitrailers, and metal shipping containers that are not normally occupied shall not be required to comply with NFPA 101, Life Safety Code.

6.8.3 Doors.

6.8.3.1 Exterior Exit and exit access doors shall open in the direction of egress travel outward.

6.8.3.2 Doors in the means of egress shall be at least 36 in. (910 mm) wide and kept free of obstructions.

6.8.3.3 Exit doors located within the means of egress that are capable of locking or latching shall be equipped with have approved panic or fire exit hardware.

6.8.3.4 Exit doors located within the means of egress shall be unlocked from the egress side when the building is occupied.
6.8.4 Aisles.
6.8.4.1 Aisles shall be at least 36 in. (910 mm) wide and shall be kept free of obstructions.
6.8.4.2 Dead end aisles shall not exceed 50 ft (15.2 m) in length.
6.8.5 Egress Travel Distance. Exits provided for consumer fireworks storage or work buildings or areas shall be located such that the maximum egress travel distance as measured from the remotest point to an exit along the natural and unobstructed path of egress travel shall not exceed 200 ft (60.8 m).
6.8.7 Egress Capacity. Egress capacity shall be based on 0.7 in./person (18 mm/person) for stairs or 0.4 in./person (10 mm/person) for level components and ramps.

It is proposed that a new paragraph 7.3.14.3 be added to read as follows:

7.3.14.3 Egress Capacity. Egress capacity shall be based on 0.7 in./person (18 mm/person) for stairs or 0.4 in./person (10 mm/person) for level components and ramps.

Renumber the remaining subsections accordingly.

5 SMO-AAA/NFPA 204 Smoke and Heat Venting.
Approval TC, SMO-AAA approved the amended Draft CP# 6 and 8 by letter ballot; Draft CP# 7 previously approved at initial ballot stage; CP 6 and CP 7 became 1124-22 and 1124-36, respectively, in the A12 ROP.

1124-22 (Log#CP20) and 1124-36 (Log#CP21)

It is proposed that paragraph 6.5.3 be deleted as shown:

6.5.3 Smoke and Heat Vents. Smoke and heat vents designed and installed in accordance with NFPA 204, Standard for Smoke and Heat Venting, shall be provided in consumer fireworks storage buildings exceeding 50,000 ft2 (4644 m2) in undivided area.

Delete Section 7.3.10 in its entirety:

7.3.10 Smoke Control.
7.3.10.1 Smoke and heat vents designed and installed in accordance with NFPA 204, Standard for Smoke and Heat Venting, shall be provided in the CFRS area of new permanent CFRS facilities or stores where the ceiling height is less than 10 ft (3.05 m) and the travel distance to reach an exit is greater than 25 ft (7.6 m).
7.3.10.2 The smoke and heat vents required by 7.3.10.1 shall be automatically activated by a smoke detection system installed throughout the CFRS area in accordance with NFPA 72, National Fire Alarm Code.

6 FCC-AAA/NFPA 1 Flame Breaks.
Approval TC, FCC-AAA, approved Draft CP#3 by letter ballot; CP3 became 1124-45 in the A12 ROP.

1124-45 (Log#CP15)

Add a new 7.3.15.3.2 to read as follows and renumber the remaining paragraphs accordingly:

7.3.15.3.2 Flame breaks shall have a flame break rating of not less than 5 minutes as determined in accordance with PYR 1128, Standard Method of Fire Test for Flame Breaks.
7.3.15.3.2.1 Combustible flame breaks shall have a flame spread index not greater than 75, as determined in accordance with ASTM E84.

Delete Section 7.3.15.3.8.
7.3.15.3.8 Where both of the facing vertical surfaces of the abutting display fixtures are constructed of perforated hardboard panels not less than ¼ in. (6 mm) thick that are
separated from each other by an open space not less than 1 ½ in. (38 mm) wide, a flame break specified in 7.3.15.3.6 shall not be required.

Revise Section 7.3.15.4.2 as follows:
7.3.15.4.2 The 10 percent limitation on the area of holes or other openings in the shelf used to support fireworks display merchandise shall not be applicable under the following conditions:
(1) Where both of the facing vertical surfaces of the abutting display fixtures are constructed of perforated hardboard panels not less than ¼ in. (6mm) thick and separated from each other by an open space not less than 1 ½ in. (38 mm) wide
(2) where such merchandise is suspended from or fastened to the shelf or surface or is displayed as packaged merchandise on the surface or in bins.

Revise Section A.7.3.15.3 as follows:
A.7.3.15.3 Flame breaks can be constructed of any of the following: The following materials are considered to be suitable for use as flame breaks based on tests conducted at Omega Point Laboratories in 2004 in accordance with PYR 1128, Standard Method of Fire Test for Flame Breaks, full scale fire tests conducted at Southwest Research Institute in 2007—2008, analysis of the previously noted fire test data, and other sources such as the UL Fire Resistance Directory.
(1) Sheet steel not less than 18 gage
(2) Sheet aluminum not less than 0.010 in. (0.25 mm) thick
(3) Hardboard not less than 1/8 in. (3 mm) thick
(4) Gypsum board not less than 3/8 in. (10 mm) thick (nominal)
(5) Wood panels not less than 1/8 in. (3 mm) thick
(6) Exterior plywood not less than 3/4 inch (18 mm) thick (nominal)
(7) Particleboard not less than 5/8 inch (15 mm) thick (nominal)
(8) Oriented strand board not less than 7/16 inch (10.5 mm) thick (nominal)
(9) Cement fiberboard
(10) Plastic laminate not less than 1/8 in. (3 mm) thick
(11) Safety glass not less than 1/8 in. (3 mm) thick
(12) Other approved material

A.7.3.15.3.1 Where installed within a retail display fixture containing consumer fireworks, the flame break should impede or retard the rapid spread of an incipient fire involving the fireworks and their packaging materials as any of the following occurs:
(1) The fire progresses along a display level or shelf.
(2) The fire attacks another display level or shelf above.
(3) The fire attacks another display fixture abutting the display fixture of origin.
As a result of installing flame breaks to impede fire spread, the quantity and rate of smoke production can be retarded as well. Thus, flame breaks can provide the building occupants with additional time to react to an incipient fire and safely evacuate the building. See Figure A.7.3.15.3.1.

Also, revise the designation for FIGURE A.7.3.15.3 Flame Break Design to FIGURE...
| 7 | BLD-BLC/NFPA 5000 | Separation Distances.  
Approval TC, BLD-BLC, approved the amended Draft CP# 5 by letter ballot; CP5 became 1124-38 in the A12 ROP. | 1124-38 (Log#CP23)  
7.3.12 Distance from Bulk Dispensing and Bulk Storage.  
7.3.12.1 CFRS facilities and stores shall not be located within 50 ft (15.2 m) of the following:  
(1) Retail propane-dispensing station dispensers  
(2) Aboveground storage tanks for flammable or combustible liquid, flammable gas, or flammable liquefied gas  
(3) Compressed natural gas–dispensing station dispensers  
7.3.12.2* New CFRS facilities and stores, existing CFRS stands and tents, and temporary CFRS facilities shall not be located within 50 ft (15.2 m) of motor vehicle fuel–dispensing station dispensers.  
7.3.12.3 Existing permanent CFRS facilities, other than CFRS stands, tents, and temporary facilities, and existing stores shall not be located within 25 ft (7.6 m) of motor vehicle fuel–dispensing station dispensers.  
7.3.12.4 Fuel tanks on vehicles or other motorized equipment shall not be considered bulk storage.  
7.3.12.5 Fuel storage for generators shall be in accordance with 7.4.9.2.  
7.3.12.6 CFRS areas and storage areas shall not be located within 300 ft (91.2 m) of any aboveground bulk storage or bulk dispensing area for the following:  
(1) Flammable or combustible liquid  
(2) Flammable gas  
(3) Flammable liquefied gas  

A.7.3.12.2 To assist the user of this code in determining what is a new CFRS facility, according to 7.1.1.1, all tents, stands, canopies, and membrane structures are considered to be new. See also Table A.7.1.1. |
| 8 | BLD-BLC/NFPA 5000 | Construction Materials.  
Approval TC, BLD-BLC, approved the amended Draft CP# 4 by letter ballot; CP4 became 1124-20 in the A12 ROP. | 1124-20 (Log#CP18)  
See issue 3 for amended text per this item. |
| 9 | AUT-AAC, AUT-SSD/NFPA 13 | Sprinkler Design Criteria.  
Approval TC, AUT-SSD, approved Draft CP#11 and CP# 12 for | 1124-21 (Log#CP24) and 1124-32 (Log#CP25)  
THIS PROPOSAL REJECTED  
It is proposed that paragraph 6.5.1.1 be revised as shown:  
6.5.1.1: The automatic sprinkler system shall be designed using the following criteria for the |
inclusion as REJECTED proposals; proposals developed at January 13 – 14, 2011 meeting of PYR-AAA based on input from AUT-SSD Task groups to PYR-AAA task group in December 2010; PYR-AAA passed letter ballot for both Draft CP# 11 and 12. These draft CP items, became 1124-21 and 1124-32, respectively, in the A12 ROP. Both items were rejected by PYR-AAA to stimulate Public Comment and provide time for further consideration. Committee Comments developed based on September 2011 AUT-SSD recommendations and AON FPRF report. These items became comments 1124-4, 1124-5, and 1124-6 in the A12 ROC.

Areas in which the consumer fireworks are stored in DOT-approved packaging:
1) Consumer fireworks stored in DOT-approved packaging shall be considered as a Class IV commodity.
2) Consumer fireworks stored to a height not greater than 10 ft. (3 m) in racks, or 12 ft. (3.7 m) otherwise, shall be classified as an Ordinary Hazard (Group 2) Extra Hazard (Group 1) occupancy.
3) Consumer fireworks stored to a height not greater than 12 ft. (3.7 m) in racks, but greater than 10 ft. (3 m) shall be classified as an Extra Hazard (Group 2) occupancy.
4) Consumer fireworks stored to a height greater than 12 ft. (3.7 m) shall be protected by an automatic sprinkler system designed using early suppression fast-response (ESFR) sprinklers, a fire control approach or a special design approach in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

Substantiation: The NFPA Pyrotechnics Technical Committee (TC) established a task group responsible for coordinating review of issue #9 of the Standards Council Decision, D#08-19 October 1, 2008 with the Technical Committee on Sprinkler System Discharge Criteria responsible for sprinkler design criteria for NFPA 13. Discussion between the respective task groups for each committee forms the basis for the proposed action. Due to recent discussions between the Committee on Pyrotechnics and the Committee on Automatic Sprinklers – Sprinkler System Discharge Criteria Technical Committee, the current sprinkler design criteria in NFPA 1124 have been called into question. This proposal recommends a more conservative approach, but has not been technically substantiated as required by the Standards Council decision so the action by the committee at this time is to act to reject the Committee Proposal.

The Committee is recommending rejection of this proposal because the Committee believes that, based upon discussions with the NFPA 13 Sprinkler System Discharge Criteria Technical Committee (AUT-SSD), further technical substantiation is required to be determined through fire testing under the auspices of the Fire Protection Research Foundation (FPRF). The purpose of this further testing is to determine the appropriate sprinkler design criteria that will provide an adequate level of protection in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

THIS PROPOSAL REJECTED

Add a new 7.3.6.1 as shown:

7.3.6.1 Sprinkler Design Criteria. The automatic sprinkler system shall be designed based on the requirements for an Extra Hazard (Group 2) occupancy in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

Delete A.7.5.1.1:

A.7.5.1.1 Preliminary results of recent full scale fire tests indicate that automatic sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy in accordance with NFPA13, Standard for the Installation of Sprinkler Systems, might be suitable for protecting retail displays of consumer fireworks where the ceiling height does not exceed 10 ft (3.1 m) and might also be adequate for ceiling heights up to 16 ft (4.9 m). This implies that there may be a need to design the
sprinkler system in new buildings for an Extra Hazard, Group 1 occupancy for ceiling heights greater than 16 ft (4.9 m). For existing buildings, existing sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy should suffice. Until such time as additional fire testing is completed and more conclusive design criteria can be verified, designers of automatic sprinkler systems for areas where retail sales of consumer fireworks are located may want to consider these design criteria. For additional information contact the American Pyrotechnics Association (APA), PO Box 30438, Bethesda, MD 20824.

**Substantiation:** Due to recent discussions between the Committee on Pyrotechnics and the Committee on Automatic Sprinkler – Sprinkler System Discharge Technical Committee, the current sprinkler design criteria in NFPA 1124 have been called into question. This proposal recommends a more conservative approach, but has not been technically substantiated as required by the Standards Council decision so the action by the committee at this time is to act to reject the Committee Proposal.

1124-4 (Log#CC1), 1124-5 (Log#CC3) and 1124-6 (Log#CC2)

**THESE COMMENTS ACCEPTED**

1124-4 Delete existing paragraph and replace with the following:

6.5.1.1* Reserved

A.6.5.1.1 Appropriate sprinkler system design criteria should be determined based upon an engineering analysis prepared by a fire protection engineer.

**Substantiation:** During a meeting of the NFPA Technical Committee on Automatic Sprinkler Discharge Criteria the Committee noted that the sprinkler design criteria in NFPA 1124 has not been adequately substantiated. As such the Committee voted to request that the criteria be deleted and replaced with the proposed Annex note, until such time as research for the purposes of determining sprinkler discharge design criteria has been conducted and criteria developed. The coordination between the AUT-SSD and PYR-AAA committees is being maintained as outlined in the Standards Council Decision (D#08-19) of October 2008 where the Sprinkler Discharge Criteria Committee serves as an approval committee for any sprinkler design requirements to be included in NFPA 1124.

1124-5 Create revised annex text for A.7.5.1.1 as shown below:

A.7.5.1.1 For existing buildings, existing sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy should be sufficient.

**Substantiation:** The Committee is retaining the language related to existing buildings from the existing A.7.5.1.1 in order to provide guidance for sprinkler systems in existing buildings. The application of the retroactivity provision in 1.4 makes the revision of this annex text for A.7.5.1.1 necessary in light of the new annex note in A.7.3.6.

1124-6 Delete existing paragraph A.7.5.1.1 and replace with the following annex now to paragraph 7.3.6:

A.7.3.6 Appropriate sprinkler system design criteria should be determined based upon an engineering analysis prepared by a fire protection engineer.

Add Annex 7.3.7 as shown:
A.7.3.7 See A.7.3.6.

Substantiation: During a meeting of the NFPA Technical Committee on Automatic Sprinkler Discharge Criteria the Committee noted that the sprinkler design criteria in NFPA 1124 has not been adequately substantiated. As such the Committee voted to request that the criteria be deleted and replaced with the proposed Annex note, until such time as research for the purposes of determining sprinkler discharge design criteria has been conducted and criteria developed. The coordination between the AUT-SSD and PYR-AAA committees is being maintained as outlined in the Standards Council Decision (D#08-19) of October 2008 where the Sprinkler Discharge Criteria Committee serves as an approval committee for any sprinkler design requirements to be included in NFPA 1124.

AUT-SSD Feb 10, 2011 ROP minutes, excerpt (Item 6 of agenda)

“...The Pyrotechnics Task Group: Jerald Farley, representing the Pyrotechnics Committee reported on the proposed action on NFPA 1124. Mr. Farley reported that the Pyrotechnics committee drafted two committee proposals, CP#11 and CP#12. These committee proposals changed the hazard classification in 6.5.1.1, added a new section 7.3.6.1 for sprinkler design criteria and deleted section A.7.5.1.1. The Pyrotechnics committee voted to reject CP#11 and CP#12. The Technical Committee on Sprinkler Discharge Criteria made a motion to support the rejection of CP#11 and CP#12. The TC will be balloted on this action.

The Technical Committee on Sprinkler Discharge Criteria also made a motion to submit a public comment to the Pyrotechnics Committee to delete section 6.5.1.1 (replace with “Reserved”) and delete A.7.5.1.1 of NFPA 1124 and to add new annex material to sections A.6.5.1.1 and A.7.3.6. The two new annex sections will address the fact that the existing sprinkler protection criteria is not adequately substantiated and the appropriate fire protection criteria needs to be determined after a careful analysis is conducted by a fire protection engineer. The committee realizes there are different scenarios and the protection criteria may be different for each. This will be the recommendation until there is some testing/documentation provided to substantiate the protection criteria based upon technical data such as fire testing.”

AUT-SSD Sep 22-23, 2011 ROC minutes, excerpt (Item 6 of agenda)

“...FPRF Presentation. NFPA 1124 Pyro Presentation – Garner Palenske, Aon

Garner Palenske presented Aon's research on pyrotechnic storage arrangements and sprinkler protection. Garner presented a proposed testing plan that could be used to develop sprinkler requirements for pyrotechnic storage/display. The TC anticipates that the testing will be conducted in the near future, but will most likely not be finished by the time the next editions of NFPA 13 and 1124 are released. Bill
Koffel will address the NFPA 1124 TC with an interim solution that requires a design professional to produce a performance-based design plan for these occupancies, as no adequately justified prescriptive design criteria exists at this time.”

NFPA 1124-2013 The text below shows how the changes implemented through Comments 1124-4, 1124-5, and 1124-6 would modify the 2006 edition of the code and what the final text would be if approved and issued by the Council (in response to Council Decision item 9).

Per 1124-4

6.5 Fire Protection.
6.5.1* Automatic Sprinkler System. An automatic sprinkler system installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, shall be provided in consumer fireworks storage buildings greater than 12,000 ft² (1115 m²).
6.5.1.1* Reserved.
6.5.1.1 The automatic sprinkler system shall be designed using the following criteria for the areas in which the consumer fireworks are stored in DOT-approved packaging:
(1) Consumer fireworks stored in DOT-approved packaging shall be considered as a Class IV commodity.
(2) Consumer fireworks stored to a height not greater than 10 ft (3 m) in racks, or 12 ft (3.7 m) otherwise, shall be classified as an Ordinary Hazard (Group 2) occupancy.
(3) Consumer fireworks stored to a height not greater than 12 ft (3.7 m) in racks, but greater than 10 ft (3 m), shall be classified as an Extra Hazard (Group 1) occupancy.
(4) Consumer fireworks stored to a height greater than 12 ft (3.7 m) shall be protected by an automatic sprinkler system designed using a fire control approach or a special design approach in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.
6.5.1.2 The waterflow alarm device shall be arranged to activate audible and visible alarms throughout the facility in accordance with NFPA 72, National Fire Alarm Code.

Add new Annex to 6.5.1.1

A.6.5.1.1 Appropriate sprinkler system design criteria should be determined based upon an engineering analysis prepared by a fire protection engineer.

Per 1124-5

Delete existing A.7.5.1.1 (per 1124-6) and replace with the following:

A.7.5.1.1 Preliminary results of recent full scale fire tests indicate that automatic sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, might be suitable for protecting retail displays of consumer fireworks where the ceiling height does not exceed 10 ft (3.1 m) and might also be adequate for ceiling heights up to 16 ft (4.9 m). This implies that there may be a need to design the sprinkler system in new buildings for an Extra Hazard, Group 1 occupancy for ceiling heights greater than 16 ft (4.9 m). For existing buildings, existing sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy...
should suffice. Until such time as additional fire testing is completed and more conclusive design criteria can be verified, designers of automatic sprinkler systems for areas where retail sales of consumer fireworks are located may want to consider these design criteria. For additional information contact the American Pyrotechnics Association (APA), PO Box 30438, Bethesda, MD 20824.

A.7.5.1.1 For existing buildings, existing sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy should be sufficient.

Per 1124-6

Delete A.7.5.1.1 (create new text per 1124-5) and create new annex A.7.3.6 and A.7.3.7 to existing 7.3.6 and 7.3.7 as shown:

7.3.6* An automatic sprinkler system designed and installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, shall be provided throughout permanent CFRS facilities and stores in which CFRS are conducted in the following buildings:

(1) New buildings greater than 3000 ft² (278.7 m²) in area [1124-31] (Log #CP17)

(2) Existing buildings greater than 7500 ft² (694 m²) in area

[7.3.6 modified by Council decision item 2]

A.7.3.6 Appropriate sprinkler system design criteria should be determined based upon an engineering analysis prepared by a fire protection engineer.

Add Annex 7.3.7 as shown:

7.3.7* Storage Rooms. Storage rooms containing consumer fireworks in a new permanent CFRS facility or store shall be protected with an automatic sprinkler system installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, or separated from the retail sales area by a fire barrier having a fire resistance rating of not less than 1 hour.

A.7.3.7 See A.7.3.6.
MEMORANDUM

To: Gregory Harrington, Staff Liaison for Fire Code Committee

From: G. Colonna, Staff Liaison for Pyrotechnics Committee

Date: July 8, 2009

Subject: Transmittal of Draft Proposals for NFPA 1124 (A11) for review and action by Fire Code Technical Committee

Attached are the Draft Proposals (pre-ROP) and the letter ballot results for proposed changes to Chapter 7 of NFPA 1124, Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles. This material was developed by the Committee on Pyrotechnics at its February 2 – 3, 2009 meeting in Orlando.

In accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008, this material has been developed as Draft Proposals (pre-ROP) and has been letter balloted through the Committee on Pyrotechnics. In addition to the Draft Proposals, I have also attached the final ballot results indicating that these items achieved the required 2/3rd majority for each of three DRAFT Committee Proposals (DRAFT CP#1 through CP#3).

In accordance with the direction of the Council, I am providing you with this information as Staff Liaison to the Fire Code Committee and requesting that you include this as an agenda item for future consideration by the Fire Code Committee. The Task Group leader for the Pyrotechnics Committee for this activity is Tad Trout, American Promotional Events. I am aware that his task group met with your Committee in December 2008 to begin this process. If your Committee has questions on any of these items presented in the attached Draft Proposals, please contact me or Mr. Trout directly for clarification.

One other informational note – the Committee on Pyrotechnics has scheduled its next meeting for August 30 – September 1 in San Diego. This meeting agenda focuses on the ongoing work by the Committee to address the items outlined in the Council decision regarding NFPA 1124. If there are any agenda items that the Fire Code Committee requests the Pyrotechnics Committee to consider, please let me know so I can include them as part of the Committee’s business for this meeting next month.

Thanks for your assistance in this process and thanks to the Fire Code Committee in advance for their efforts to assist with this revision of NFPA 1124. If you have any questions, please contact me.
Enclosures:  Draft Committee Proposals
Letter Ballot on Draft Committee Proposals, final results

cc:    Linda Fuller, Standards Administration
       J. Moreau-Correia, Project Administrative Supervisor
TECHNICAL COMMITTEE ON FIRE CODE

MEMORANDUM

TO: Technical Committee on Fire Code (FCC-AAA)

FROM: Gregory Harrington, P.E., Staff Liaison

DATE: August 5, 2010

SUBJECT: Approval Committee Ballot for NFPA 1124

CP#1 Ballot Results

The July 30, 2010 date for receipt of the Approval Ballots for NFPA 1124 has passed. As there were no negative votes on Draft CP#1, these results are now final.

The results are as follows:

29 Members Eligible to Vote
4 Ballots Not Returned (Bancroft, Fangmann, Schirmer and Sharry)
24 Affirmative (without comment)
1 Abstention (Erickson)

Carl Baldassarra voted for Randolph Tucker.

Abstention:

Erickson: I will be abstaining on both ballots. My reason for doing so is that this subject is totally out of my area of expertise and while I have followed the debate and read through the material, I cannot make a professional judgment on what is the correct course of action.
The number of affirmative votes necessary to pass balloting is based on the number eligible to vote, minus the not returned and abstentions. The results show that this Approval Ballot has achieved the necessary 2/3 majority needed to pass ballot: 29 eligible to vote – 4 not returned – 1 abstention = 24 x .66 = 15.84 (rounded up) to 16. The ballot received 24 affirmative votes. In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required. These criteria have been met.

GH/DM
MEMORANDUM

To: Technical Committee on Pyrotechnics

From: G. Colonna

Date: January 11, 2010

Subject: Draft Proposals Ballot for NFPA 1124 (A11)

Attached are the Draft Proposals (pre-ROP) Ballot and ballot material on NFPA 1124, Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles. This material was developed originally at your February 2 – 3, 2009 meeting in Orlando and further modified during the August 31 – September 1, 2009 meeting in San Diego. The ballot is for formally voting on whether or not you concur with the Committee's Actions on these draft proposals. If you do not concur, or you abstain, you must provide a technical reason. Following the vote of the Committee, these items and the respective actions will be forwarded to the Fire Code Committee (responsible for NFPA 1) in accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for correction.

Please return your ballot as soon as possible, but no later than Friday, January 22, 2010. For action by the Committee that passes either or both of the attached DRAFT Committee Proposals, the proposal will be presented to the NFPA 1 Committee during our upcoming meeting February 1 – 2, that overlaps their meeting on February 2 – 3 in Salt Lake City.

Your cooperation in meeting this deadline is appreciated. If you wish to fax your ballot, please fax to (617) 984-7110.

Note: Please remember that the return of ballots and attendance at Committee Meetings are required for all principal and alternate members in accordance with the Regulations Governing Committee Projects.

Enclosures: Ballot Form
Draft Committee Proposals

cc: Linda Fuller, Standards Administration
    J. Moreau-Correia, Project Administrative Supervisor
DRAFT PROPOSAL BALLOT DUE BY:
Friday, January 22, 2010
NFPA 1124 PYR-AAA
Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles
Staff Liaison: Guy R. Colonna

Return Completed Ballot To: J. Moreau-Correia
E-Mail to jmoreaucorreia@nfpa.org
Fax to 617-984-7110
One Batterymarch Park, Quincy, MA 02169

Date: ___________________ Signed: ________________________________________

Name: ______________________________
Type or Print black ink

Committee Action Key:
A = Accept
R = Reject
APA = Accept in Part
APR = Accept in Principle
APP = Accept in Principle in Part
H = Hold

With respect to the Committee Actions on the DRAFT Proposals that accompanied the ballot, please record me as voting: (check one):

☐ Affirmative On All Items. I agree with all committee meeting actions without comment.

☐ Affirmative With Exception(s): I agree with all committee meeting actions Except for the Affirmative with comment, Negative and /or Abstention checked below.

*Reasons must accompany these votes.
When possible, reasons are requested via e-mail in a Word Document.

Please return this Ballot Page only to NFPA.

<table>
<thead>
<tr>
<th>Log No.</th>
<th>Section</th>
<th>Committee Action</th>
<th>Affirmative with Comment*</th>
<th>Negative*</th>
<th>Abstain*</th>
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<tr>
<td>Draft CP#1</td>
<td>7.3.1.1, 7.3.1.2, 7.3.1.2.1</td>
<td>Accept</td>
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<td>Draft CP#2</td>
<td>7.3.6</td>
<td>Accept</td>
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NFPA 1124-2006
Draft Committee Proposals
Approved for letter ballot at Committee Meeting, August 31 – September 1, 2009, San Diego, CA
These actions relate to items 1 and 2 in the Standards Council Decision, D#08-19 and are to be coordinated with the Fire Code Committee in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Log# DRAFT CP#1
Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that paragraph 7.3.1.1 be amended and new paragraphs 7.3.1.2 and 7.3.1.2.1 be added to read as follows:

7.3.1 Exempt Amounts.

7.3.1.1 The requirements of this chapter shall not apply to permanent CFRS facilities or and Class A and Class B stores where the consumer fireworks are in packages, there are no quantities of aerial devices meeting the descriptions in C.3.1.2, and where the total quantity of consumer fireworks on hand does not exceed 125 lb (net) [56.8 kg] of pyrotechnic composition or, in a building protected throughout with an approved automatic sprinkler system installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, 250 lb (net) [113.6 kg] of pyrotechnic composition.

7.3.1.2 The requirements of this chapter shall not apply to temporary CFRS facilities and Class C stores where the consumer fireworks are in packages and where the total quantity of consumer fireworks on hand does not exceed 125 lb (net) [56.8 kg] of pyrotechnic composition or, in a building protected throughout with an approved automatic sprinkler system installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, 250 lb (net) [113.6 kg] of pyrotechnic composition, except as specified in 7.3.1.2.1.

7.3.1.2.1 Where the quantity of consumer fireworks on hand includes any quantity of aerial devices meeting the descriptions in C.3.1.2 in any quantity not exceeding the quantities specified in 7.3.1.2, temporary CFRS facilities and Class C stores shall only be required to comply with the following sections as applicable:

(1) 7.2.3 (Mercantile occupancies per NFPA 101)
(2) 7.3.8 Portable Fire Extinguishers
(3) 7.3.11 No Smoking Signs
(4) 7.3.14.1.1 (Minimum number of exits)
(5) 7.3.14.2 Egress Travel Distance
7.3.14.3.2.4 (Dead end aisles)

7.3.14.4 Doors and Doorways

7.3.15.5 Covered Fuses

7.3.15.6 Aerial Devices (CFRS facilities)

7.3.16 Electrical Equipment

7.3.17 Heating Equipment

7.3.19 Operations

7.3.21 Housekeeping

7.3.22 Training

7.3.23 Under the Influence

7.4.6.3 Fireworks Discharge

7.4.9.3 Cooking Equipment

7.5.1.2 (Consumer fireworks in stores)

7.6 Stands

Existing 7.3.1.2 to be renumbered as 7.3.1.3.

**Substantiation:** This section is based on the maximum allowable quantity (MAQ) of hazardous materials per control area specified for consumer fireworks, 1.4G in Table 60.1.26.1 of NFPA 1-2009 (Table 60.1.3.1 of the 2000 edition), as well as Table 34.1.3.1 of NFPA 5000-2009. These quantities are also identical to the maximum allowable quantity per control area of hazardous materials posing a physical hazard in Table 2703.1.1(1) of the 2006 International Fire Code (IFC) and Table 307.1(1) of the 2006 International Building Code (IBC). Utilizing the default value for determining the weight of the pyrotechnic composition of the consumer fireworks in accordance with Footnote k to Table 60.1.26.1 of NFPA 1, this would allow for a gross weight of consumer fireworks, 1.4G (including packaging) of 500 lb. or 1,000 lb. where sprinklers are provided. It should be noted that 500 lb. gross weight of consumer fireworks is approximately equivalent to 12 to 15 cases. Similarly, 1,000 lb. gross weight of consumer fireworks is approximately equivalent to 25 to 30 cases.

Because of the concerns of several members of Task Group A and as a result of the full-scale fire tests conducted at Southwest Research Institute (SWRI) for the American Fireworks Standards Laboratory (AFSL), it was decided to recommend a revision to Section 7.3.1.1 to address aerial devices that meet
the requirements for consumer fireworks, 1.4G and are sold to the public in consumer fireworks retail sales facilities (CFRS) and stores.

Task Group A believes that there is no need to provide for further substantiation or documentation of the exempt amounts contained in Chapter 7 of NFPA 1124 for consumer fireworks since they are based upon the maximum allowable quantities specified in NFPA 1 and NFPA 5000 as noted above, as well as the IFC and IBC. However, Task Group A believes that additional safety measures should be provided for aerial devices even if they are included in the exempt amounts for not having to comply completely with Chapter 7 of NFPA 1124. It is believed that this approach is technically justified based upon the SWRI full-scale fire tests where the aerial devices were appropriately contained to meet the intent of the requirements for restricting the travel of aerial devices after they are ignited.

The proposed revision to 7.3.1.1 would only exempt permanent CRFS facilities and Class A and Class B stores from the requirements of Chapter 7 where the exempt amounts of consumer fireworks are in packages and there are no quantities of aerial devices which meet the descriptions in C.3.1.2. In other words, if even one aerial device is being sold in one of these facilities or stores, then they would have to comply with the entire Chapter 7 as applicable. Thus, there is no exempt amount allowed for aerial devices in these facilities and stores. This is more conservative than currently allowed for buildings designed and constructed in accordance with NFPA 1 and NFPA 5000 as noted previously. This revision is being proposed because the Pyrotechnics Technical Committee (TC) believes that this more conservative approach to requiring compliance with Chapter 7 of NFPA 1124 is appropriate where aerial devices are sold to the public.

Proposed new 7.3.1.2 applies the current exempt amounts to Class C stores, which by definition do not exceed 3,000 sq ft in area and one story in height, and to temporary CFRS facilities which include stands not greater than 800 sq ft in area and tents of any size. However, new 7.3.1.2.1 would require these stores or facilities to comply with a list of specific sections in Chapter 7 where these stores or facilities contain quantities of aerial devices up to the exempt amounts specified in 7.3.1.2. The Pyrotechnics TC believes that this is a conservative approach to the application of exempt amounts in these stores and facilities where aerial devices are sold since they may pose more of a fire and life safety hazard than the other types of consumer fireworks that are not capable of movement on their own. This concept is similar to that in NFPA 1 Chapter 60 Hazard Materials and comparable Chapter 34 in NFPA 5000 where the maximum allowable quantities (MAQ) are not exceeded. The maximum allowable quantities in those
codes are the same as the exempt amounts specified in 7.3.1 of NFPA 1124 for all types of consumer fireworks.

Where the MAQs are not exceeded, Section 60.1.3.1 of NFPA 1 still specifies compliance with Sections 60.1 General Requirements and 60.2 Requirements for All Occupancies Containing High-Hazard Contents which is comparable to Section 34.2 of NFPA 5000. However, compliance with the rest of Chapter 60, or the rest of Chapter 34 in NFPA 5000, is not mandated.

The following discusses the nineteen (19) sections listed in proposed new 7.3.1.2.1 as being required where aerial devices are sold in Class C stores or temporary CFRS facilities in quantities not exceeding the exempt amounts specified in 7.3.1.2.

Section 7.2.3 This section requires compliance with NFPA 101 for mercantile occupancies.
- This is a basic requirement of NFPA 1/5000 for all occupancies regardless of hazard.

Section 7.3.8 Portable Fire Extinguishers. This section specifies minimum requirements for portable fire extinguishers.
- This is a basic requirement of NFPA 1 (13.6.2) / 5000 (27.3.5.3).

Section 7.3.11 No Smoking Signs. This section prohibits smoking in specific locations and requires posting with “No Smoking” signs.
- Similar requirements are contained in NFPA 1 (60.1.11.1 and 60.1.13.3).

Section 7.3.14.1.1 This section specifies that the minimum number of required exits must be at least three.
- This exceeds the minimum requirements in NFPA 1 / 101 / 5000.
- This provides another exit option to further minimize the possibility of having all exits blocked during a fire emergency involving aerial devices.

Section 7.3.14.2 Egress Travel Distance. This section limits the travel distance to reach an exit in all CFRS facilities and Class C stores to a maximum of 75 ft.
• This is comparable to the requirements in NFPA 1 / 101 / 5000 for mercantile occupancies containing high-hazard contents.

Section 7.3.14.3.2.4 This section prohibits dead end aisles.

• This is comparable to the requirements in NFPA 1 / 101 / 5000 for mercantile occupancies containing high-hazard contents.

Section 7.3.14.4 Doors and Doorways. This section requires the minimum egress door width to be not less than 36 inches with a minimum clear width not greater than 32 inches. It also requires the egress doors to swing in the direction of egress travel and be provided with panic hardware where latches are installed on the doors.

• The minimum width and direction of door swing requirements are comparable to the requirements in NFPA 1 / 101 / 5000.
• The requirement for panic hardware exceeds the minimum requirements in NFPA 1 / 101 / 5000 for egress door hardware in mercantile occupancies.

Section 7.3.15.5 Covered Fuses. This section requires all consumer fireworks being sold to the public to be provided with covered fuses that protect the individual fireworks device from being discharged accidentally or by malicious mischief, or in the early stages of a fire.

• The intent of this requirement is to reduce the potential for rapid fire growth that could involve the ignition of multiple fireworks devices in the early stages of fire development which are the most critical to egress. Covered fuses are intended to facilitate egress by minimizing the adverse effects of discharging fireworks devices.

Section 7.3.15.6 Aerial Devices. This section requires that aerial devices be packaged and displayed for sale in a manner that will limit the travel distance of ejected pyrotechnic components should ignition of the fireworks occur.

• The intent of this requirement is to minimize the impact of discharging aerial devices on the egress of the occupants in the early stages of fire development by restraining their travel. This will also minimize the potential for the aerial devices igniting multiple fires and blocking multiple paths of travel to reach the exits. This is intended to confine the major effects of discharging aerial devices to the area immediately adjacent to the origin of the fire.
Section 7.3.16 Electrical Equipment. This section requires all electrical wiring to comply with NFPA 70, National Electrical Code.

- This is comparable to the requirements in NFPA 1 (60.1.1.16) and is a basic requirement in NFPA 101 (9.1.2) / 5000 (52.1).

Section 7.3.17 Heating Equipment. This section requires heating units to be listed and used in accordance with their listing. It also requires temporary heating sources to have tip-over and temperature-overheat protection and prohibits open flame and exposed element heating devices.

- This is comparable to the requirements in NFPA 1 (60.1.11.2).

Section 7.3.19 Operations. This section contains general operations requirements such as maintaining clear access to the means of egress, limiting the proximity of fireworks displays to exits and entrances to the building in order to minimize immediate blockage should a fire occur, and prohibiting the ignition and/or discharge of fireworks within 300 feet of the building or facility.

- These requirements provide an enhanced level of fire and life safety where aerial devices are sold at virtually no cost since they are operational in nature and can be readily implemented.

Section 7.3.21 Housekeeping. These are general housekeeping provisions to help maintain a reasonably debris- and rubbish-free facility without loose pyrotechnic composition lying around for any significant period of time. It also provides for a safe means for cleaning up the loose pyrotechnic composition in order to avoid ignition of those materials.

- These are basic fire safety requirements that can be readily implemented without any significant cost to help improve the overall level of safety in the building or facility since they are basically operational in nature.

Section 7.3.22 Training. This section requires that all personnel handling consumer fireworks be provided with safety training related to the performance of their duties.

- This requirement is comparable to the requirement in NFPA 1 (60.1.9).

Section 7.4.6.3 Fireworks Discharge. This section requires signage to indicate that fireworks are not allowed to be discharged within 300 feet.
• This requirement ties in with the requirement in Section 7.3.19.4 above which prohibits the discharge of fireworks within 300 feet.

Section 7.4.9.3 Cooking Equipment. This section prohibits cooking equipment within tents, canopies, and membrane structure containing consumer fireworks. It also prohibits open flame cooking equipment within 50 feet of such tents, canopies, or membrane structures.

• These requirements are comparable to the requirements in NFPA 1 (60.1.11.2).

Section 7.5.1.2 Fireworks Displayed for Sale in Stores. This section specifies operational requirements for the display of consumer fireworks in stores in such a manner as to minimize their involvement in a fire condition in order to limit their impact on the means of egress for the occupants of the store. This section also restricts access to the aerial devices in order to minimize malicious mischief involving the ignition and/or discharge of such devices when the building is occupied.

• Basically these are operational requirements that can be implemented at virtually no cost to the store but provide a significant degree of fire and life safety to the occupants and the public shopping in the store. The main purpose of these requirements is to minimize the opportunity for malicious mischief involving the aerial fireworks being sold, as well as their impact should they become involved in a fire. These requirements also facilitate egress from the areas where aerial type fireworks are sold.

Section 7.6 Stands. This section contains all of the requirements specifically applicable to stands where consumer fireworks are sold to the public.

• The Pyrotechnics TC believes that it is vitally important that stands used to sell fireworks that include aerial devices, regardless of the quantity, meet all of the applicable requirements specific to stands due to the very close proximity the occupants of the stands have to the fireworks devices. The occupants are very likely to be in the immediate area of the fire ignition so they should be provided with all of the appropriate fire and life safety features currently contained in Section 7.6 of NFPA 1124.

In summary, it is the opinion of the Pyrotechnics TC that the exempt amounts specified in Section 7.3.1 are valid based upon the reference codes indicated above. Furthermore, to err on the side of safety where aerial devices are sold at retail, which are much more energetic and have much more opportunity
to spread fire and involve more devices during a fire incident than the other types of consumer fireworks that are not self-propelled, certain specific requirements of Chapter 7 should be applicable regardless of the quantity of aerial devices being sold.

Committee Meeting Action: Accept
Log# Draft CP#2
Submitter: Technical Committee on Pyrotechnics
Recommendation: Task Group A proposes to retain the current requirement in paragraph 7.3.6 as shown below:

7.3.6 An automatic sprinkler system designed and installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, shall be provided throughout permanent CFRS facilities and stores in which CFRS are conducted in the following buildings:

1. New buildings greater than 6,000 ft\(^2\) (557.2 m\(^2\)) in area
2. Existing buildings greater than 7,500 ft\(^2\) (694 m\(^2\)) in area

Substantiation: Task Group A does not believe there is a need to make any further revisions to these sprinkler threshold limits in NFPA 1124 as they have been adequately substantiated and vetted through the NFPA standards development process and by the NFPA general membership, as well as the NFPA Standards Council (SC).

As a result of the initial development of Chapter 7 of NFPA 1124, the November 2002 Report on Comments (ROC) proposed automatic sprinkler system thresholds of 12,000 ft\(^2\) for new buildings and 15,000 ft\(^2\) for existing buildings. These limits were based on those contained in NFPA 101 for mercantile occupancies. A Public Comment 1124-93/Log #163 was submitted to Section 7.5.1.1 by the Southern Fire Code Development Committee to reduce the sprinkler threshold limit to 6,000 ft\(^2\) for new construction. That Public Comment was rejected by the Pyrotechnics Technical Committee (TC). So the proponent brought it to the floor of the NFPA Technical Committee Reports (TCR) Session held in Atlanta, GA in November, 2002. It was approved by the NFPA voting members in attendance and subsequently upheld by the Pyrotechnics TC and the NFPA SC. At that session it was also noted that because there was no comparable Public Comment submitted to reduce the threshold limit for existing buildings, an appeal would be filed with the NFPA SC to request that the 15,000 ft\(^2\) threshold be reduced to 7,500 ft\(^2\) for existing buildings. This would be comparable to the one-half reduction in the sprinkler threshold for new buildings.

Subsequent to the ROC meeting, the American Pyrotechnics Association (APA) followed through on their commitment made during the TCR Session in Atlanta and submitted an appeal to the NFPA SC to, in fact,
reduce the sprinkler threshold for existing buildings to 7,500 ft\(^2\). That appeal was granted by the NFPA SC. Thus, the automatic sprinkler system threshold for both new and existing buildings was based on one-half that required by NFPA 101 for mercantile occupancies for those buildings and facilities where consumer fireworks, 1.4G were sold at retail to the public.

For further information and history regarding the regulation of the retail sales of consumer fireworks, it should be noted that in the 2000 edition of NFPA 1 a new Section 16-10 Sales, Handling, and Storage of Consumer Fireworks was incorporated to address, among others, the retail sales of consumer fireworks. It should also be noted that there were no automatic sprinkler system threshold requirements contained in that section. Subsequent to Section 16-10 being incorporated into NFPA 1, a TIA was issued on January 18, 2001. It was designated as TIA 00-1 (NFPA 1). It was a result of a joint Task Group effort established by the NFPA SC consisting of members of the NFPA 1, NFPA 101, and NFPA 1124 TCs to develop a more comprehensive package of requirements for the retail sales of consumer fireworks. The TIA included new Sections 16-10.3 and 16-10.4 which contained additional requirements. However, there were no threshold area limits set for requiring automatic sprinkler system protection. But the maximum quantity limits specified for consumer fireworks in retail sales facilities were allowed to be increased 100% where an automatic sprinkler system was installed. Also, for existing buildings the retail display area for consumer fireworks was allowed to exceed 3,000 ft\(^2\) (without any upper limit) where an automatic sprinkler system was installed in the retail display area.

A further comparison to NFPA 101-2009 and NFPA 5000-2009 may also be warranted to justify the recommendation to not reduce the current sprinkler thresholds in NFPA 1124 for mercantile occupancies where consumer fireworks, 1.4G are sold at retail. NFPA 101 Section 6.2.2.4 High Hazard Contents describes such contents as those “likely to burn with extreme rapidity or from which explosions are likely.” The Annex A note to this section states:

“High hazard contents include occupancies where flammable liquids are handled or used or are stored under conditions involving possible release of flammable vapors; where grain dust, wood flour or plastic dust, aluminum or magnesium dust, or other explosive dusts are produced; where hazardous chemicals or explosives are manufactured, stored, or handled; where materials are processed or handled under conditions producing flammable flyings; and other situations of similar hazard.”
None of these situations directly, or even indirectly, appear to apply to consumer fireworks, 1.4G. Furthermore, Section 6.2.2.3 Ordinary Hazard Contents classifies contents under that heading if they are “likely to burn with moderate rapidity or give off a considerable volume of smoke.” That description sounds more like consumer fireworks, 1.4G complying with NFPA 1124 based on the full-scale fire tests conducted at Southwest Research Institute (SWRI).

Nevertheless, in Chapter 36 New Mercantile Occupancies Section 36.1.5.2 contains specific requirements for mercantile occupancies classified as high hazard. It specifies three special requirements that must be met. But none of them mention a requirement that automatic sprinklers be provided. However, Section 36.3.5.1(2) requires new mercantile occupancies greater than 12,000 sq ft to be sprinklered. Similarly, Section 37.3.5.1(1) requires existing mercantile occupancies greater than 15,000 sq ft in area on any story to be sprinklered. As noted previously, these area thresholds for sprinkler protection are twice that specified in NFPA 1124. It is also interesting to note that Section 36.4.6 Retail Sales of Consumer Fireworks, 1.4G requires that mercantile occupancies where consumer fireworks, 1.4G are sold at retail comply with NFPA 1124. So NFPA 101 seems to be satisfied with the life safety protection level for automatic sprinklers specified in NFPA 1124, as does the Mercantile and Business Occupancies TC.

Section 6.3.2 Classification of Hazard of Contents of NFPA 5000 contains descriptions for high hazard level contents in buildings regulated by NFPA 5000. Section 6.3.2.4.3 High Hazard Level 2 Contents describes such contents as those that “present a hazard from accelerated burning”. In the list of High Hazard Level 2 Contents there is no mention made of consumer fireworks, 1.4G. However, Section 6.3.2.4.4 High Hazard Level 3 Contents describes such contents as “materials that present a deflagration hazard or a hazard from accelerated burning.” Item 3 in the list of materials under this classification includes consumer fireworks, 1.4G. Therefore, it appears that NFPA 5000 does not consider consumer fireworks, 1.4G to “burn with extreme rapidity.” It is also interesting to note that Chapter 34 High Hazard Contents prescribes specific requirements for buildings that contain such contents. Section 34.1.1.2 exempts buildings containing high hazard contents from having to comply with Chapter 34 under certain conditions including Item (14) for consumer fireworks, 1.4G in mercantile occupancies complying with NFPA 1124. As a result, there is no specific sprinkler requirement for mercantile occupancies containing consumer fireworks, 1.4G as would be required for all buildings containing High
Hazard Levels 1 through 5 Contents by Section 34.3.2.1 Fire Protection Systems where the sprinkler threshold is zero (0) sq ft.

Thus, it can be concluded that both NFPA 101 and NFPA 5000 do not establish a sprinkler threshold for mercantile occupancies where consumer fireworks, 1.4G are sold at retail that is less than that currently specified in NFPA 1124. In fact, NFPA 1124 is more restrictive than both NFPA 101 and NFPA 5000 for requiring automatic sprinkler protection in mercantile occupancies where consumer fireworks, 1.4G are sold at retail.

Furthermore, the SWRI full-scale fire tests appear to indicate that in the tests where automatic sprinklers were provided, they were not essential for maintaining a reasonably tenable atmosphere in the early stages of fire development in order for the public to have adequate time to evacuate the building. It was interesting to note that in three of the four sprinklered tests with retail sales gondolas sprinkler activation times ranged from 13 to 16 minutes after ignition. Sprinkler activation always occurred shortly after the fire jumped the 4 foot aisle between the ignition gondola and the target gondola. In the one other sprinkler test involving the retail sales gondolas, the sprinklers activated 2 minutes 45 seconds after ignition, again, after the fire had jumped the aisle. So it is the opinion of Task Group A that the sprinkler system is not essential to occupant life safety. It performs more of a property protection function and can also help the fire department to contain and eventually extinguish the fire within the consumer fireworks. The sprinkler system certainly limits the temperatures at the ceiling and minimizes the possibility of flashover but is not necessary to sustain tenable conditions in order for the occupants of the building to evacuate in the early stages of the fire. In fact, one of the drawbacks to the operation of the automatic sprinkler system noted during the fire tests is that it immediately forces a large amount of smoke to the floor, causing complete obscuration in the immediate area of the fire.

Another way to look at what is the appropriate threshold for triggering the requirement for an automatic sprinkler system in consumer fireworks retail sales (CFRS) facilities and stores is to determine the purpose of the installation of an automatic sprinkler system in such buildings. Then goals can be assigned to the purpose and an analysis conducted to determine if the goals for installing sprinkler protection can be achieved without the installation of an automatic sprinkler system. In most cases there are basically three purposes for installing automatic sprinkler protection in mercantile type occupancies. They are as follows:
1. Life Safety of the Occupants/Customers
2. Firefighter Safety
3. Property Protection

Each of these three purposes is discussed in the following.

1. Life Safety of the Occupants/Customers

The goal for protecting the life safety of the building occupants and customers should be to provide adequate egress time with an appropriate factor of safety for all occupants and customers to evacuate safely without exposure to untenable conditions or projectiles and to minimize the possibility of being “trapped” and thus unable to reach an exit.

To establish a base line for comparison, an analysis of a typical CFRS facility/store should be undertaken based on the current threshold limit for automatic sprinkler protection which would represent a 6,000 sq ft one story building. It is also assumed that the maximum travel distance allowed is 75 ft as required by 7.3.14.2 of NFPA 1124 and the minimum number of exits provided is three as required by 7.3.14.1. For conservative purposes an additional assumption is made that one of the exits will be blocked during the fire emergency. This would result in a maximum travel distance of approximately 115 ft.

Using a very conservative rate of travel for occupants based on a mobility impaired person using a walking frame (rollator) of 120 ft/minute as documented in Table 3-12.24 of the SFPE Fire Protection Engineering Handbook, it would take approximately 60 seconds (1 minute) to reach an exit from the most remote point.

The next time factor to consider is the time it will take the occupants to egress through the two available exit doors each of which have a minimum clear width of 32 inches as required in by 7.3.14.4.1. The occupant load of such a 6,000 sq ft building is calculated to be 200 occupants based on the occupant load factor of 30 sq ft/occupant for mercantile occupancies on the first story. Assuming a very conservative discharge rate of 10 persons/foot-minute as documented on P.3 – 347 of the SFPE Handbook for Fruin’s Levels of Service, this would result in approximately 25 persons/minute/exit door with a cumulative discharge rate of 50 persons/minute. This calculates out to a time of approximately 4 minutes for all occupants to egress through the two exit doors.
The final time component for this egress analysis is the reaction time which involves the occupants’ perceptions of a fire condition, their interpretation of what they see, the actions they consider to take, and the decision to finally move towards an exit. This has been estimated to be approximately 3 minutes which is based on the SFPE Handbook Table 3-13.1 for a W2 Occupancy Type.

This results in a total calculated evacuation time of approximately 8 minutes from the time the fire is originally observed until the last occupant has passed through one of the two unblocked exit doors. It should be noted that this is a very conservative calculation.

As previously noted above, there were four tests conducted at SWRI with automatic sprinkler systems in place to determine their time of activation. In three of the four tests, the sprinklers activated approximately 13 to 16 minutes after ignition which was very shortly after the fire jumped the 4 ft wide aisle. In one of the four tests activation occurred at approximately 3 minutes after ignition, again shortly after the fire jumped the aisle. Thus, it is not likely that the automatic sprinkler system will have any significant impact on the egress of the occupants.

It should be noted that the SWRI fire test room had a 16 ft high ceiling and an area of 4,225 sq ft (65 ft x 65 ft). It should also be noted that when the automatic sprinklers did activate, dense smoke was immediately driven to the floor in the area of the sprinkler discharge, totally obscuring vision throughout the fire test room. Obviously, very early sprinkler activation would be counterproductive to efficient egress, especially in close proximity to the origin of the fire.

2. Firefighter Safety
The basic goal for firefighter safety should be to minimize any significant adverse impacts to the responding firefighters caused by the fire exposure itself and aerial fireworks that may become ignited so that the hazard is no more severe than a “typical” mercantile occupancy fire. In assessing this goal, a determination must be made as to what an “unusual” exposure may be for a fire in a CFRS facility/store. The causes of an “unusual” exposure can be isolated to the following:

- Aerial fireworks
- Extra smoke produced by ignited fireworks
- Rapid fire growth/involvement of fireworks
Aerial fireworks should not pose an unusual exposure due to the fact that they are required to be “restrained” in accordance with 7.3.15.6 (general application) and 7.5.1.2(3) (stores).

Regarding the extra smoke that will be produced by ignited fireworks, it is Task Group A’s opinion that the automatic sprinkler system will not significantly address this problem. In fact, it may not even activate until after the fire department has initiated firefighting activities inside the building based on the discussions previously noted above. Also as noted above, when the automatic sprinklers do activate, they drive the dense smoke immediately to the floor, reducing visibility in the area of the fire to virtually “zero.” Obviously, this would impede the fire department’s ability to find the seat of the fire and eventually extinguish it. And it may cause severe disorientation for the firefighters inside the building.

Furthermore, the requirements for covered fuses found in 7.3.15.5 (general application) and 7.5.1.2(2) (stores) which also requires the fireworks to be packaged, will assist in limiting the early and rapid ignition of the fireworks, thus helping to minimize the generation of excessive smoke production by them.

Flame breaks will also help to retard the rapid/significant growth of the fire within the fireworks in order to minimize the quantity of fireworks involved and the generation of large quantities of smoke. Flame breaks are required by 7.3.15.3. It should be noted that the SWRI fire tests clearly showed that significant fire growth did not occur until after the fire jumped the aisle. As noted above in the automatic sprinkler system tests, this occurred at approximately 13 to 16 minutes after ignition in three of the four tests with one of the tests having this occur within 3 minutes.

It should also be noted that ceiling heights are required to be at least 10 ft unless a smoke and heat vent system activated by a smoke detection system is provided based on Section 7.3.10. Thus, the higher ceilings provide a smoke reservoir in which the buoyant smoke can accumulate before becoming a significant problem for the firefighters trying to find the seat of the fire.

Regarding the potential concern about rapid fire growth and involvement of the fireworks in a fire, this is also addressed by the covered fuses requirement and the flame break requirement noted above. It is
also somewhat mitigated by the minimum aisle width requirement of 48 inches which helps to minimize the possibility of the fire jumping across the aisle to ignite adjacent display gondolas.

Thus, the various protection and mitigation features provided in Chapter 7 should result in a more "typical" mercantile occupancy fire in a CFRS facility/store that should not pose an unusual exposure/hazard to the responding firefighters. And it should be noted that the automatic sprinkler system threshold for new mercantile occupancies in NFPA 101 and NFPA 5000 as previously discussed is 12,000 sq ft as compared to the 6,000 sq ft threshold in Chapter 7.

3. Property Protection

The goal of property protection should be to reasonably limit the fire/smoke damage to both the building and its contents, as well as to prevent the fire from spreading to adjacent buildings and structures.

Regarding the protection of the building contents, this is not an issue as far as the consumer fireworks industry is concerned. If a fire starts in a CFRS facility and can’t be controlled/extinguished by portable fire extinguishers, then it may be better to let the contents burn rather than attempt to extinguish the fire. That is because water damaged fireworks are considered hazardous waste that must be disposed of properly. It is the consumer fireworks industry’s experience with the very limited number of fires they’ve had in retail sales facilities and storage warehouses containing consumer fireworks that the cost to properly dispose of the hazardous waste consisting of the water damaged fireworks is significantly greater than the cost of the lost merchandise. So in their opinion, if the fire gets out of control, it would be better to let it burn so that the contents are completely consumed by the fire, thus minimizing the problems with hazardous waste disposal. Of course, this assumes that the fire will be contained to the building of origin and not spread to adjacent buildings or structures.

Regarding protection of the building, the responding fire department should have adequate capabilities to handle a fire in a maximum 6,000 sq ft building used as a CFRS facility/store. Based on the Iowa Fire Flow Formula, a 6,000 sq ft building with a 10 ft ceiling height would require 600 gpm of fire flow to be applied to successfully control and extinguish a post-flashover fire. This is calculated based on the total volume of the building of 60,000 cubic feet divided by 100. If the ceiling height was as great as 16 ft, this
would result in a 96,000 cu ft volume which would equate to approximately 1,000 gpm of fire flow required to apply to the fire by firefighting crews.

A 600 gpm fire flow would require two 250 gpm hose streams applied through 2½ inch hose lines and one 100 gpm hose stream applied through a 1½ inch hose line. Ideally, this would require a total of ten firefighters on the scene with at least one fire department pumper capable of pumping a minimum 500 gpm under normal conditions. This includes three firefighters for each 2½ inch hose line and two firefighters for the 1½ inch hose line along with one engine driver/pump operator and an officer in control of the fire scene.

A 1,000 gpm fire flow would require four 250 gpm hose streams using 2½ inch hose lines. This would result in a need for fourteen firefighters including twelve to man the four 2½ inch hose lines, one engine driver/pump operator, and one fire ground officer. This would also require a fire department pumper with a minimum capacity of 1,000 gpm.

It should also be noted that if the fire in a CFRS facility/store has been mitigated by the requirements in Chapter 7 to be roughly equivalent to a fire in a “typical” mercantile occupancy as previously discussed, then a 6,000 sq ft unsprinklered building should be able to be handled by the responding fire department much more easily than a 12,000 sq ft unsprinklered mercantile occupancy that would be allowed by NFPA 101 and NFPA 5000.

Regarding the protection of exposures, this should not be a significant firefighter safety issue. This is mainly because the responding fire department need only deploy its forces outside the building, directing hose streams to protect adjacent exposures. This tactic will be aided by the fact that there is a requirement for fire department access to be provided to any part of the building exterior to within 150 feet of a public way or an approved fire apparatus access road in accordance with Section 7.3.4. Furthermore, CFRS facilities are required to be provided with certain fire separation distances based on the fire-resistance rating requirements for the exterior walls with protected openings as specified in Table 7.4.7.1.1. This table would require the exterior walls to have a minimum 2-hour fire-resistance rating where the fire separation distance is less than 10 ft or a minimum 1-hour fire-resistance rating where the fire separation distance is at least 10 ft but less than 60 ft. No fire-resistance rating would be required where the fire separation distance is at least 60 ft. Those conditions should not result in any
significant challenge to the fire department’s efforts at preventing the spread of a fire from a CFRS facility to an adjacent building or structure.

It should also be noted that there are general requirements in Chapter 7 that require all CFRS facilities and stores be separated by at least 50 ft from motor fuel dispensers and flammable and combustible liquid storage tanks associated with such motor fuel dispensing. Also a minimum 300 ft separation distance is required to bulk storage and bulk dispensing of flammable liquids and gasses.

So it does not appear that it would be necessary to provide automatic sprinkler system protection for CFRS facilities/stores in order to maintain firefighter safety when protecting exposures.

In conclusion, Task Group A believes that the Committee has adequately justified the current automatic sprinkler system thresholds specified in Chapter 7 for CFRS facilities and stores. Thus, the requirements in the code should be allowed to stand as is. This Draft Committee Proposal is prepared showing the existing language as contained in the 2006 edition of NFPA 1124.

Committee Meeting Action: Accept
MEMORANDUM

TO: Technical Committee on Pyrotechnics

FROM: Jeanne Moreau-Correia

DATE: January 25, 2010

SUBJ: Final Results: Draft Proposals Ballot for NFPA 1124 (A11)

The Final Results of the Draft Proposal Ballot for NFPA 1124 (A11) Letter Ballot are as follows:

32 Eligible to Vote
3 Not Returned (R. Bowes, J. Kitchens, and R. Robbins)

Affirmatives
All votes except those noted below.

Affirmatives with Comments

CP#1  C. Weeth
CP#2  C. Weeth

Abstentions

CP#1  M. Roberts
CP#2  M. Roberts

The number of affirmative votes needed to obtain a recommendation to approve the Draft Proposals is 19
(32 eligible to vote - 3 not returned - 1 abstentions = 28 × 0.66 = 18.48)

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
(32 ÷ 2 = 16 (17)

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal
member was not received.

According to the final ballot results, all ballot items received the necessary 2/3 required affirmative votes to
pass ballot.

Attachments: Ballots
DRAFT PROPOSAL BALLOT DUE BY:
Friday, January 22, 2010
NFPA 1124 PYR-AAA
Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles
Staff Liaison: Guy R. Colonna

Return Completed Ballot To: J. Moreau-Correia
E-Mail to jmoreaucorreia@nfpa.org
Fax to 617-984-7110
One Batterymarch Park, Quincy, MA 02169

Date: Jan 22, 2010
Signed: Mary Roberts
Name: MARY ROBERTS
Type or Print black ink

Committee Action Key:
A = Accept
R = Reject
APA = Accept in Part
APR = Accept in Principle
APP = Accept in Principle in Part
H = Hold

With respect to the Committee Actions on the DRAFT Proposals that accompanied the ballot, please record me as voting: (check one):

☐ Affirmative On All Items. I agree with all committee meeting actions without comment.

☐ Affirmative With Exception(s): I agree with all committee meeting actions Except for the Affirmative with comment, Negative and /or Abstention checked below.

*Reasons must accompany these votes.
When possible, reasons are requested via e-mail in a Word Document.

Please return this Ballot Page only to NFPA.

<table>
<thead>
<tr>
<th>Log No.</th>
<th>Section</th>
<th>Committee Action</th>
<th>Affirmative with Comment*</th>
<th>Negative*</th>
<th>Abstain*</th>
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<tbody>
<tr>
<td>Draft CP#1</td>
<td>7.3.1.1, 7.3.1.2, 7.3.1.2.1</td>
<td>Accept</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Draft CP#2</td>
<td>7.3.6</td>
<td>Accept</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
1/22/2010

To: NFPA
From: Mary Roberts

Reason for Abstentions:

Because consumer fireworks issues have so much impact and because I was not present when the ballot issues were being discussed, I have an uncertainty about voting for or against the subject matter. This is due in part to my concerns after having read various fire tests that have been submitted to the committee.

Mary Roberts

[Signature]
Moreau-Correia, Jeanne

From: Charles P Weeth [chzweeth@pyro-pages.com]
Sent: Friday, January 22, 2010 2:38 PM
To: Moreau-Correia, Jeanne
Subject: RE: Reminder: NFPA 1124 Letter Ballot - Draft Committee Proposals - Due Friday, January 22, 2010

Please record my vote as AFFIRMATIVE for CP#1 And CP #2.

COMMENTS ON CP#1

I still question that there is any scientific basis for the threshold limits established in NFPA 1. These threshold limits need to be substantiated by independent third party testing.

The various exceptions in CP#1 are understandable but remain problematic for a number of different reasons. A table or flowchart detailing what provisions are applicable to what CFRSFs of the various types and sizes with all of the variables would be helpful to AHJs and CFRSF operators.

It is also essential that there are minimum standards for existing CFRSFs, even if this means some must retrofit and change their operations significantly.

COMMENTS ON CP#2

Although I have not seen the complete report on the full scale sprinkler tests, from the details provided I was not surprised at the length of time from ignition to sprinkler activation. A consumer fireworks fire is very dramatic but if everything is packaged properly, ignition fuses covered, and housekeeping up to par, it can still take quite some time to develop in order to generate sufficient heat to activate the sprinkler system.

The large volume of smoke generated by the fireworks is what poses the greatest hazard to the occupants. The volumes are generally much greater than most other consumer products. Keeping the height of the retail displays lower, the aisle lengths shorter and the widths wider, reducing the distances to exits and increasing the number of exits as well as increasing the total cubic volume in the building will increase the amount of time for the occupants to exit to safety.

CFRSFs with low ceilings have less cubic volume for the smoke to fill and thus will quickly overwhelm any occupants. Likewise CFRSFs with taller ceilings but with sales displays of consumer fireworks 15-20-30 feet in height are particularly troubling.

Retail sales display heights and the other criteria may need to be a function of the total cubic volume in the store in order to address this hazard. For example, a store with a 9-10’ high ceiling may need to be limited to internal retail displays no more than 4-5’.
MEMORANDUM

TO: Technical Committee on Fire Code (FCC-AAA)
FROM: Gregory Harrington, P.E., Staff Liaison
DATE: July 12, 2010
SUBJECT: Approval Committee Ballots for NFPA 1124

The enclosed ballots are in response to NFPA Standards Council Decision D #08-19, in which several NFPA Technical Committees were identified as “Approval Committees” for proposals on NFPA 1124, Code for the Manufacturing, Transportation, Storage and Retail Sale of Fireworks and Pyrotechnic Articles, pertaining to consumer fireworks retail sales. Draft Committee Proposal CP#1 addresses threshold values for application of NFPA 1124; Draft Committee Proposal CP#2 addresses threshold limits for sprinkler protection. At its July 9, 2010 teleconference, FCC-AAA voted to take the following actions:

- DRAFT #CP1 - Accept the provisions and substantiation put forth by the Technical Committee on Pyrotechnics
- DRAFT #CP2 - Indicate that the provisions are not supported by the substantiation and recommend other provisions that are supported by the substantiation and/or other information the Approval Committee has available to it (see ballot for recommended revision)

In accordance with the NFPA Regulations Governing Committee Projects, the above actions must be letter balloted through FCC-AAA. In order to provide substantive feedback to PYR-AAA and the Standards Council, please include any comments you may have, especially with regard to the suggested revision to Draft #CP2. Please complete and return the attached letter ballots no later than Friday, July 30, 2010 to the attention of Diane Matthews by email to dmatthews@nfpa.org or by fax to 617-984-7110.

Please let me know if you have any questions. I can be reached by phone at 617-984-7471, or by email at gharrington@nfpa.org.

GEH/DM
With regard to the action on Draft CP #1 concerning threshold values for application of NFPA 1124 to “Accept the provisions and substantiation put forth by the Technical Committee on Pyrotechnics,”:

AGREE □ DISAGREE* □ ABSTAIN* □

*If you Disagree or Abstain, reasons must be provided:

____________________________________________________________
____________________________________________________________
____________________________________________________________

Sign Name: ______________________________________________
Print Name: ______________________________________________
Date: _____________________________________________________

Return By: Friday, July 30, 2010

To: Diane Matthews, Administrator, Technical Projects
Email: dmatthews@nfpa.org
Fax: 617-984-7110
Phone: 617-984-7407
With regard to the action on Draft CP #2 concerning threshold limits for sprinkler protection to “Indicate that the provisions are not supported by the substantiation and recommend other provisions that are supported by the substantiation and/or other information the Approval Committee has available to it,” as follows:

7.3.6 An automatic sprinkler system designed and installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, shall be provided throughout permanent CFRS facilities and stores in which CFRS are conducted in the following buildings:

(1) New buildings greater than 6,000 ft² (557.2 m²) **3000 ft² (280 m²)** in area

(2) Existing buildings greater than 7,500 ft² (694 m²) in area

AGREE [ ] DISAGREE* [ ] ABSTAIN* [ ]

*If you Disagree or Abstain, reasons must be provided:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Sign Name: ____________________________________________

Print Name: ____________________________________________

Date: _________________________________________________

Return By: **Friday, July 30, 2010**

To: Diane Matthews, Administrator, Technical Projects
Email: dmatthews@nfpa.org
Fax: 617-984-7110
Phone: 617-984-7407
Recommendation: It is proposed that paragraph 7.3.1.1 be amended and new paragraphs 7.3.1.2 and 7.3.1.2.1 be added to read as follows:

7.3.1 Exempt Amounts.

7.3.1.1 The requirements of this chapter shall not apply to permanent CFRS facilities or and Class A and Class B stores where the consumer fireworks are in packages, there are no quantities of aerial devices meeting the descriptions in C.3.1.2, and where the total quantity of consumer fireworks on hand does not exceed 125 lb (net) [56.8 kg] of pyrotechnic composition or, in a building protected throughout with an approved automatic sprinkler system installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, 250 lb (net) [113.6 kg] of pyrotechnic composition.

7.3.1.2 The requirements of this chapter shall not apply to temporary CFRS facilities and Class C stores where the consumer fireworks are in packages and where the total quantity of consumer fireworks on hand does not exceed 125 lb (net) [56.8 kg] of pyrotechnic composition or, in a building protected throughout with an approved automatic sprinkler system installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, 250 lb (net) [113.6 kg] of pyrotechnic composition, except as specified in 7.3.1.2.1.

7.3.1.2.1 Where the quantity of consumer fireworks on hand includes any quantity of aerial devices meeting the descriptions in C.3.1.2 in any quantity not exceeding the quantities specified in 7.3.1.2, temporary CFRS facilities and Class C stores shall only be required to comply with the following sections as applicable:

1. 7.2.3 (Mercantile occupancies per NFPA 101)
2. 7.3.8 Portable Fire Extinguishers
3. 7.3.11 No Smoking Signs
4. 7.3.14.1.1 (Minimum number of exits)
5. 7.3.14.2 Egress Travel Distance
6. 7.3.14.3.2.4 (Dead end aisles)
7. 7.3.14.4 Doors and Doorways
8. 7.3.15.5 Covered Fuses
9. 7.3.15.6 Aerial Devices (CFRS facilities)
10. 7.3.16 Electrical Equipment
11. 7.3.17 Heating Equipment
12. 7.3.19 Operations
(13) 7.3.21 Housekeeping
(14) 7.3.22 Training
(15) 7.3.23 Under the Influence
(16) 7.4.6.3 Fireworks Discharge
(17) 7.4.9.3 Cooking Equipment
(18) 7.5.1.2 (Consumer fireworks in stores)
(19) 7.6 Stands

Existing 7.3.1.2 to be renumbered as 7.3.1.3.

Substantiation: This section is based on the maximum allowable quantity (MAQ) of hazardous materials per control area specified for consumer fireworks, 1.4G in Table 60.1.26.1 of NFPA 1-2009 (Table 60.1.3.1 of the 2000 edition), as well as Table 3.1.3.1 of NFPA 5000-2009. These quantities are also identical to the maximum allowable quantity per control area of hazardous materials posing a physical hazard in Table 2703.1.1(1) of the 2006 International Fire Code (IFC) and Table 307.1(1) of the 2006 International Building Code (IBC). Utilizing the default value for determining the weight of the pyrotechnic composition of the consumer fireworks in accordance with Footnote k to Table 60.1.26.1 of NFPA 1, this would allow for a gross weight of consumer fireworks, 1.4G (including packaging) of 500 lb. or 1,000 lb. where sprinklers are provided. It should be noted that 500 lb. gross weight of consumer fireworks is approximately equivalent to 12 to 15 cases. Similarly, 1,000 lb. gross weight of consumer fireworks is approximately equivalent to 25 to 30 cases.

Because of the concerns of several members of Task Group A and as a result of the full-scale fire tests conducted at Southwest Research Institute (SWRI) for the American Fireworks Standards Laboratory (AFSL), it was decided to recommend a revision to Section 7.3.1.1 to address aerial devices that meet the requirements for consumer fireworks, 1.4G and are sold to the public in consumer fireworks retail sales facilities (CFRS) and stores.

Task Group A believes that there is no need to provide for further substantiation or documentation of the exempt amounts contained in Chapter 7 of NFPA 1124 for consumer fireworks since they are based upon the maximum allowable quantities specified in NFPA 1 and NFPA 5000 as noted above, as well as the IFC and IBC. However, Task Group A believes that additional safety measures should be provided for aerial devices even if they are included in the exempt amounts for not having to comply completely with Chapter 7 of NFPA 1124. It is believed that this approach is technically justified based upon the SWRI
full-scale fire tests where the aerial devices were appropriately contained to meet the intent of the requirements for restricting the travel of aerial devices after they are ignited.

The proposed revision to 7.3.1.1 would only exempt permanent CRFS facilities and Class A and Class B stores from the requirements of Chapter 7 where the exempt amounts of consumer fireworks are in packages and there are no quantities of aerial devices which meet the descriptions in C.3.1.2. In other words, if even one aerial device is being sold in one of these facilities or stores, then they would have to comply with the entire Chapter 7 as applicable. Thus, there is no exempt amount allowed for aerial devices in these facilities and stores. This is more conservative than currently allowed for buildings designed and constructed in accordance with NFPA 1 and NFPA 5000 as noted previously. This revision is being proposed because the Pyrotechnics Technical Committee (TC) believes that this more conservative approach to requiring compliance with Chapter 7 of NFPA 1124 is appropriate where aerial devices are sold to the public.

Proposed new 7.3.1.2 applies the current exempt amounts to Class C stores, which by definition do not exceed 3,000 sq ft in area and one story in height, and to temporary CFRS facilities which include stands not greater than 800 sq ft in area and tents of any size. However, new 7.3.1.2.1 would require these stores or facilities to comply with a list of specific sections in Chapter 7 where these stores or facilities contain quantities of aerial devices up to the exempt amounts specified in 7.3.1.2. The Pyrotechnics TC believes that this is a conservative approach to the application of exempt amounts in these stores and facilities where aerial devices are sold since they may pose more of a fire and life safety hazard than the other types of consumer fireworks that are not capable of movement on their own. This concept is similar to that in NFPA 1 Chapter 60 Hazard Materials and comparable Chapter 34 in NFPA 5000 where the maximum allowable quantities (MAQ) are not exceeded. The maximum allowable quantities in those codes are the same as the exempt amounts specified in 7.3.1 of NFPA 1124 for all types of consumer fireworks.

Where the MAQs are not exceeded, Section 60.1.3.1 of NFPA 1 still specifies compliance with Sections 60.1 General Requirements and 60.2 Requirements for All Occupancies Containing High-Hazard Contents which is comparable to Section 34.2 of NFPA 5000. However, compliance with the rest of Chapter 60, or the rest of Chapter 34 in NFPA 5000, is not mandated.
The following discusses the nineteen (19) sections listed in proposed new 7.3.1.2.1 as being required where aerial devices are sold in Class C stores or temporary CFRS facilities in quantities not exceeding the exempt amounts specified in 7.3.1.2.

Section 7.2.3 This section requires compliance with NFPA 101 for mercantile occupancies.
  - This is a basic requirement of NFPA 1/5000 for all occupancies regardless of hazard.

Section 7.3.8 Portable Fire Extinguishers. This section specifies minimum requirements for portable fire extinguishers.
  - This is a basic requirement of NFPA 1 (13.6.2) / 5000 (27.3.5.3).

Section 7.3.11 No Smoking Signs. This section prohibits smoking in specific locations and requires posting with “No Smoking” signs.
  - Similar requirements are contained in NFPA 1 (60.1.11.1 and 60.1.13.3).

Section 7.3.14.1.1 This section specifies that the minimum number of required exits must be at least three.
  - This exceeds the minimum requirements in NFPA 1 / 101 / 5000.
  - This provides another exit option to further minimize the possibility of having all exits blocked during a fire emergency involving aerial devices.

Section 7.3.14.2 Egress Travel Distance. This section limits the travel distance to reach an exit in all CFRS facilities and Class C stores to a maximum of 75 ft.
  - This is comparable to the requirements in NFPA 1 / 101 /5000 for mercantile occupancies containing high-hazard contents.

Section 7.3.14.3.2.4 This section prohibits dead end aisles.
  - This is comparable to the requirements in NFPA 1 / 101 / 5000 for mercantile occupancies containing high-hazard contents.

Section 7.3.14.4 Doors and Doorways. This section requires the minimum egress door width to be not less than 36 inches with a minimum clear width not greater than 32 inches. It also requires the egress
doors to swing in the direction of egress travel and be provided with panic hardware where latches are installed on the doors.

- The minimum width and direction of door swing requirements are comparable to the requirements in NFPA 1 / 101 /5000.
- The requirement for panic hardware exceeds the minimum requirements in NFPA 1 / 101 / 5000 for egress door hardware in mercantile occupancies.

Section 7.3.15.5 Covered Fuses. This section requires all consumer fireworks being sold to the public to be provided with covered fuses that protect the individual fireworks device from being discharged accidentally or by malicious mischief, or in the early stages of a fire.

- The intent of this requirement is to reduce the potential for rapid fire growth that could involve the ignition of multiple fireworks devices in the early stages of fire development which are the most critical to egress. Covered fuses are intended to facilitate egress by minimizing the adverse effects of discharging fireworks devices.

Section 7.3.15.6 Aerial Devices. This section requires that aerial devices be packaged and displayed for sale in a manner that will limit the travel distance of ejected pyrotechnic components should ignition of the fireworks occur.

- The intent of this requirement is to minimize the impact of discharging aerial devices on the egress of the occupants in the early stages of fire development by restraining their travel. This will also minimize the potential for the aerial devices igniting multiple fires and blocking multiple paths of travel to reach the exits. This is intended to confine the major effects of discharging aerial devices to the area immediately adjacent to the origin of the fire.

Section 7.3.16 Electrical Equipment. This section requires all electrical wiring to comply with NFPA 70, National Electrical Code.

- This is comparable to the requirements in NFPA 1 (60.1.1.16) and is a basic requirement in NFPA 101 (9.1.2) / 5000 (52.1).

Section 7.3.17 Heating Equipment. This section requires heating units to be listed and used in accordance with their listing. It also requires temporary heating sources to have tip-over and temperature-overheat protection and prohibits open flame and exposed element heating devices.

- This is comparable to the requirements in NFPA 1 (60.1.11.2).
Section 7.3.19 Operations. This section contains general operations requirements such as maintaining clear access to the means of egress, limiting the proximity of fireworks displays to exits and entrances to the building in order to minimize immediate blockage should a fire occur, and prohibiting the ignition and/or discharge of fireworks within 300 feet of the building or facility.

- These requirements provide an enhanced level of fire and life safety where aerial devices are sold at virtually no cost since they are operational in nature and can be readily implemented.

Section 7.3.21 Housekeeping. These are general housekeeping provisions to help maintain a reasonably debris- and rubbish-free facility without loose pyrotechnic composition lying around for any significant period of time. It also provides for a safe means for cleaning up the loose pyrotechnic composition in order to avoid ignition of those materials.

- These are basic fire safety requirements that can be readily implemented without any significant cost to help improve the overall level of safety in the building or facility since they are basically operational in nature.

Section 7.3.22 Training. This section requires that all personnel handling consumer fireworks be provided with safety training related to the performance of their duties.

- This requirement is comparable to the requirement in NFPA 1 (60.1.9).

Section 7.4.6.3 Fireworks Discharge. This section requires signage to indicate that fireworks are not allowed to be discharged within 300 feet.

- This requirement ties in with the requirement in Section 7.3.19.4 above which prohibits the discharge of fireworks within 300 feet.

Section 7.4.9.3 Cooking Equipment. This section prohibits cooking equipment within tents, canopies, and membrane structure containing consumer fireworks. It also prohibits open flame cooking equipment within 50 feet of such tents, canopies, or membrane structures.

- These requirements are comparable to the requirements in NFPA 1 (60.1.11.2).

Section 7.5.1.2 Fireworks Displayed for Sale in Stores. This section specifies operational requirements for the display of consumer fireworks in stores in such a manner as to minimize their involvement in a fire condition in order to limit their impact on the means of egress for the occupants of the store. This
section also restricts access to the aerial devices in order to minimize malicious mischief involving the ignition and/or discharge of such devices when the building is occupied.

- Basically these are operational requirements that can be implemented at virtually no cost to the store but provide a significant degree of fire and life safety to the occupants and the public shopping in the store. The main purpose of these requirements is to minimize the opportunity for malicious mischief involving the aerial fireworks being sold, as well as their impact should they become involved in a fire. These requirements also facilitate egress from the areas where aerial type fireworks are sold.

Section 7.6 Stands. This section contains all of the requirements specifically applicable to stands where consumer fireworks are sold to the public.

- The Pyrotechnics TC believes that it is vitally important that stands used to sell fireworks that include aerial devices, regardless of the quantity, meet all of the applicable requirements specific to stands due to the very close proximity the occupants of the stands have to the fireworks devices. The occupants are very likely to be in the immediate area of the fire ignition so they should be provided with all of the appropriate fire and life safety features currently contained in Section 7.6 of NFPA 1124.

In summary, it is the opinion of the Pyrotechnics TC that the exempt amounts specified in Section 7.3.1 are valid based upon the reference codes indicated above. Furthermore, to err on the side of safety where aerial devices are sold at retail, which are much more energetic and have much more opportunity to spread fire and involve more devices during a fire incident than the other types of consumer fireworks that are not self-propelled, certain specific requirements of Chapter 7 should be applicable regardless of the quantity of aerial devices being sold.

Committee Meeting Action: Accept
Log# Draft CP#2
Submitter: Technical Committee on Pyrotechnics
Recommendation: Task Group A proposes to retain the current requirement in paragraph 7.3.6 as shown below:

7.3.6 An automatic sprinkler system designed and installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, shall be provided throughout permanent CFRS facilities and stores in which CFRS are conducted in the following buildings:

1. New buildings greater than 6,000 ft² (557.2 m²) in area
2. Existing buildings greater than 7,500 ft² (694 m²) in area

Substantiation: Task Group A does not believe there is a need to make any further revisions to these sprinkler threshold limits in NFPA 1124 as they have been adequately substantiated and vetted through the NFPA standards development process and by the NFPA general membership, as well as the NFPA Standards Council (SC).

As a result of the initial development of Chapter 7 of NFPA 1124, the November 2002 Report on Comments (ROC) proposed automatic sprinkler system thresholds of 12,000 ft² for new buildings and 15,000 ft² for existing buildings. These limits were based on those contained in NFPA 101 for mercantile occupancies. A Public Comment 1124-93/Log #163 was submitted to Section 7.5.1.1 by the Southern Fire Code Development Committee to reduce the sprinkler threshold limit to 6,000 ft² for new construction. That Public Comment was rejected by the Pyrotechnics Technical Committee (TC). So the proponent brought it to the floor of the NFPA Technical Committee Reports (TCR) Session held in Atlanta, GA in November, 2002. It was approved by the NFPA voting members in attendance and subsequently upheld by the Pyrotechnics TC and the NFPA SC. At that session it was also noted that because there was no comparable Public Comment submitted to reduce the threshold limit for existing buildings, an appeal would be filed with the NFPA SC to request that the 15,000 ft² threshold be reduced to 7,500 ft² for existing buildings. This would be comparable to the one-half reduction in the sprinkler threshold for new buildings.

Subsequent to the ROC meeting, the American Pyrotechnics Association (APA) followed through on their commitment made during the TCR Session in Atlanta and submitted an appeal to the NFPA SC to, in fact, reduce the sprinkler threshold for existing buildings to 7,500 ft². That appeal was granted by the NFPA SC. Thus, the automatic sprinkler system threshold for both new and existing buildings was based on
one-half that required by NFPA 101 for mercantile occupancies for those buildings and facilities where consumer fireworks, 1.4G were sold at retail to the public.

For further information and history regarding the regulation of the retail sales of consumer fireworks, it should be noted that in the 2000 edition of NFPA 1 a new Section 16-10 Sales, Handling, and Storage of Consumer Fireworks was incorporated to address, among others, the retail sales of consumer fireworks. It should also be noted that there were no automatic sprinkler system threshold requirements contained in that section. Subsequent to Section 16-10 being incorporated into NFPA 1, a TIA was issued on January 18, 2001. It was designated as TIA 00-1 (NFPA 1). It was a result of a joint Task Group effort established by the NFPA SC consisting of members of the NFPA 1, NFPA 101, and NFPA 1124 TCs to develop a more comprehensive package of requirements for the retail sales of consumer fireworks. The TIA included new Sections 16-10.3 and 16-10.4 which contained additional requirements. However, there were no threshold area limits set for requiring automatic sprinkler system protection. But the maximum quantity limits specified for consumer fireworks in retail sales facilities were allowed to be increased 100% where an automatic sprinkler system was installed. Also, for existing buildings the retail display area for consumer fireworks was allowed to exceed 3,000 ft² (without any upper limit) where an automatic sprinkler system was installed in the retail display area.

A further comparison to NFPA 101-2009 and NFPA 5000-2009 may also be warranted to justify the recommendation to not reduce the current sprinkler thresholds in NFPA 1124 for mercantile occupancies where consumer fireworks, 1.4G are sold at retail. NFPA 101 Section 6.2.2.4 High Hazard Contents describes such contents as those “likely to burn with extreme rapidity or from which explosions are likely.” The Annex A note to this section states:

“High hazard contents include occupancies where flammable liquids are handled or used or are stored under conditions involving possible release of flammable vapors; where grain dust, wood flour or plastic dust, aluminum or magnesium dust, or other explosive dusts are produced; where hazardous chemicals or explosives are manufactured, stored, or handled; where materials are processed or handled under conditions producing flammable flyings; and other situations of similar hazard.”

None of these situations directly, or even indirectly, appear to apply to consumer fireworks, 1.4G. Furthermore, Section 6.2.2.3 Ordinary Hazard Contents classifies contents under that heading if they are “likely to burn with moderate rapidity or give off a considerable volume of smoke.” That description
sounds more like consumer fireworks, 1.4G complying with NFPA 1124 based on the full-scale fire tests conducted at Southwest Research Institute (SWRI).

Nevertheless, in Chapter 36 New Mercantile Occupancies Section 36.1.5.2 contains specific requirements for mercantile occupancies classified as high hazard. It specifies three special requirements that must be met. But none of them mention a requirement that automatic sprinklers be provided. However, Section 36.3.5.1(2) requires new mercantile occupancies greater than 12,000 sq ft to be sprinklered. Similarly, Section 37.3.5.1(1) requires existing mercantile occupancies greater than 15,000 sq ft in area on any story to be sprinklered. As noted previously, these area thresholds for sprinkler protection are twice that specified in NFPA 1124. It is also interesting to note that Section 36.4.6 Retail Sales of Consumer Fireworks, 1.4G requires that mercantile occupancies where consumer fireworks, 1.4G are sold at retail comply with NFPA 1124. So NFPA 101 seems to be satisfied with the life safety protection level for automatic sprinklers specified in NFPA 1124, as does the Mercantile and Business Occupancies TC.

Section 6.3.2 Classification of Hazard of Contents of NFPA 5000 contains descriptions for high hazard level contents in buildings regulated by NFPA 5000. Section 6.3.2.4.3 High Hazard Level 2 Contents describes such contents as those that “present a hazard from accelerated burning”. In the list of High Hazard Level 2 Contents there is no mention made of consumer fireworks, 1.4G. However, Section 6.3.2.4.4 High Hazard Level 3 Contents describes such contents as “materials that present a deflagration hazard or a hazard from accelerated burning.” Item 3 in the list of materials under this classification includes consumer fireworks, 1.4G. Therefore, it appears that NFPA 5000 does not consider consumer fireworks, 1.4G to “burn with extreme rapidity.” It is also interesting to note that Chapter 34 High Hazard Contents prescribes specific requirements for buildings that contain such contents. Section 34.1.1.2 exempts buildings containing high hazard contents from having to comply with Chapter 34 under certain conditions including Item (14) for consumer fireworks, 1.4G in mercantile occupancies complying with NFPA 1124. As a result, there is no specific sprinkler requirement for mercantile occupancies containing consumer fireworks, 1.4G as would be required for all buildings containing High Hazard Levels 1 through 5 Contents by Section 34.3.2.1 Fire Protection Systems where the sprinkler threshold is zero (0) sq ft.

Thus, it can be concluded that both NFPA 101 and NFPA 5000 do not establish a sprinkler threshold for mercantile occupancies where consumer fireworks, 1.4G are sold at retail that is less than that currently
specified in NFPA 1124. In fact, NFPA 1124 is more restrictive than both NFPA 101 and NFPA 5000 for requiring automatic sprinkler protection in mercantile occupancies where consumer fireworks, 1.4G are sold at retail.

Furthermore, the SWRI full-scale fire tests appear to indicate that in the tests where automatic sprinklers were provided, they were not essential for maintaining a reasonably tenable atmosphere in the early stages of fire development in order for the public to have adequate time to evacuate the building. It was interesting to note that in three of the four sprinklered tests with retail sales gondolas sprinkler activation times ranged from 13 to 16 minutes after ignition. Sprinkler activation always occurred shortly after the fire jumped the 4 foot aisle between the ignition gondola and the target gondola. In the one other sprinkler test involving the retail sales gondolas, the sprinklers activated 2 minutes 45 seconds after ignition, again, after the fire had jumped the aisle. So it is the opinion of Task Group A that the sprinkler system is not essential to occupant life safety. It performs more of a property protection function and can also help the fire department to contain and eventually extinguish the fire within the consumer fireworks. The sprinkler system certainly limits the temperatures at the ceiling and minimizes the possibility of flashover but is not necessary to sustain tenable conditions in order for the occupants of the building to evacuate in the early stages of the fire. In fact, one of the drawbacks to the operation of the automatic sprinkler system noted during the fire tests is that it immediately forces a large amount of smoke to the floor, causing complete obscuration in the immediate area of the fire.

Another way to look at what is the appropriate threshold for triggering the requirement for an automatic sprinkler system in consumer fireworks retail sales (CFRS) facilities and stores is to determine the purpose of the installation of an automatic sprinkler system in such buildings. Then goals can be assigned to the purpose and an analysis conducted to determine if the goals for installing sprinkler protection can be achieved without the installation of an automatic sprinkler system. In most cases there are basically three purposes for installing automatic sprinkler protection in mercantile type occupancies. They are as follows:

1. Life Safety of the Occupants/Customers
2. Firefighter Safety
3. Property Protection

Each of these three purposes is discussed in the following.
1. Life Safety of the Occupants/Customers

The goal for protecting the life safety of the building occupants and customers should be to provide adequate egress time with an appropriate factor of safety for all occupants and customers to evacuate safely without exposure to untenable conditions or projectiles and to minimize the possibility of being “trapped” and thus unable to reach an exit.

To establish a base line for comparison, an analysis of a typical CFRS facility/store should be undertaken based on the current threshold limit for automatic sprinkler protection which would represent a 6,000 sq ft one story building. It is also assumed that the maximum travel distance allowed is 75 ft as required by 7.3.14.2 of NFPA 1124 and the minimum number of exits provided is three as required by 7.3.14.1. For conservative purposes an additional assumption is made that one of the exits will be blocked during the fire emergency. This would result in a maximum travel distance of approximately 115 ft.

Using a very conservative rate of travel for occupants based on a mobility impaired person using a walking frame (rollator) of 120 ft/minute as documented in Table 3-12.24 of the SFPE Fire Protection Engineering Handbook, it would take approximately 60 seconds (1 minute) to reach an exit from the most remote point.

The next time factor to consider is the time it will take the occupants to egress through the two available exit doors each of which have a minimum clear width of 32 inches as required in by 7.3.14.4.1. The occupant load of such a 6,000 sq ft building is calculated to be 200 occupants based on the occupant load factor of 30 sq ft/occupant for mercantile occupancies on the first story. Assuming a very conservative discharge rate of 10 persons/foot-minute as documented on P.3 – 347 of the SFPE Handbook for Fruin’s Levels of Service, this would result in approximately 25 persons/minute/exit door with a cumulative discharge rate of 50 persons/minute. This calculates out to a time of approximately 4 minutes for all occupants to egress through the two exit doors.

The final time component for this egress analysis is the reaction time which involves the occupants’ perceptions of a fire condition, their interpretation of what they see, the actions they consider to take, and the decision to finally move towards an exit. This has been estimated to be approximately 3 minutes which is based on the SFPE Handbook Table 3-13.1 for a W2 Occupancy Type.
This results in a total calculated evacuation time of approximately 8 minutes from the time the fire is originally observed until the last occupant has passed through one of the two unblocked exit doors. It should be noted that this is a very conservative calculation.

As previously noted above, there were four tests conducted at SWRI with automatic sprinkler systems in place to determine their time of activation. In three of the four tests, the sprinklers activated approximately 13 to 16 minutes after ignition which was very shortly after the fire jumped the 4 ft wide aisle. In one of the four tests activation occurred at approximately 3 minutes after ignition, again shortly after the fire jumped the aisle. Thus, it is not likely that the automatic sprinkler system will have any significant impact on the egress of the occupants.

It should be noted that the SWRI fire test room had a 16 ft high ceiling and an area of 4,225 sq ft (65 ft x 65 ft). It should also be noted that when the automatic sprinklers did activate, dense smoke was immediately driven to the floor in the area of the sprinkler discharge, totally obscuring vision throughout the fire test room. Obviously, very early sprinkler activation would be counterproductive to efficient egress, especially in close proximity to the origin of the fire.

2. Firefighter Safety

The basic goal for firefighter safety should be to minimize any significant adverse impacts to the responding firefighters caused by the fire exposure itself and aerial fireworks that may become ignited so that the hazard is no more severe than a “typical” mercantile occupancy fire. In assessing this goal, a determination must be made as to what an “unusual” exposure may be for a fire in a CFRS facility/store.

The causes of an “unusual” exposure can be isolated to the following:

- Aerial fireworks
- Extra smoke produced by ignited fireworks
- Rapid fire growth/involvement of fireworks

Aerial fireworks should not pose an unusual exposure due to the fact that they are required to be “restrained” in accordance with 7.3.15.6 (general application) and 7.5.1.2(3) (stores).

Regarding the extra smoke that will be produced by ignited fireworks, it is Task Group A’s opinion that the automatic sprinkler system will not significantly address this problem. In fact, it may not even activate until after the fire department has initiated firefighting activities inside the building based on
the discussions previously noted above. Also as noted above, when the automatic sprinklers do activate, they drive the dense smoke immediately to the floor, reducing visibility in the area of the fire to virtually “zero.” Obviously, this would impede the fire department’s ability to find the seat of the fire and eventually extinguish it. And it may cause severe disorientation for the firefighters inside the building.

Furthermore, the requirements for covered fuses found in 7.3.15.5 (general application) and 7.5.1.2(2) (stores) which also requires the fireworks to be packaged, will assist in limiting the early and rapid ignition of the fireworks, thus helping to minimize the generation of excessive smoke production by them.

Flame breaks will also help to retard the rapid/significant growth of the fire within the fireworks in order to minimize the quantity of fireworks involved and the generation of large quantities of smoke. Flame breaks are required by 7.3.15.3. It should be noted that the SWRI fire tests clearly showed that significant fire growth did not occur until after the fire jumped the aisle. As noted above in the automatic sprinkler system tests, this occurred at approximately 13 to 16 minutes after ignition in three of the four tests with one of the tests having this occur within 3 minutes.

It should also be noted that ceiling heights are required to be at least 10 ft unless a smoke and heat vent system activated by a smoke detection system is provided based on Section 7.3.10. Thus, the higher ceilings provide a smoke reservoir in which the buoyant smoke can accumulate before becoming a significant problem for the firefighters trying to find the seat of the fire.

Regarding the potential concern about rapid fire growth and involvement of the fireworks in a fire, this is also addressed by the covered fuses requirement and the flame break requirement noted above. It is also somewhat mitigated by the minimum aisle width requirement of 48 inches which helps to minimize the possibility of the fire jumping across the aisle to ignite adjacent display gondolas.

Thus, the various protection and mitigation features provided in Chapter 7 should result in a more “typical” mercantile occupancy fire in a CFRS facility/store that should not pose an unusual exposure/hazard to the responding firefighters. And it should be noted that the automatic sprinkler system threshold for new mercantile occupancies in NFPA 101 and NFPA 5000 as previously discussed is 12,000 sq ft as compared to the 6,000 sq ft threshold in Chapter 7.
3. Property Protection

The goal of property protection should be to reasonably limit the fire/smoke damage to both the building and its contents, as well as to prevent the fire from spreading to adjacent buildings and structures.

Regarding the protection of the building contents, this is not an issue as far as the consumer fireworks industry is concerned. If a fire starts in a CFRS facility and can’t be controlled/extinguished by portable fire extinguishers, then it may be better to let the contents burn rather than attempt to extinguish the fire. That is because water damaged fireworks are considered hazardous waste that must be disposed of properly. It is the consumer fireworks industry’s experience with the very limited number of fires they’ve had in retail sales facilities and storage warehouses containing consumer fireworks that the cost to properly dispose of the hazardous waste consisting of the water damaged fireworks is significantly greater than the cost of the lost merchandise. So in their opinion, if the fire gets out of control, it would be better to let it burn so that the contents are completely consumed by the fire, thus minimizing the problems with hazardous waste disposal. Of course, this assumes that the fire will be contained to the building of origin and not spread to adjacent buildings or structures.

Regarding protection of the building, the responding fire department should have adequate capabilities to handle a fire in a maximum 6,000 sq ft building used as a CFRS facility/store. Based on the Iowa Fire Flow Formula, a 6,000 sq ft building with a 10 ft ceiling height would require 600 gpm of fire flow to be applied to successfully control and extinguish a post-flashover fire. This is calculated based on the total volume of the building of 60,000 cubic feet divided by 100. If the ceiling height was as great as 16 ft, this would result in a 96,000 cu ft volume which would equate to approximately 1,000 gpm of fire flow required to apply to the fire by firefighting crews.

A 600 gpm fire flow would require two 250 gpm hose streams applied through 2½ inch hose lines and one 100 gpm hose stream applied through a 1½ inch hose line. Ideally, this would require a total of ten firefighters on the scene with at least one fire department pumper capable of pumping a minimum 500 gpm under normal conditions. This includes three firefighters for each 2½ inch hose line and two firefighters for the 1½ inch hose line along with one engine driver/pump operator and an officer in control of the fire scene.
A 1,000 gpm fire flow would require four 250 gpm hose streams using 2½ inch hose lines. This would result in a need for fourteen firefighters including twelve to man the four 2½ inch hose lines, one engine driver/pump operator, and one fire ground officer. This would also require a fire department pumper with a minimum capacity of 1,000 gpm.

It should also be noted that if the fire in a CFRS facility/store has been mitigated by the requirements in Chapter 7 to be roughly equivalent to a fire in a “typical” mercantile occupancy as previously discussed, then a 6,000 sq ft unsprinklered building should be able to be handled by the responding fire department much more easily than a 12,000 sq ft unsprinklered mercantile occupancy that would be allowed by NFPA 101 and NFPA 5000.

Regarding the protection of exposures, this should not be a significant firefighter safety issue. This is mainly because the responding fire department need only deploy its forces outside the building, directing hose streams to protect adjacent exposures. This tactic will be aided by the fact that there is a requirement for fire department access to be provided to any part of the building exterior to within 150 feet of a public way or an approved fire apparatus access road in accordance with Section 7.3.4. Furthermore, CFRS facilities are required to be provided with certain fire separation distances based on the fire-resistance rating requirements for the exterior walls with protected openings as specified in Table 7.4.7.1.1. This table would require the exterior walls to have a minimum 2-hour fire-resistance rating where the fire separation distance is less than 10 ft or a minimum 1-hour fire-resistance rating where the fire separation distance is at least 10 ft but less than 60 ft. No fire-resistance rating would be required where the fire separation distance is at least 60 ft. Those conditions should not result in any significant challenge to the fire department’s efforts at preventing the spread of a fire from a CFRS facility to an adjacent building or structure.

It should also be noted that there are general requirements in Chapter 7 that require all CFRS facilities and stores be separated by at least 50 ft from motor fuel dispensers and flammable and combustible liquid storage tanks associated with such motor fuel dispensing. Also a minimum 300 ft separation distance is required to bulk storage and bulk dispensing of flammable liquids and gasses.

So it does not appear that it would be necessary to provide automatic sprinkler system protection for CFRS facilities/stores in order to maintain firefighter safety when protecting exposures.
In conclusion, Task Group A believes that the Committee has adequately justified the current automatic sprinkler system thresholds specified in Chapter 7 for CFRS facilities and stores. Thus, the requirements in the code should be allowed to stand as is. This Draft Committee Proposal is prepared showing the existing language as contained in the 2006 edition of NFPA 1124.

Committee Meeting Action: Accept
MEMORANDUM

To: Technical Committee on Pyrotechnics

From: G. Colonna

Date: December 10, 2010

Subject: Amended Draft Proposal Ballot for NFPA 1124 (A12)

Attached is an amended Draft Proposal (pre-ROP) Ballot and ballot material on NFPA 1124, *Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*. This material was developed beginning in 2009 and based on comments from the Fire Code Technical Committee responsible for NFPA 1 was further reviewed and revised during your September 30 – October 1, 2010 meeting in Phoenix. The ballot is for formally voting on whether or not you concur with the Committee's Action on the remaining draft proposal under the purview of the Fire Code Committee as the approval committee. If you do not concur, or you abstain, you must provide a technical reason. Following the vote of the Committee, this item and the respective action will be forwarded to the Fire Code Committee (responsible for NFPA 1) in accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for correction.

Please return your ballot as soon as possible, but no later than **Thursday, December 23, 2010**. For action by the Committee that passes the attached amended DRAFT Committee Proposal the proposal will be presented to the NFPA 1 Committee for their review and subsequent approval.

Your cooperation in meeting this deadline is appreciated. If you wish to fax your ballot, please fax to **(617) 984-7110**.

**Note:** Please remember that the return of ballots and attendance at Committee Meetings are required for all principal and alternate members in accordance with the Regulations Governing Committee Projects.

Enclosures: Ballot Form
Draft Committee Proposals

cc: Linda Fuller, Standards Administration
J. Moreau, Project Administrative Supervisor
Amended DRAFT PROPOSAL BALLOT DUE BY:
Thursday, December 23, 2010
NFPA 1124 PYR-AAA
Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles
Staff Liaison: Guy R. Colonna

Return Completed Ballot To: J. Moreau
E-Mail to jmoreau@nfpa.org
Fax to 617-984-7110
One Batterymarch Park, Quincy, MA 02169

Date:___________________ Signed:__________________________________

Name: __________________________________
Type or Print black ink

Committee Action Key:
A = Accept
R= Reject
APA = Accept in Part
APR = Accept in Principle
APP = Accept in Principle in Part
H = Hold

With respect to the Committee Actions on the DRAFT Proposals that accompanied the ballot, please record me as voting: (check one):

☐ Affirmative On All Items. I agree with all committee meeting actions without comment.

☐ Affirmative With Exception(s): I agree with all committee meeting actions Except for the Affirmative with comment, Negative and /or Abstention checked below.

*Reasons must accompany these votes.
When possible, reasons are requested via e-mail in a Word Document.

Please return this Ballot Page only to NFPA.

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<tr>
<th>Log No.</th>
<th>Section</th>
<th>Committee Action</th>
<th>Affirmative with Comment*</th>
<th>Negative*</th>
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NFPA 1124-2006
Amended Draft Committee Proposal
Approved for letter ballot initially at Committee Meeting, August 31 – September 1, 2009, San Diego, CA and approved as amended at Committee Meeting, September 30 – October 1, 2010, Phoenix, AZ.
These actions relate to items 1 and 2 in the Standards Council Decision, D#08-19 and are to be coordinated with the Fire Code Committee in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Amended Log# Draft CP#2
Submitter: Technical Committee on Pyrotechnics
Recommendation: Task Group A proposes to retain the current requirement in paragraph 7.3.6 as shown below:

7.3.6 An automatic sprinkler system designed and installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, shall be provided throughout permanent CFRS facilities and stores in which CFRS are conducted in the following buildings:

1. New buildings containing a gross sales area greater than 3000 ft² (278.7 m²) in area excluding storage areas not open to the public greater than 6,000 ft² (557.2 m²) in area
2. Existing buildings greater than 7,500 ft² (694 m²) in area

Substantiation:

1) The gross sales area of 6000ft² was reduced to 3000ft² based upon the recommendation of the NFPA 1 Committee. The Technical Committee on Pyrotechnics agrees with this recommendation as indicated with the proposed change to 7.3.6 (1).

Comments from NFPA 1 TC on Fire Code substantiation on their balloting of this draft proposal:

- “The 3,000ft² threshold is a reasonable threshold to support manual fire suppression operations because it will allow the fire department to conduct effective defensive operations via the sprinkler system supply and more easily reach the seat of the small fires in those CFRS facilities less than 3,000ft². Reduced distance to enter and easier access to the seat of the fire will reduce the risk of exposure to firefighters in dealing with CFRS facilities”
- “There is obviously significant question as to the appropriate threshold for fire sprinkler protection in these facilities. With the ongoing question and debate, there is no consensus that the current 6,000ft² threshold provides appropriate protection for occupants or firefighters. The 3,000 ft² threshold strikes a balance and is based on the long established consensus of 3000ft² for Class C mercantile occupancies within NFPA 101. If we are going to err based on the lack of consensus, we should err on the side of life safety”
- “The 3,000ft² area requirement for automatic sprinkler protection in new buildings, as defined in NFPA 1124, coordinates more closely to other requirements for protection of mercantile occupancies of this size. This would include the action taken by this Technical Committee on Draft CP#1, as well as other recognized levels of protection already in place which use this 3,000ft² limitation.”
1) The language “Excluding storage areas not open to the public” was added by the Technical Committee on Pyrotechnics so that 7.3.6 (1) is consistent with NFPA 101 - 36.1.4.2 for the classification of Class C stores. This language also makes it internally consistent with the rest of this chapter where Class C stores are referenced.

**Committee Meeting Action:** Accept
MEMORANDUM

To: Gregory Harrington, Staff Liaison for Fire Code Committee

From: G. Colonna, Staff Liaison for Pyrotechnics Committee

Date: January 10, 2011

Subject: Transmittal of Amended Draft Proposal for NFPA 1124 (A11) for review and action by Fire Code Technical Committee

Attached is Amended Draft Proposal (pre-ROP) CP#2 and the letter ballot results for proposed changes to Chapter 7 of NFPA 1124, Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles. This material was developed by the Committee on Pyrotechnics at its February 2 – 3, 2009 meeting in Orlando and amended during the September 30 – October 1, 2010 meeting in Phoenix, AZ based on input from the Fire Code Technical Committee.

In accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008, this material has been developed as Draft Proposals (pre-ROP) and has been letter balloted through the Committee on Pyrotechnics. In addition to the Draft Proposal, I have also attached the final ballot results indicating that the item achieved the required 2/3rd majority and simple majority with affirmative votes for Amended DRAFT Committee Proposal (DRAFT CP#2).

In accordance with the direction of the Council, I am providing you with this information as Staff Liaison to the Fire Code Committee and requesting that you include this as an agenda item for future consideration by the Fire Code Committee. The Task Group leader for the Pyrotechnics Committee for this activity is Tad Trout, American Promotional Events. If your Committee has questions on any aspect as presented in the attached Draft Proposal, please contact me or Mr. Trout directly for clarification.

Thanks for your assistance in this process and thanks to the Fire Code Committee in advance for their efforts to assist with this revision of NFPA 1124. If you have any questions, please contact me.

Enclosures: Amended Draft Committee Proposal (1 item, Draft CP#2)
Letter Ballot on Amended Draft Committee Proposal, final results

cc: Linda Fuller, Standards Administration
J. Moreau, Project Administrative Supervisor
NFPA 1124-2006
Amended Draft Committee Proposal
Approved for letter ballot initially at Committee Meeting, August 31 – September 1, 2009, San Diego, CA and approved as amended at Committee Meeting, September 30 – October 1, 2010, Phoenix, AZ.
These actions relate to items 1 and 2 in the Standards Council Decision, D#08-19 and are to be coordinated with the Fire Code Committee in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Amended Log# Draft CP#2
Submitter: Technical Committee on Pyrotechnics
Recommendation: Task Group A proposes to retain the current requirement in paragraph 7.3.6 as shown below:

7.3.6 An automatic sprinkler system designed and installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, shall be provided throughout permanent CFRS facilities and stores in which CFRS are conducted in the following buildings:

(1) New buildings containing a gross sales area greater than 3000 ft² (278.7 m²) in area excluding storage areas not open to the public greater than 6,000 ft² (557.2 m²) in area

(2) Existing buildings greater than 7,500 ft² (694 m²) in area

Substantiation:

1) The gross sales area of 6000ft² was reduced to 3000ft² based upon the recommendation of the NFPA 1 Committee. The Technical Committee on Pyrotechnics agrees with this recommendation as indicated with the proposed change to 7.3.6 (1).

Comments from NFPA 1 TC on Fire Code substantiation on their balloting of this draft proposal:
• “The 3,000ft² threshold is a reasonable threshold to support manual fire suppression operations because it will allow the fire department to conduct effective defensive operations via the sprinkler system supply and more easily reach the seat of the small fires in those CFRS facilities less than 3,000ft². Reduced distance to enter and easier access to the seat of the fire will reduce the risk of exposure to firefighters in dealing with CFRS facilities”
• “There is obviously significant question as to the appropriate threshold for fire sprinkler protection in these facilities. With the ongoing question and debate, there is no consensus that the current 6,000ft² threshold provides appropriate protection for occupants or firefighters. The 3,000 ft² threshold strikes a balance and is based on the long established consensus of 3000ft² for Class C mercantile occupancies within NFPA 101. If we are going to err based on the lack of consensus, we should err on the side of life safety”
• “The 3,000ft² area requirement for automatic sprinkler protection in new buildings, as defined in NFPA 1124, coordinates more closely to other requirements for protection of mercantile occupancies of this size. This would include the action taken by this Technical Committee on Draft CP#1, as well as other recognized levels of protection already in place which use this 3,000ft² limitation.”

October 24, 2012
Supplemental Agenda October 29-30, 2012
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1) The language “Excluding storage areas not open to the public” was added by the Technical Committee on Pyrotechnics so that 7.3.6 (1) is consistent with NFPA 101 - 36.1.4.2 for the classification of Class C stores. This language also makes it internally consistent with the rest of this chapter where Class C stores are referenced.

Committee Meeting Action: Accept
MEMORANDUM

TO: NFPA Technical Committee on Pyrotechnics
FROM: Jeanne Moreau
DATE: January 4, 2011
SUBJECT: NFPA 1124 A11 Draft Ballot Final Results – CP2

The Final Results of the NFPA 1124 Draft Ballot are as follows:

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<td>32</td>
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<tr>
<td>2</td>
<td>Negative</td>
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<td>0</td>
<td>Abstentions</td>
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</tbody>
</table>

There are two criteria necessary to pass ballot [(1) affirmative \(\frac{2}{3}\) vote and (2) simple majority].

1. The number of affirmative votes needed for the proposal/comment to pass is 20.
   \[
   (32 \text{ eligible to vote} - 2 \text{ not returned} - 0 \text{ abstentions} = 30 \times 0.66 = 19.8)
   \]

2. In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:
   \[
   [32 \text{ eligible} \div 2 = 16 + 1 = (17)]
   \]

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.

According to the final ballot results, all ballot items received the necessary \(\frac{2}{3}\) required affirmative votes to pass ballot.
MEMORANDUM

TO: NFPA Technical Committee on Fire Code (FCC-AAA)

FROM: Gregory Harrington, P.E., Staff Liaison

DATE: February 23, 2011

SUBJECT: NFPA 1124 Amended CP#2 Approval Committee FINAL Ballot Results (A/2011)

The Final Results of the NFPA 1124 Amended CP#2 Approval Committee Ballot are as follows:

30 Members Eligible to Vote
1 Not Returned (C. Schirmer)
15 Affirmative
1 Abstention (D. Erickson)

There are two criteria necessary to pass ballot [(1) affirmative $\frac{2}{3}$ vote and (2) simple majority].

(1) The number of affirmative votes needed for the proposal/comment to pass is 19.

$$\text{(30 eligible to vote - 1 not returned - 1 abstention} = 28 \times 0.66 = 18.48$$

(2) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:

$$[30 \text{ eligible} ÷ 2 = 15 + 1 = (16)]$$

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.

According to the final ballot results, this did not receive the necessary $\frac{2}{3}$ required affirmative votes to pass ballot.
Matthews, Diane

From: Scott Adams [SAdams@pcfd.org]
Sent: Tuesday, February 15, 2011 4:28 PM
To: Matthews, Diane
Subject: RE: Technical Committee on Fire Code (FCC-AAA) RE: Approval Committee Ballot
Circulation for NFPA 1124 - Amended Draft Proposal CP#2

Diane: Please accept my apologies’ for not voting sooner.

In regard to the action to “ACCEPT” the provisions and substantiation put forth by the Technical Committee on Pyrotechnics on Amended Draft Proposal (pre-ROP) CP #2 concerning Threshold Limits for Sprinkler Protection, I would like to change my Non-Returned Vote, to “DISAGREE.”

The reasons for my vote of Disagree, are as follows:

In the proposed amendment to CP#2 for proposed changes to Chapter 7 of NFPA 1124, Code for Manufacture, Transportation, Storage and Retail Sales of Fireworks and Pyrotechnic Articles, section 7.3.6 “An automatic sprinkler system designed and installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, shall be provided throughout permanent CFRS facilities and stores in which CFRS are conducted in the following buildings:

For subsection 1, I believe that our intent was to require all new buildings containing a gross sales area greater than 3000 ft² (278.7 m²) in area, to also include all storage areas not open to the public to be protected with fire sprinklers. It is my understanding that we did not specifically talk about exempting storage.

These are the reasons for my negative vote.

Scott W. Adams
Assistant Fire Chief
District Fire Marshal
Park City Fire Service District
Office: (435) 940-2532
Direct: (435) 940-2503

From: Matthews, Diane [mailto:DMatthews@NFPA.org]
Sent: Tuesday, February 15, 2011 6:53 AM
To: Matthews, Diane
Cc: Solomon, Robert; Collette, Kristin; Colonna, Guy; Dolan, James; Fuller, Linda; Baio, Debbie
Subject: TO: Technical Committee on Fire Code (FCC-AAA) RE: Approval Committee Ballot Circulation for NFPA 1124 - Amended Draft Proposal CP#2

NFPA TECHNICAL COMMITTEE ON FIRE CODE (FCC-AAA)
TECHNICAL COMMITTEE ON FIRE CODE

APPROVAL COMMITTEE BALLOT FOR NFPA 1124, CODE FOR THE MANUFACTURING, TRANSPORTATION, STORAGE AND RETAIL SALE OF FIREWORKS AND PYROTECHNIC ARTICLES

With regard to the action to "ACCEPT" the provisions and substantiation put forth by the Technical Committee on Pyrotechnics on Amended Draft Proposal (pre-ROP) CP #2 concerning Threshold Limits for Sprinkler Protection, I;

AGREE □  DISAGREE* [X]  ABSTAIN* □

If you Disagree or Abstain, reasons must be provided:

SEE ATTACHED

Sign Name: [Signature]
Print Name: [Name]
Date: 2/8/11
Return By: Monday, February 14, 2011

To: Diane Matthews, Administrator, Technical Projects
   Email: dmatthews@nfpa.org
   Fax: 617-984-7110
   Phone: 617-984-7407
Apfelbeck Comments on Disagree for Amended Draft Proposal CP #2 concerning Threshold Limits for Sprinkler Protection:

I disagree with the significant change proposed to (1) based on the following:

1. The Amended Draft Proposal CP#2 language concerning Threshold Limits for Sprinkler Protection is significantly different from the language supported by the NFPA 1 TC. The sprinkler threshold language supported by the NFPA 1 TC was:

   (1) New buildings greater than 3000 ft² (280 m²) in area

2. The NFPA 1124 proposed language creates the potential situation where an existing building would be required to be fire sprinkler protected because it exceeds the 7,500 square foot threshold, however, if the building was constructed new, no fire sprinkler protection would be required.

3. The proposed language would also utilize a different methodology than utilized in (2) which applies to the entire existing building square footage. It is questionable as to why one methodology is appropriate for existing buildings and a different methodology should be utilized for new buildings.

4. The limitation of a 3,000 square foot sales area excluding storage areas does not take into account the significant firefighter safety and fire protection considerations addressed by the NFPA 1 TC during their deliberations in supporting the "(1) New buildings greater than 3000 ft² (280 m²) in area" language. The total building square footage and the contents create the hazard, not just the sales area.

5. The NFPA 1124 TC has failed to justify a change in the NFPA 1 TC's position. The NFPA 1124's substantiation for this change in utilizing the example of the Class C store exemption for storage areas under the Life Safety Code does not provide an equivalent comparison in levels of risk to the occupants, hazards to firefighters and property protection for the entire CRFS building. It is important to note that total reliance on NFPA 101 is not appropriate as NFPA 101 is not a fire prevention code, it is a life safety code. NFPA 101 specifically states that it is not a fire prevention or building code and is not intended to preserve property from loss by fire. Nor does NFPA 101 have a specific intent of firefighter safety in its scope as NFPA 1 does.
Diane-
Based upon my review of the negative votes in the Ballot Circulation, please change my vote to Negative. The separate calculation of the sales area to determine the need for sprinkler protection can produce building configurations with unacceptably large unsprinklered areas which can jeopardize safety for building occupants.

Carl F. Baldassarra, P.E., FSFPE
Licensed in IL, KS, NM
Executive Vice President
The RJA Group, Inc.
600 West Fulton Street, Suite 500
Chicago, IL 60661
Phone: (312) 879-7220
Fax: (312) 879-7221
www.rjainc.com

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NFPA TECHNICAL COMMITTEE ON FIRE CODE (FCC-AAA)

Attached is the Approval Committee Ballot Circulation for NFPA 1124, Amended Draft Proposal (pre-ROP) CP#2.

If you wish to submit a ballot or change your vote, please do so on or before Tuesday, February 22, 2011. Ballots or changes in vote should be submitted to Diane Matthews either via e-mail to dmatthews@nfpa.org or fax to 617.984.7110.

If you do not wish to change your vote, no response is necessary.
Diane, Please change my vote from agree to disagree on CP#2 for the Amended Draft Proposal. The changes significantly alter the technical merits of the 3000 square foot threshold and I no longer support the committee proposal. Specifically, these changes would lessen the level of fire fighter life safety in the building. Jeffrey P. Collins, PE, Fire Marshal, Palm Beach County Fire Rescue

---

**NFPA TECHNICAL COMMITTEE ON FIRE CODE (FCC-AAA)**

Attached is the Approval Committee Ballot Circulation for NFPA 1124, **Amended** Draft Proposal (pre-ROP) CP#2.

If you wish to submit a ballot or change your vote, please do so on or before **Tuesday, February 22, 2011**. Ballots or changes in vote should be submitted to Diane Matthews either via e-mail to dmathews@nfpa.org or fax to 617.984.7110.

If you do not wish to change your vote, no response is necessary.

To obtain NFPA ballot information postings, please go to [http://www.nfpa.org/1](http://www.nfpa.org/1). The file can be found under the “Next Edition” tab.

If you have any questions, please don’t hesitate to contact me.

Diane

Diane D. Matthews  
Administrator, Technical Projects  
NFPA  
Phone: (617) 984-7407  
Fax: (617) 984-7110  
dmathews@nfpa.org

---

Under Florida law, e-mail addresses are public records. If you do not want your e-mail address released in response to a public records request, do not send electronic mail to this entity. Instead, contact this office by phone or in writing.
TECHNICAL COMMITTEE ON FIRE CODE

APPROVAL COMMITTEE BALLOT FOR NFPA 1124, CODE FOR THE MANUFACTURING, TRANSPORTATION, STORAGE AND RETAIL SALE OF FIREWORKS AND PYROTÉCHNIC ARTICLES

With regard to the action to "ACCEPT" the provisions and substantiation put forth by the Technical Committee on Pyrotechnics on Amended Draft Proposal (pre-ROP) CP #2 concerning Threshold Limits for Sprinkler Protection, I:

AGREE  [ ]  DISAGREE* [X]  ABSTAIN* [ ]

If you Disagree or Abstain, reasons must be provided:

[ ] An concern lies in the exception of the storage area limitations. Theoretically, a building owner could create a small display center with a large storage area and avoid sprinkler requirements.

Sign Name: [Signature]
Print Name: Applicant
Date: 2-9-11

Return By: Monday, February 14, 2011

To: Diane Matthews, Administrator, Technical Projects
   Email: dmatthews@nfpa.org
   Fax: 617-984-7110
   Phone: 617-984-7407
Diane,

I wish to change my vote to negative based on the comments and substantiations by other members of the committee. The intent of the NFPA 1 TC is to require sprinklers in buildings greater than 3000 square feet in area.

Robert Fash

---

From: Matthews, Diane [mailto:DMatthews@NFPA.org]
Sent: Tuesday, February 15, 2011 5:53 AM
To: Matthews, Diane
Cc: Solomon, Robert; Collette, Kristin; Colonna, Guy; Dolan, James; Fuller, Linda; Baio, Debbie
Subject: TO: Technical Committee on Fire Code (FCC-AAA) RE: Approval Committee Ballot Circulation for NFPA 1124 - Amended Draft Proposal CP#2

NFPA TECHNICAL COMMITTEE ON FIRE CODE (FCC-AAA)

Attached is the Approval Committee Ballot Circulation for NFPA 1124, Amended Draft Proposal (pre-ROP) CP#2.

If you wish to submit a ballot or change your vote, please do so on or before Tuesday, February 22, 2011. Ballots or changes in vote should be submitted to Diane Matthews either via e-mail to dmatthews@nfpa.org or fax to 617.984.7110.

If you do not wish to change your vote, no response is necessary.

To obtain NFPA ballot information postings, please go to http://www.nfpa.org. The file can be found under the "Next Edition" tab.

If you have any questions, please don’t hesitate to contact me.

Diane

Diane D. Matthews
Administrator, Technical Projects
NFPA
Phone: (617) 984-7407
Fax: (617) 984-7110
dmatthews@nfpa.org
Hi Diane,

Thanks for the reminder - I had filed out but had not sent it. In case you cannot read the copy here is my statement for "Disagree".

I do not think this meets the intent of what was determined by the NFPA 1 TC. This is based on 3,000 sq ft building size, not 3,000 sq ft showroom.

Regards, Bob J

Robert James, Program Manager
Regulatory Services
Underwriters Laboratories, Inc.
8751 Ashworth Drive
Tampa, FL 33647
W: 813-966-1899
F: 813-966-1899
email: robert.j.james@us.ul.com
Web: www.ul.com

600-935-9844 for information
UL - The Standard in Safety
Our Mission - Working for a Safer World Since 1894....
TECHNICAL COMMITTEE ON FIRE CODE

APPROVAL COMMITTEE BALLOT FOR NFPA 1124, CODE FOR THE MANUFACTURING, TRANSPORTATION, STORAGE AND RETAIL SALE OF FIREWORKS AND PYROTECHNIC ARTICLES

With regard to the action to "ACCEPT" the provisions and substantiation put forth by the Technical Committee on Pyrotechnics on Amended Draft Proposal (pre-ROP) CP #2 concerning Threshold Limits for Sprinkler Protection, I:

AGREE  DISAGREE*  ABSTAIN*

If you Disagree or Abstain, reasons must be provided:
The TC for NFPA 1 intended to have square footage apply to the entire facility, discussions didn’t center around sales areas as the Pyrotechnic Committee is proposing. It is conceivable to manipulate the proposal as it is written regarding storage.

Sign Name:  Val F. Milt
Print Name:  Val F. Milt
Date:  2/22/11

Return By:  Monday, February 14, 2011

To:  Diane Matthews, Administrator, Technical Projects
     Email: dmatthews@nfpa.org
     Fax: 617-984-7110
     Phone: 617-984-7407
Sorry Diane –

I wish to change my vote to negative because I believe the increase of the square footage over that in the committee’s original proposal is inappropriate and no technical substantiation has been offered for the increase.

Wayne

Wayne D. Moore, P.E., CFPS, SET | Principal | Hughes Associates, Inc.
117 Metro Center Boulevard | Suite 1002 | Warwick, Rhode Island 02886
Tel: 401-736-8992 x 311 | Fax 401-736-8929 |
email: wmoore@haifire.com | www.haifire.com

"Life is not about waiting for the storms to pass... it's about learning how to dance in the rain!"
Vivian Greene

Wayne, you must supply a reason as to why you are voting negatively. Please provide your reason. Thank you.

Diane D. Matthews
Administrator, Technical Projects
NFPA
Phone: (617) 984-7407
Fax: (617) 984-7110
dmatthews@nfpa.org

From: Wayne Moore [mailto:wmoore@haifire.com]
Sent: Wednesday, February 16, 2011 1:12 PM
To: Matthews, Diane
Subject: NFPA 1124 Amended CP#2
Diane –

I wish to change my vote to Negative on the above referenced ballot.

Thanks.

Wayne

Wayne D. Moore, P.E., CFPS, SET | Principal | Hughes Associates, Inc.
117 Metro Center Boulevard | Suite 1002 | Warwick, Rhode Island 02886
Tel: 401.736.8992 x 311 | Fax 401-736-8929 |
email: wmoore@halfire.com | www.halfire.com

HUGHES ASSOCIATES, INC.
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"Life is not about waiting for the storms to pass...
it's about learning how to dance in the rain!"
Vivian Greene
TECHNICAL COMMITTEE ON FIRE CODE

APPROVAL COMMITTEE BALLOT FOR NFPA 1124, CODE FOR THE MANUFACTURING, TRANSPORTATION, STORAGE AND RETAIL SALE OF FIREWORKS AND PYROTECHNIC ARTICLES

With regard to the action to "ACCEPT" the provisions and substantiation put forth by the Technical Committee on Pyrotechnics on Amended Draft Proposal (pre-ROP) CP #2 concerning Threshold Limits for Sprinkler Protection, I:

AGREE ☐ DISAGREE* ☒ ABSTAIN* ☐

If you Disagree or Abstain, reasons must be provided:

THE CHANGES PROPOSED ARE TOO OPEN ENDED. AT A MINIMUM THERE SHOULD BE A LIMIT ON THE SIZE OF THE STORAGE NORA AND A MINIMUM FIRE SEPARATION BETWEEN THE RETAIL & STORAGE

Sign Name: [Signature]
Print Name: James S. Purcell
Date: 2-14-11

Return By: Monday, February 14, 2011

To: Diane Matthews, Administrator, Technical Projects
   Email: dmatthews@nfpa.org
   Fax: 617-984-7110
   Phone: 617-984-7407
Hi Diane:

I seem to have misplaced my entire ballot. So I don’t have the sheet with the boxes to place my big “x” in. So I hope this is acceptable. For CP #2, I agree with Tony Apfelbeck’s substantiation for voting “Negative” and therefore I am voting “Negative” for the NFPA 1124 Amended CP#2 Ballot Circulation. If possible, can you please resend me the original information sent out for the first vote (that I missed).

I am sure I received your email, but I can’t find it anywhere in my folders or inbox so possibly I deleted without realizing.

Thanks for your help with this. If you have any questions, I am not in Friday, Saturday, Sunday or Monday. So either send your question to cstashak@hotmail.com or call me at 847-922-2286.

Thanks so much!!

Cathy

---

From: Matthews, Diane [mailto:DMatthews@NFPA.org]
Sent: Tuesday, February 15, 2011 7:53 AM
To: Matthews, Diane
Cc: Solomon, Robert; Collette, Kristin; Colonna, Guy; Dolan, James; Fuller, Linda; Baio, Debbie
Subject: TO: Technical Committee on Fire Code (FCC-AAA) RE: Approval Committee Ballot Circulation for NFPA 1124 - Amended Draft Proposal CP#2

NFPA TECHNICAL COMMITTEE ON FIRE CODE (FCC-AAA)

Attached is the Approval Committee Ballot Circulation for NFPA 1124, Amended Draft Proposal (pre-ROP) CP#2.

If you wish to submit a ballot or change your vote, please do so on or before **Tuesday, February 22, 2011**. Ballots or changes in vote should be submitted to Diane Matthews either via e-mail to dmatthews@nfpa.org or fax to 617.984.7110.

If you do not wish to change your vote, no response is necessary.

To obtain NFPA ballot information postings, please go to [http://www.nfpa.org/](http://www.nfpa.org/). The file can be found under the “Next Edition” tab.

If you have any questions, please don’t hesitate to contact me.

Diane
Matthews, Diane

From: Jim Tidwell [jimtidwell@tccfire.com]
Sent: Tuesday, February 15, 2011 12:44 PM
To: Matthews, Diane
Subject: RE: Technical Committee on Fire Code (FCC-AAA) RE: Approval Committee Ballot Circulation for NFPA 1124 - Amended Draft Proposal CP#2

Diane, for all of the reasons outlined by Tony, Bob and Wayne, I'd like to change my vote to negative, citing their reasons. Do you need anything other than this email from me?

Jim

From: Matthews, Diane [mailto:DMatthews@NFPA.org]
Sent: Tuesday, February 15, 2011 7:53 AM
To: Matthews, Diane
Cc: Solomon, Robert; Collette, Kristin; Colonna, Guy; Dolan, James; Fuller, Linda; Baio, Debbie
Subject: TO: Technical Committee on Fire Code (FCC-AAA) RE: Approval Committee Ballot Circulation for NFPA 1124 - Amended Draft Proposal CP#2

NFPA TECHNICAL COMMITTEE ON FIRE CODE (FCC-AAA)

Attached is the Approval Committee Ballot Circulation for NFPA 1124, Amended Draft Proposal (pre-ROP) CP#2.

If you wish to submit a ballot or change your vote, please do so on or before Tuesday, February 22, 2011. Ballots or changes in vote should be submitted to Diane Matthews either via e-mail to dmatthews@nfpa.org or fax to 617.984.7110.

If you do not wish to change your vote, no response is necessary.

To obtain NFPA ballot information postings, please go to http://www.nfpa.org/1. The file can be found under the “Next Edition” tab.

If you have any questions, please don’t hesitate to contact me.

Diane

Diane D. Matthews
Administrator, Technical Projects
NFPA
Phone: (617) 984-7407
Fax: (617) 984-7110
dmatthews@nfpa.org
TECHNICAL COMMITTEE ON FIRE CODE

APPROVAL COMMITTEE BALLOT FOR NFPA 1124, CODE FOR THE MANUFACTURING, TRANSPORTATION, STORAGE AND RETAIL SALE OF FIREWORKS AND PYROTECHNIC ARTICLES.

With regard to the action to "ACCEPT" the provisions and substantiation put forth by the Technical Committee on Pyrotechnics on Amended Draft Proposal (pre-ROP) CP #2 concerning Threshold Limits for Sprinkler Protection, 1:

AGREE □ DISAGREE* X ABSTAIN* □

If you Disagree or Abstain, reasons must be provided:

Please see the Attachment.

______________________________
Sign Name: W.

Print Name: W.

Date: Feb 13th, 2011

To: Diane Matthews, Administrator, Technical Projects
Email: dmatthews@nfpa.org
Fax: 617-984-7110
Phone: 617-984-7407
Comments from Wayne Waggoner on “CP #2 concerning Threshold Limits for Sprinkler Protection”

I support Tony Apfelbeck’s position and his comments that have been submitted on the Amended Draft Proposal “CP #2 concerning Threshold Limits for Sprinkler Protection”

I would also offer the following comment:

To me this is problematic as the draft proposal CP# 2 “Threshold Limits for Sprinkler protection” does not make a distinction between storage and sales area, even though the proposal suggests this is a reduction from 6,000 sq. ft. to 3,000 sq. ft. sales area. I believe, under new construction a building could have a very large warehouse connected to the 3,000 sq.ft. sales area that may not have been sprinkler protected - large meaning more than 3,000 sq. ft. - the original language says no sprinklers in a 6,000 sq. ft. building and the new says no sprinklers in a 3,000 sq. ft. sales area and an undetermined size warehouse.

I am voting No and argue, people visiting a pyrotechnical sales area and its connecting warehouse should be protected by automatic fire sprinklers. Most of these “new” are really old building conversions.
Matthews, Diane

From: Douglas Erickson [douglerickson@mac.com]
Sent: Thursday, February 17, 2011 8:22 AM
To: Matthews, Diane
Subject: Re: TO: Technical Committee on Fire Code (FCC-AAA) RE: Approval Committee Ballot Circulation for NFPA 1124 - Amended Draft Proposal CP#2

Diane:
I would like to change my original vote to – Abstain.

Substantiation:
I have been following this issue via the numerous pieces of correspondence and ballots. Unfortunately due to scheduling conflicts, some with other NFPA committees, I have not been able to make the face-to-face meetings of NFPA 1. Therefore I have missed the opportunity to hear the debates to decide whether I should be voting for or against this CP#2 and now the amendment. I have carefully reviewed the amended language and agree with the negative ballot of Tony Apfelbeck that an awful lot of changes were made between the language supported at the NFPA 1 meeting and the voting on the amendment. As I was not at the meeting nor am I an expert in the protection of fireworks sales or storage facilities I find myself needing to let those that heard the arguments and are the experts decide this very important change in NFPA 1124.

Doug
--
Douglas S. Erickson, FASHE, CHFM, HFDP, CHC
Deputy Executive Director
American Society for Health Care Engineering
155 N. Wacker Drive, Suite 400
Chicago, IL 60606
312-422-3823
847-347-0627 cell (preferred)
derickson@aha.org
douglerickson@mac.com (preferred)

ASHE’s Mission: Dedicated to optimizing the healthcare physical environment.

On 2/15/11 7:53 AM, "Matthews, Diane" <DMatthews@NFPA.org> wrote:

NFPA TECHNICAL COMMITTEE ON FIRE CODE (FCC-AAA)

Attached is the Approval Committee Ballot Circulation for NFPA 1124, Amended Draft Proposal (pre-ROP) CP#2.

If you wish to submit a ballot or change your vote, please do so on or before Tuesday, February 22, 2011. Ballots or changes in vote should be submitted to Diane Matthews either via e-mail to dmatthews@nfpa.org or fax to 617.984.7110.
MEMORANDUM

To: Technical Committee on Pyrotechnics

From: G. Colonna

Date: May 10, 2010

Subject: Draft Proposals Ballot for NFPA 1124 (A11) CP4 and CP5

Attached are the Draft Proposals (pre-ROP) Ballot and ballot material on NFPA 1124, *Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*. This material was finalized at your February 1 – 2, 2010 meeting in Salt Lake City and approved during the meeting for submittal to the Committee for letter ballot. The ballot is for formally voting on whether or not you concur with the Committee's Actions on these draft proposals. If you do not concur, or you abstain, you must provide a technical reason. Following the vote of the Committee, these items and the respective actions will be forwarded to the Building Code Committee (specifically BLD-IND, responsible for NFPA 5000) in accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for correction.

Please return your ballot as soon as possible, but no later than **Friday, May 28, 2010**. For action by the Committee that passes either or both of the attached DRAFT Committee Proposals, the proposal will be presented to the NFPA 5000 BLD-IND Committee for their review and approval as the responsible approval TC.

Your cooperation in meeting this deadline is appreciated. If you wish to fax your ballot, please fax to *(617) 984-7110.*

**Note:** Please remember that the return of ballots and attendance at Committee Meetings are required for all principal and alternate members in accordance with the Regulations Governing Committee Projects.

Enclosures: Ballot Form
Draft Committee Proposals

cc: Linda Fuller, Standards Administration
    J. Moreau-Correia, Project Administrative Supervisor
Return Completed Ballot To: J. Moreau-Correia  
E-Mail to jmoreaucorreia@nfpa.org  
Fax to 617-984-7110  
One Batterymarch Park, Quincy, MA 02169  

Date:___________________ Signed:__________________________________  

Name: __________________________________  
Type or Print black ink  

Committee Action Key:  
A = Accept  
R= Reject  
APA = Accept in Part  
APR = Accept in Principle  
APP = Accept in Principle in Part  
H = Hold  

With respect to the Committee Actions on the DRAFT Proposals that accompanied the ballot, please record me as voting: (check one):  

☐ Affirmative On All Items. I agree with all committee meeting actions without comment.  

☐ Affirmative With Exception(s): I agree with all committee meeting actions Except for the Affirmative with comment, Negative and /or Abstention checked below.  

*Reasons must accompany these votes.  
When possible, reasons are requested via e-mail in a Word Document.  

Please return this Ballot Page only to NFPA.  

<table>
<thead>
<tr>
<th>Log No.</th>
<th>Section</th>
<th>Committee Action</th>
<th>Affirmative with Comment*</th>
<th>Negative*</th>
<th>Abstain*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft CP#4</td>
<td>6.4.1, 6.4.2, 7.3.5, and 7.4.3</td>
<td>Accept</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Draft CP#5</td>
<td>6.7, 7.3.12, and 7.4.7</td>
<td>Accept</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NFPA 1124-2006
Draft Committee Proposals
Approved for letter ballot at Committee Meeting, February 1 – 2, 2010, Salt Lake City, UT
These actions relate to items 3 and 8 (Draft CP#4) and item 7 (Draft CP#5) in the Standards Council
Decision, D#08-19 and are to be coordinated with the Building Code Committee in accordance with
Standards Council direction following the completion of the letter ballot by the Committee on
Pyrotechnics.

Log# DRAFT CP#4
Submitter: Technical Committee on Pyrotechnics
Recommendation: The NFPA Pyrotechnics Technical Committee (TC) does not propose any revisions to
Chapters 6 and 7 of NFPA 1124-2006 in regard to the NFPA Standards Council Decision regarding Fire
Safety Concern Issue #3: Height and Area Limitations and Fire Safety Concern Issue #8: Construction
Materials as detailed in the Standards Council Decision D#08-19. These two issues are being addressed
as a single item, and thus as a single Draft Committee Proposal, since the technical provisions are so
interrelated that they can’t be reasonably addressed separately.
The NFPA Pyrotechnics TC has taken this position based upon the following supporting documentation
of an analysis conducted of the requirements in Section 7.2.3 regarding the height and area limitations
issue and Sections 6.4.2 and 7.4.3(1) regarding the construction materials issue. The Committee voted
to submit this Draft Committee Proposal to letter ballot at the February 1 – 2, 2010 meeting as noted in
the minutes for that meeting.

It is proposed that paragraph 6.4.1 and 6.4.2 read as follows (NO CHANGE IS PROPOSED TO THE
CURRENT 2006 NFPA 1124 REQUIREMENTS FOR THESE PARAGRAPHS):

6.4.1 Buildings and Structures. Consumer fireworks shall be stored only in the following buildings or
structures, provided that the building or structure does not exceed one story in height and does not
contain a basement:
(1) Buildings or structures constructed in accordance with the building code enforced by the AHJ
(2) Buildings or structures constructed in accordance with 6.4.2
(3) Magazines meeting the requirements in Chapter 4
(4) Trailers, semitrailers, and metal shipping containers that are separated by at least 20 ft (6.1 m) from
any building or structure other than trailers, semitrailers, or metal shipping containers

6.4.2 Construction Materials. The following construction requirements shall apply to consumer
fireworks storage buildings
in jurisdictions that have not adopted a building code:
(1) Buildings having an area not greater than 8000 ft² (743 m²) shall be permitted to be constructed of
any approved construction materials.
(2) Buildings having an area greater than 8000 ft² (743 m²) shall be constructed in accordance with one
of the following:
(a) Buildings shall be constructed of noncombustible or limited-combustible materials.
(b) Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.
(3) Roof coverings for any building shall have a minimum rating of Class C as determined in accordance with NFPA 256, *Standard Methods of Fire Tests of Roof Coverings*.

In addition, it is proposed that paragraph 7.3.5 and 7.4.3 read as follows (NO CHANGE IS PROPOSED TO THE CURRENT 2006 NFPA 1124 REQUIREMENTS FOR THESE PARAGRAPHS):

**7.3.5 Construction of Buildings and Structures.** Consumer fireworks shall only be permitted to be sold at retail in any of the following buildings or structures, provided that any new building or structure does not exceed one story in height:
(1) Permanent buildings or structures constructed in accordance with the building code enforced by the AHJ
(2) Tents, canopies, or temporary membrane structures complying with NFPA 102, *Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures*
(3) Temporary structures constructed in accordance with this chapter
(4) Temporary CFRS stands greater than 800 ft² (74 m²) in area that also meet the requirements for a permanent structure
(5) Vehicles, such as vans, buses, trailers, recreational vehicles, motor homes, travel trailers, trucks, and automobiles, complying with the applicable requirements for CFRS stands

**7.4.3 Construction Materials.** The following construction materials requirements shall apply to new permanent CFRS facilities in jurisdictions that have not adopted a local building code:
(1) Buildings having an area up to and including 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials.
(2) Buildings having an area greater than 8000 ft² (743m²) shall be constructed in accordance with one of the following:
(a) Buildings shall be constructed of noncombustible or limited-combustible materials.
(b) Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.
(3) Roof coverings for any building shall have a minimum rating of Class C as determined in accordance with NFPA 256, *Standard Methods of Fire Tests of Roof Coverings*.

**Substantiation:**

**Issue #3 Height and Area Limitations**

In the Standards Council Decision “the Council directs that the limits pertaining to size of space, type of construction, and fuel loading as addressed by Chapter 7 of NFPA 1124 and as represented by the Mercantile Occupancy classification be adequately substantiated...” It is the opinion of the Pyrotechnics Technical Committee, that the references made to the Fire Protection Research Foundation (FPRF) Report relied upon by the Council for their decision on this issue are inappropriate and misused since
the Report refers to the use of the NFPA 101 Life Safety Code mercantile occupancy subclassifications for Class A, B, and C stores which are distinguished on the basis of height and area for a purpose other than what was intended.

NFPA 1124 references NFPA 101 for mercantile occupancies for the purpose of establishing the base minimum requirements for the means of egress in Chapter 7 for regulating the retail sales of consumer fireworks that are conducted in mercantile occupancies. However, Chapter 7 provides many more additional means of egress requirements and limitations, as well as fire protection features, that go well beyond those requirements in NFPA 101 for mercantile occupancies, even those with high hazard contents. Nevertheless, the true purpose of the subclassification of the mercantile occupancy into Class A, B, and C stores in NFPA 101 is to address means of egress and life safety requirements, not minimum construction requirements based on height and area for the purpose of determining a minimum type of construction as would be the case if a building code, such as NFPA 5000, were to be applied.

Section 36.1.4.2 of NFPA 101 – 2009 defines the subclassifications of the mercantile occupancy as follows:

1. Class A
   - Retail sales area greater than 30,000 sq ft or
   - Retail sales areas occupying more than 3 stories

2. Class B
   - Retail sales area greater than 3,000 sq ft and less than 30,000 sq ft occupying no more than 3 stories
   - Retail sales area not greater than 3,000 sq ft occupying 2 or 3 stories

3. Class C
   - Retail sales area not greater than 3,000 sq ft occupying only 1 story

A review of Chapter 36 of NFPA 101 identified all the sections where the mercantile occupancy subclassifications of Class A, B, or C are used to apply a requirement as shown in the following list that also indicates the specific application of each section:

- 36.2.3.2 Street floor exits
- 36.2.4.3 Single means of egress
- 36.2.4.4 Single means of egress
36.2.4.5 Single means of egress
36.2.5.6 Minimum aisle width leading directly to an exit
36.2.5.11 Egress through storerooms
36.2.9 Emergency lighting
36.3.1(1) and (2) Protection of vertical openings
36.3.4.1 Fire alarm system
36.3.5.2 Automatic sprinkler system supervision
36.4.4.3.2.2 Single means of egress (mall buildings)
36.4.4.3.4 Two means of egress (mall buildings)
36.7.2 Drills

A review of these sections clearly indicates that they address issues directly related to the means of egress and life safety and in no way do they deal with fuel loading, building construction types, or construction materials. In fact, Section 36.1.6 Minimum Construction Requirements states: “(No special requirements.)” Of course, this is because such requirements are generally not contained in the NFPA 101 Life Safety Code since it is not a building code.

The only building height and area limits specified in Chapter 7 of NFPA 1124 are found in the following sections:

7.3.5 Construction of Buildings and Structures

Limits new buildings to 1 story in height

(4) Limits temporary consumer fireworks retail sales (CFRS) stands to a maximum area of 800 sq ft. If they exceed 800 sq ft in floor area, they must meet the requirements for permanent CFRS facilities.

7.3.6 Automatic Sprinkler System Thresholds

Establishes building area thresholds for requiring automatic sprinkler systems in permanent CFRS facilities and stores as follows:

(1) New buildings greater than 6,000 sq ft in area
(2) Existing buildings greater than 7,500 sq ft in area

7.4.3 Construction Materials
This section only applies to new permanent CFRS facilities where there is no local building code as follows:

(1) Building areas not greater than 8,000 sq ft are allowed to use any approved construction materials.

(2) Buildings with an area greater than 8,000 sq ft are limited to one of two options for the use of construction materials as follows:
   (a) Construction materials shall be noncombustible or limited-combustible materials. This would be equivalent to Type II (000) construction in NFPA 5000 and Type IIB construction in the ICC International Building Code (IBC).
   (b) Where exterior walls are provided with a fire-resistance rating of not less than 2-hours, the roof decking and its supporting structure, as well as interior partitions, are allowed to be constructed of combustible materials. This would be equivalent to Type III (200) construction in NFPA 5000 and Type IIIB construction in the ICC International Building Code (IBC).

(3) Roof coverings for any building shall have a minimum rating of Class C as determined in accordance with NFPA 256, Standard Methods of Fire Tests of Roof Coverings.

7.4.5.3 Public Notification
Requires permanent CFRS facilities greater than 3,000 sq ft in area to be provided with a public address system or audible/visual alarms for notification of a fire emergency.

7.6.2.1 Portable Fire Extinguishers
Allows temporary CFRS stands less than 200 sq ft in area to be provided with only one portable fire extinguisher.

Generally speaking, NFPA 1124 assumes that a local building code would apply but does provide minimum construction requirements for those jurisdictions which have not adopted a local building code as indicated above in Section 7.4.3 Construction Materials. A further discussion of this will follow in the discussion on Issue #8 Construction Materials.
It should also be noted that building height limits are not an issue since Section 7.3.5 of NFPA 1124 limits new buildings to one (1) story in height.

In conclusion, no further substantiation is necessary for Issue #3 other than that provided in Issue #8, which follows since all of the other provisions relating to building height and area contained in Chapter 7 of NFPA 1124 are not provided to address limits on the size of the space, type of construction, or fuel loading from a building construction materials perspective. As previously noted, this is left to the local authority having jurisdiction to determine based upon the applicable building code where one has been adopted.

**Issue #8 Construction Materials**

The Standards Council Decision indicates that the Council needs further justification for establishing the 8,000 sq ft limitation in Sections 6.4.2 and 7.4.3(1) of NFPA 1124 for differentiating between the different types of construction materials requirements. It should be noted that for both of these sections the minimum requirements for construction materials are only applied if the local jurisdiction has not adopted a building code. The basic presumption behind all of the requirements in NFPA 1124 is that there is also a local building code enforced. However, to be able to provide some minimum reasonable building construction requirements for those jurisdictions that have not adopted a building code but have adopted NFPA 1124, it was felt prudent to specify some minimum requirements which are generally based on comparable limitations in the three legacy model building codes, as well as the ICC International Building Code (IBC) and NFPA 5000.

The type of construction described in Sections 6.4.2(1) and 7.4.3(1) would be classified in accordance with the three legacy model building codes, the 2009 IBC, and NFPA 5000 – 2009 as follows:

- 1997 ICBO Uniform Building Code (UBC) Type V-N
- 1999 BOCA National Building Code (NBC) Type 5B
- 1999 SBCCI Standard Building Code (SBC) Type VI – Unprotected
- 2009 ICC International Building Code (IBC) Type VB
- NFPA 5000 – 2009 Type V (000)
The description of the type of construction specified in Sections 6.4.2(2) (a) and (b) and 7.4.3(2) (a) and (b) for the three legacy model building codes, as well as the 2009 IBC and NFPA 5000 – 2009, are indicated as follows:

- 1997 ICBO Uniform Building Code (UBC) Type II-N / III-N
- 1999 BOCA National Building Code (NBC) Type 2C / 3B
- 1999 SBCCI Standard Building Code (SBC) Type IV – Unprotected / Type V – Unprotected
- 2009 ICC International Building Code (IBC) Type IIB / IIIB
- NFPA 5000 – 2009 Type II (000) / Type III (200)

Section 6.4.2 addresses the minimum construction requirements for consumer fireworks storage buildings based on their classification as a Group H-3 occupancy by all of the model building codes except NFPA 5000 which classifies them as a High-Hazard Contents Protection Level 3. The basic allowable areas, as well as additional allowable area increase calculations, are summarized based on those occupancy classifications for the various model codes previously described for the three types of construction indicated above as follows.

### Use Group H-3 Occupancies / High-Hazard Contents Protection Level 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Type of Const.</th>
<th>Base Allowable Height</th>
<th>Base Allowable Area (sf)</th>
<th>% Open Space Increase</th>
<th>Maximum Area Increase (sf)</th>
<th>Total Allowable Area (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UBC</td>
<td>V-N</td>
<td>1st/40'</td>
<td>5,100</td>
<td>57%</td>
<td>25,500</td>
<td>30,600</td>
</tr>
<tr>
<td>NBC</td>
<td>5B</td>
<td>1st/40'</td>
<td>4,800</td>
<td>67%</td>
<td>4,800</td>
<td>9,600</td>
</tr>
<tr>
<td>SBC</td>
<td>VI - Un</td>
<td>- 0 -</td>
<td>- 0 -</td>
<td>N/A</td>
<td>- 0 -</td>
<td>- 0 -</td>
</tr>
<tr>
<td></td>
<td>VI - 1hr</td>
<td>1st/50'</td>
<td>4,000</td>
<td>N/A</td>
<td>- 0 -</td>
<td>4,000</td>
</tr>
<tr>
<td>IBC</td>
<td>VB</td>
<td>1st/40'</td>
<td>5,000</td>
<td>60%</td>
<td>3,750</td>
<td>8,750</td>
</tr>
<tr>
<td>NFPA 5000</td>
<td>V (000)</td>
<td>1st/60'</td>
<td>5,000</td>
<td>60%</td>
<td>18,750</td>
<td>23,750</td>
</tr>
</tbody>
</table>

N/A – Not applicable

1 – Percent (%) open space increase needed to allow 8,000 sq ft of floor area.

**UBC:** 43’ of open space on 3 sides or 32’ of open space on 4 sides

**NBC:** 30’ of open space for 60% of building perimeter
SBC: No area increases allowed

IBC: 30’ of open space for 85% of building perimeter or
24’ of open space for 100% of building perimeter

NFPA: 30’ of open space for 85% of building perimeter or
24’ of open space for 100% of building perimeter

2 – Includes maximum area increases for open space and automatic sprinklers where allowed.

UBC: 100% increase for open space of 60’ on 3 sides or 40’ on 4 sides
and 3x multiplier for automatic sprinklers

NBC: 150% increase for open space of 30’ for 100% of building perimeter. No increase allowed for automatic sprinklers.

SBC: No area increases allowed

IBC: 75% increase for open space of 30’ for 100% of building perimeter.
No increase allowed for automatic sprinklers.

NFPA: 75% increase for open space of 30’ for 100% of building perimeter
plus 300% increase for automatic sprinklers

3 – Minimum 50’ open space required around entire building perimeter which allows a 100% area increase for open space:

5,100 sq ft + 5,100 sq ft = 10,200 sq ft allowable area.

See Section 503.4.6 and Table 3-G of the UBC.

4 – Minimum 30’ open space required around entire building perimeter which allows a 75% area increase for open space:

5,000 sq ft + 3,750 sq ft = 8,750 sq ft allowable area.

See Section 34.3.5.3.1(1) of NFPA 5000.

Use Group H-3 Occupancies / High-Hazard Contents Protection Level 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Type of Const.</th>
<th>Base Allowable Height</th>
<th>Base Allowable Area (sf)</th>
<th>Maximum Area Increase (sf)</th>
<th>Total Allowable Area (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UBC2</td>
<td>II-N</td>
<td>1st/55’</td>
<td>7,500</td>
<td>37,500</td>
<td>45,000</td>
</tr>
<tr>
<td></td>
<td>III-N</td>
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<td>“</td>
<td>“</td>
<td>“</td>
</tr>
<tr>
<td>NBC</td>
<td>2C</td>
<td>2st/30’</td>
<td>9,600</td>
<td>15,400</td>
<td>25,000</td>
</tr>
<tr>
<td></td>
<td>3B</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>SBC</td>
<td>IV - Un</td>
<td>1st/55'</td>
<td>7,500</td>
<td>- 0 -</td>
<td>7,500</td>
</tr>
<tr>
<td></td>
<td>V - Un</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>IBC</td>
<td>IIB</td>
<td>2st/55'</td>
<td>14,000</td>
<td>10,500</td>
<td>24,500</td>
</tr>
<tr>
<td></td>
<td>IIIB</td>
<td>2st/55'</td>
<td>13,000</td>
<td>9,750</td>
<td>22,750</td>
</tr>
<tr>
<td>NFPA 5000†</td>
<td>II (000)</td>
<td>2st/55'</td>
<td>14,000</td>
<td>52,500</td>
<td>66,500</td>
</tr>
<tr>
<td></td>
<td>III (200)</td>
<td>2st/55'</td>
<td>13,000</td>
<td>48,750</td>
<td>61,750</td>
</tr>
</tbody>
</table>

1 – Includes maximum area increases for open space and automatic sprinklers where allowed.

   UBC: 100% increase for open space of 60’ on 3 sides or 40’ on 4 sides and 3x multiplier for automatic sprinklers

   NBC: 150% increase for open space of 30’ for 100% of building perimeter. No increase allowed for automatic sprinklers.

   SBC: No area increases allowed

   IBC: 75% increase for open space of 30’ for 100% of building perimeter. No increase allowed for automatic sprinklers.

   NFPA: 75% increase for open space of 30’ for 100% of building perimeter plus 300% increase for automatic sprinklers

2 – Minimum 50’ open space required around entire building perimeter which allows a 100% area increase for open space:

   7,500 sq ft + 7,500 sq ft = 15,000 sq ft allowable area

   See Section 503.4.6 and Table 3-G of the UBC.

3 – Minimum 30’ open space required around entire building perimeter which allows a 75% area increase for open space:

   II (000) – 14,000 sq ft + 10,500 sq ft = 24,500 sq ft allowable area
   III (200) – 13,000 sq ft + 9,750 sq ft = 22,750 sq ft allowable area

   See Section 34.3.5.3.1(1) of NFPA 5000.

Based on this comparison of the allowable areas for the Use Group H-3/High-Hazard Contents Protection Level 3 occupancy classifications under the three legacy model building codes, as well as the IBC and NFPA 5000, it appears that the 8,000 sq ft maximum area limit for the use of any type of construction materials allowed by any building code and approved by the authority having jurisdiction is
a reasonable approach for those jurisdictions that do not otherwise adopt a local building code. This is certainly a conservative approach compared to NFPA 5000 where Type V (000) construction would allow an area of 8,750 sq ft based upon the requirement that a minimum 30 ft open space be provided around the entire building perimeter which translates into a 75% area increase for open space. See Section 34.3.5.3.1(1) of NFPA 5000.

Since Section 7.4.3 addresses the minimum construction types and building materials for new permanent CFRS facilities, an analysis of the three legacy model building codes, as well as the ICC International Building Code (IBC) and NFPA 5000, has been compiled for the Use Group M – Mercantile occupancy classification utilizing the same construction types as previously identified for the Use Group H-3/High-Hazard Contents Protection Level 3 occupancies in the tables above. It should also be noted that the mercantile occupancy is the appropriate occupancy classification when applying NFPA 5000 based on the fact that Item (14) of Section 34.1.1 Applicability does not require consumer fireworks, 1.4G in mercantile occupancies complying with NFPA 1124 to comply with Chapter 34 High Hazard Contents. Therefore, when applying Table 7.4.1 Allowable Building Height and Area, high hazard contents not requiring Protection Level 1 through Protection Level 5 are to be based on the appropriate occupancy class. Obviously, in this case that would be a mercantile occupancy.

A review of the following two tables for the different types of construction addressed in Section 7.4.3 Part (1) and Part (2) (a) and (b) clearly indicates that the 8,000 sq ft maximum allowable area for the use of any construction materials that are approved for use by the local jurisdiction which would be comparable to Type V (000) in NFPA 5000 (unprotected wood frame construction) is very conservative. The other types of construction which are comparable to Type II (000) and III (200) in NFPA 5000 have base allowable areas that are well over the 8,000 sq ft threshold for triggering a comparable type of construction. Therefore, we believe that these comparisons of allowable heights and areas are sufficient justification for the 8,000 sq ft limitation utilized in Section 7.4.3 of NFPA 1124 for specifying minimum construction materials and types of construction for those jurisdictions that have not adopted a local building code.

Use Group M – Mercantile Occupancies
<table>
<thead>
<tr>
<th>Code</th>
<th>Type of Const.</th>
<th>Base Allowable Height</th>
<th>Base Allowable Area (sf)</th>
<th>% Open Space Increase&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Maximum Area Increase&lt;sup&gt;2&lt;/sup&gt; (sf)</th>
<th>Total Allowable Area (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UBC</td>
<td>V-N</td>
<td>2st/40'</td>
<td>8,000</td>
<td>- 0 -</td>
<td>40,000</td>
<td>48,000</td>
</tr>
<tr>
<td>NBC</td>
<td>5B</td>
<td>1st/40'</td>
<td>4,800</td>
<td>67</td>
<td>16,800</td>
<td>21,600</td>
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<tr>
<td>SBC</td>
<td>VI – Un</td>
<td>2st/40'</td>
<td>6,000</td>
<td>33</td>
<td>18,000</td>
<td>24,000</td>
</tr>
<tr>
<td>IBC</td>
<td>VB</td>
<td>1st/40'</td>
<td>9,000</td>
<td>- 0 -</td>
<td>33,750</td>
<td>42,750</td>
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<td>NFPA 5000</td>
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<td>1st/40'</td>
<td>9,000</td>
<td>- 0 -</td>
<td>33,750</td>
<td>42,750</td>
</tr>
</tbody>
</table>

1 – Percent (%) open space increase needed to allow 8,000 sq ft of floor area.

NBC: 30’ of open space for 60% of building perimeter

SBC: 30’ of open space for 50% of building perimeter

2 – Includes maximum area increases for open space and automatic sprinklers where allowed.

UBC: 100% increase for open space of 60’ on 3 sides or 40’ on 4 sides

and 3x multiplier for automatic sprinklers

NBC: 150% increase for open space of 30’ for 100% of building perimeter plus 200% increase for automatic sprinklers

SBC: 100% increase for open space of 30’ for 100% of building perimeter plus 200% increase for automatic sprinklers

IBC: 75% increase for open space of 30’ for 100% of building perimeter plus 300% increase for automatic sprinklers

NFPA: 75% increase for open space of 30’ for 100% of building perimeter plus 300% increase for automatic sprinklers

**Use Group M – Mercantile Occupancies**

<table>
<thead>
<tr>
<th>Code</th>
<th>Type of Const.</th>
<th>Base Allowable Height</th>
<th>Base Allowable Area (sf)</th>
<th>Maximum Area Increase&lt;sup&gt;1&lt;/sup&gt; (sf)</th>
<th>Total Allowable Area (sf)</th>
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<tbody>
<tr>
<td>UBC</td>
<td>II-N</td>
<td>2st/55'</td>
<td>12,000</td>
<td>60,000</td>
<td>72,000</td>
</tr>
<tr>
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<td>III-N</td>
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<td>“</td>
<td>“</td>
</tr>
<tr>
<td>NBC</td>
<td>2C</td>
<td>2st/30'</td>
<td>9,600</td>
<td>33,600</td>
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<td></td>
<td>SBC</td>
<td>IV – Un</td>
<td>2st/55'</td>
<td>9,000</td>
<td>27,000</td>
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<td>V – Un</td>
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<tr>
<td>IBC</td>
<td>IIB</td>
<td>2st/55'</td>
<td>12,500</td>
<td>46,875</td>
<td>59,375</td>
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<td>IIIB</td>
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</tr>
<tr>
<td>NFPA 5000</td>
<td>II (000)</td>
<td>4st/55’</td>
<td>12,500</td>
<td>46,875</td>
<td>59,375</td>
</tr>
<tr>
<td></td>
<td>III (200)</td>
<td>“</td>
<td>“</td>
<td>“</td>
<td>“</td>
</tr>
</tbody>
</table>

1 – Includes maximum area increases for open space and automatic sprinklers where allowed.

**UBC:** 100% increase for open space of 60’ on 3 sides or 40’ on 4 sides and 3x multiplier for automatic sprinklers

**NBC:** 150% increase for open space of 30’ for 100% of building perimeter plus 200% increase for automatic sprinklers

**SBC:** 100% increase for open space of 30’ for 100% of building perimeter plus 200% increase for automatic sprinklers

**IBC:** 75% increase for open space of 30’ for 100% of building perimeter plus 300% increase for automatic sprinklers

**NFPA:** 75% increase for open space of 30’ for 100% of building perimeter plus 300% increase for automatic sprinklers

**Committee Meeting Action:** Accept
Log# Draft CP#5
Submitter: Technical Committee on Pyrotechnics

The NFPA Pyrotechnics TC has taken this position based upon the following supporting documentation of an analysis conducted of the requirements in Section 6.4.7 (correct reference is Section 6.7) and Section 7.4.7 regarding separation distances. The Committee voted to submit this Draft Committee Proposal to letter ballot at the February 1 – 2, 2010 meeting as noted in the minutes for that meeting.

It is proposed that Section 6.7 read as follows (NO CHANGE IS PROPOSED TO THE CURRENT 2006 NFPA 1124 REQUIREMENTS FOR THESE PARAGRAPHS):

6.7 Separation Distances.
6.7.1* Consumer fireworks storage or work buildings at distribution facilities shall be separated from adjacent permanent buildings and structures in accordance with Table 6.7.1.
6.7.2 Consumer fireworks storage or work buildings at manufacturing facilities shall be separated from inhabited buildings, passenger railways, public highways, and other storage buildings in accordance with the distances specified in Table 4.6.6, and shall be separated from process buildings and areas by the distances specified in Table 4.6.3.

<table>
<thead>
<tr>
<th>Separation Distances</th>
<th>Exterior Wall Fire Resistance Rating (hr)</th>
<th>Exterior Wall Opening Protection Rating (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ft</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>&lt; 5</td>
<td>&lt; 1.5</td>
<td>3</td>
</tr>
<tr>
<td>≥ 5 to &lt; 10</td>
<td>≥ 1.5 to &lt; 3</td>
<td>2</td>
</tr>
<tr>
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<td>≥ 3 to &lt; 18.3</td>
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<td>≥ 60</td>
<td>≥ 18.3</td>
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6.7.3 Other Separation Distances.
6.7.3.1 Consumer fireworks storage or work buildings shall not be located within 50 ft (15.2 m) of the following:
(1) Motor vehicle fuel–dispensing station dispensers
(2) Retail propane–dispensing station dispensers
(3) Compressed natural gas dispensing facilities
(4) Aboveground storage tanks for flammable or combustible liquid, flammable gas, or flammable liquefied gas
6.7.3.2 Consumer fireworks storage or work buildings shall not be located within 300 ft (91.2 m) of any aboveground bulk storage or bulk dispensing area for the following:
(1) Flammable or combustible liquid
(2) Flammable gas
In addition, it is proposed that paragraph 7.3.12 and 7.4.7 read as follows (NO CHANGE IS PROPOSED TO THE CURRENT 2006 NFPA 1124 REQUIREMENTS FOR THESE PARAGRAPHS):

7.3.12 Distance from Bulk Dispensing and Bulk Storage.
7.3.12.1 CFRS facilities and stores shall not be located within 50 ft (15.2 m) of the following:
(1) Retail propane-dispensing station dispensers
(2) Aboveground storage tanks for flammable or combustible liquid, flammable gas, or flammable liquefied gas
(3) Compressed natural gas–dispensing station dispensers
7.3.12.2 New CFRS facilities and stores, existing CFRS stands and tents, and temporary CFRS facilities shall not be located within 50 ft (15.2 m) of motor vehicle fuel–dispensing station dispensers.
7.3.12.3 Existing CFRS facilities, other than CFRS stands, tents, and temporary facilities, and existing stores shall not be located within 25 ft (7.6 m) of motor vehicle fuel–dispensing station dispensers.
7.3.12.4 Fuel tanks on vehicles or other motorized equipment shall not be considered bulk storage.
7.3.12.5 Fuel storage for generators shall be in accordance with 7.4.9.2.
7.3.12.6 CFRS areas and storage areas shall not be located within 300 ft (91.2 m) of any aboveground bulk storage or bulk dispensing area for the following:
(1) Flammable or combustible liquid
(2) Flammable gas
(3) Flammable liquefied gas

7.4.7 Separation Distances.
7.4.7.1 Permanent Facilities.
7.4.7.1.1 New Facilities. New permanent consumer fireworks retail sales facilities shall be separated from adjacent permanent buildings and structures in accordance with Table 7.4.7.1.1.

<table>
<thead>
<tr>
<th>Separation Distances</th>
<th>Exterior Wall Fire Resistance Rating (hr)</th>
<th>Exterior Wall Opening Protection Rating (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 10 ft (&lt; 3.05 m)</td>
<td>2</td>
<td>1½</td>
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<tr>
<td>10 to 60 ft (&lt; 0.3 m)</td>
<td>1</td>
<td>%</td>
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<tr>
<td>60 ft to 183 ft (≥ 18.3 m)</td>
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</table>

7.4.7.1.2 Existing Facilities. Existing permanent CFRS facilities shall be separated from adjacent permanent buildings and structures by not less than 10 ft (3.05 m) or shall be separated by a wall with a 1-hour fire resistance rating.

7.4.7.2 Temporary Facilities. Temporary CFRS facilities shall be located as specified in Table 7.4.7.2.


<table>
<thead>
<tr>
<th>Buildings</th>
<th>Combustibles</th>
<th>Tents</th>
<th>Vehicle Parking</th>
<th>Stands</th>
<th>Storage of Consumer Fireworks</th>
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<td>Ft</td>
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<td>Ft</td>
<td>m</td>
<td>Ft</td>
<td>m</td>
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<tr>
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<td>20</td>
<td>6.1</td>
<td>10</td>
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<tr>
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<td>6.1</td>
<td>10</td>
<td>3.05</td>
<td>20</td>
</tr>
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</table>

Substantiation:

**Issue #7 Separation Distances**

The Fire Protection Research Foundation (FPRF) Report relied upon by the Council for their decision on this issue points to Section 6.4.7 (correct reference for separation distance requirements in Chapter 6 is Section 6.7) and Section 7.4.7 of NFPA 1124 that addresses separation distances and focuses on the minimum separation distances specified for temporary consumer fireworks retail sales facilities in Table 7.4.7.2 Temporary CFRS Facilities – Minimum Separation Distances. The Council Decision states that “the separation distances be adequately substantiated...” However, it is not clear if this refers to all separation distances specified in Chapters 6 and 7 of NFPA 1124 or only those referenced in the FPRF Report specifically addressing temporary consumer fireworks retail sales facilities. Due to the ambiguity in the direction given by the Council, the action in creating this Draft Committee Proposal substantiates all of the separation distances specified throughout Chapters 6 and 7 of NFPA 1124.

**Section 6.7 Separation Distances**

It should be noted that there is evidently a typographical error in the Council’s Decision since there is no Section 6.4.7. However, Section 6.7 Separation Distances does contain requirements for minimum separation distances for consumer fireworks storage and work buildings so that will be the section addressed in this discussion.

The separation distances and fire-resistance ratings specified for the exterior walls in Table 6.7.1 Separation Distance for Consumer Fireworks Storage or Work Buildings are based on both Table 7.3.2.1 Fire-Resistance Ratings for Exterior Walls of NFPA 5000 and Table 602 Fire-Resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance of the ICC International Building Code (IBC).
The separation distances and fire-resistance ratings specified for exterior walls in Table 7.3.2.1 of NFPA 5000 for industrial and storage occupancies with ordinary hazard contents were used and then 1-hour of additional fire-resistance was added. The separation distance at which the exterior walls were allowed to be constructed without a fire-resistance rating was also extended from 30 ft or greater to 60 ft or greater (doubled). This was done to provide an additional factor of safety for these buildings storing consumer fireworks, 1.4G which are considered a storage occupancy containing Protection Level 3 high hazard contents.

However, it should be noted that for industrial and storage occupancies with high hazard contents complying with Protection Levels 1, 2, and 3 in NFPA 5000, Table 7.3.2.1 indicates that the exterior wall fire-resistance ratings and separation distances are to be determined in accordance with the requirements in Chapter 34. Section 34.3.5.3 Minimum Distances to Property Lines or Horizontal Separation specifies the separation distance requirements for Protection Level 3 high hazard contents. Specifically, Section 34.3.5.3.1(1) requires buildings complying with Protection Level 3 with an area greater than 1,000 sq ft to be separated by a minimum 30 ft to property lines or provide a horizontal separation of 30 ft. Since no other requirements are specified for the exterior walls in this situation, it must be assumed that the exterior walls are not required to have a fire-resistance rating where the separation distance is at least 30 ft. Thus, for that condition, Table 6.7.1 in NFPA 1124 is conservative since it requires a minimum 1-hour fire-resistance rating up to a separation distance of 60 ft.

It is also interesting to note that Table 7.3.2.1 of NFPA 5000 specifies the same fire-resistance ratings for the separation distances indicated in Table 6.7.1 for industrial and storage occupancies with high hazard contents complying with Protection Levels 4 and 5 with the exception that the exterior walls with a separation distance greater than 30 ft are not required to have a fire-resistance rating.

As noted above, Table 6.7.1 is also very similar to Table 602 of the ICC IBC for Group H occupancies. Buildings storing consumer fireworks, 1.4G are classified as Group H-3 occupancies in the IBC. The fire-resistance ratings and separation distances are identical between the two tables with the following exceptions in Table 602. For the 5 ft to 10 ft separation distance, the 2-hour fire-resistance rating applies to all types of construction other than Type IA. For the separation distance between 10 ft and 30 ft, the 1-hour fire-resistance rating applies to all types of construction other than Types IA and IB. And the fire-resistance rating is zero for separation distances of at least 30 ft.
In summary, the separation distances and exterior wall fire-resistance ratings specified in Table 6.7.1 of NFPA 1124 meet or exceed the minimum requirements contained in NFPA 5000 and the ICC IBC for the comparable occupancy classifications. We believe that this is adequate substantiation to justify the separation distances and exterior wall fire-resistance ratings contained in Table 6.7.1 of NFPA 1124.

**Table 7.4.7.1.1 Separation Distances**

The separation distances and fire-resistance ratings specified for the exterior walls in Table 7.4.7.1.1 Separation Distances Between New Permanent Buildings and Structures for the retail sales of consumer fireworks are based on both Table 7.3.2.1 Fire-Resistance Ratings for Exterior Walls of NFPA 5000 and Table 602 Fire-Resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance of the International Building Code (IBC) for Group M Mercantile occupancies. Because of the way separation distances are determined for the purpose of establishing fire-resistance ratings for exterior walls and opening protectives, the distances in the tables in NFPA 5000 and the IBC were doubled based on there being an assumed property line equidistant between the buildings without taking into consideration the actual location of a property line that may exist between separate properties.

For an additional level of conservatism, the minimum 1-hour fire-resistance rating for exterior walls was extended beyond the 20 ft separation distance (10 ft x 2) in Table 7.3.2.1 of NFPA 5000 out to a separation distance of 60 ft (30 ft x 2) before no fire-resistance rating was allowed. A comparison to Table 602 of the IBC indicates that the minimum 1-hour fire-resistance rating for exterior walls would be comparable to the 60 ft separation distance in Table 7.4.7.1.1 of NFPA 1124 based on doubling the separation distance of up to 30 ft for the 1-hour rating of the exterior walls in Group M occupancies. It should also be noted that for Types IIB and VB construction for separation distances between 10 ft and 30 ft in Table 602, there would not be a required fire-resistance rating. This would be comparable to 20 ft to 60 ft in Table 7.4.7.1.1 based on the doubling concept.

The use of the mercantile occupancy classification for applying Table 7.3.2.1 of NFPA 5000 is justified based on Item (14) of Section 34.1.1 Applicability of NFPA 5000 which does not require consumer fireworks, 1.4G in mercantile occupancies complying with NFPA 1124 to comply with Chapter 34 High-Hazard Contents. Thus, the fire separation distances versus exterior wall fire-resistance ratings contained in Table 7.4.7.1.1 of NFPA 1124 meet or exceed the minimum requirements contained in NFPA 5000 and the ICC IBC for the comparable occupancy classifications. We believe that this is
Adequate substantiation to justify the separation distances and exterior wall fire-resistance ratings contained in Table 7.4.7.1.1 of NFPA 1124.

**Table 7.4.7.2 Temporary CFRS Facilities – Minimum Separation Distances**

The FPRF Report specifically addresses Table 7.4.7.2 Temporary CFRS Facilities – Minimum Separation Distances and questions how these separation distances were determined. The main basis for the Report’s concerns are documented in a discussion of the Washington Test which is the subject of an article titled “Fireworks Stand Test Burn” by David Lynam, Clark County, WA Fire Marshal, published in Fire Technology, Second Quarter, April 2001, Volume 37, No.2 on pages 153 through 166. Although the Committee is reluctant to call this a bona fide fire test (it’s considered to be more of a demonstration due to a lack of calibrated instrumentation and appropriate documentation and a general lack of the use of standardized testing technologies and techniques), the test results can be utilized in the analysis and justification for the separation distances specified in Table 7.4.7.2 despite the FPRF Report’s claim to the contrary based on the conclusions of the test report.

It should be noted that the article concludes that the “test data supports the adequacy of a twenty-foot (20 ft) setback to combustibles (including buildings) from temporary stands constructed and loaded with fireworks... except where openings are present. Where openings are present – particularly a large front sales opening, forty foot (40 ft) setbacks are required to provide a similar level of protection.” This is based on the construction of the test stand which was enclosed on both sides and the back but was partially open on the front side. The opening in the front side extended the full length of the 16 ft long stand and was open from a height of approximately 4 ft to a height of approximately 7 ft, resulting in a 3 ft high by 16 ft long opening in the front exterior wall of the stand.

At a separation distance of 20 ft from the front of the stand, the calculated peak heat flux based on measurements made during the fire test was approximately 14 kW/m². It should be noted that research of the available literature shows that spontaneous (non-piloted) ignition of cellulosic materials such as wood or paper (without a pilot flame or spark nearby to initiate the combustion process) occurs at approximately 28 kW/m². (Refer to pages 212 – 214 of the book titled “An Introduction to Fire Dynamics” by Dougal Drysdale, published in 1985 by John Wiley and Sons, Ltd.) Therefore, spontaneous ignition as a possible spread of the fire due to radiant heat exposure can be eliminated from consideration and the focus can be on the piloted ignition of cellulosic materials such as wood which
results from radiant heating in conjunction with a pilot flame or spark to initiate the combustion process.

Drysdale has documented the piloted ignition of wood at 12 kW/m$^2$ and cardboard at 12.5 kW/m$^2$. However, no time to ignition from initial exposure to those radiant heat fluxes was provided. In Vytenis Babrauskas’ book titled “Ignition Handbook” published in 2003 by Fire Science Publishers on pages 267 – 274 there are a significant amount of data regarding radiant heat piloted ignition of various cellulosic materials that include ignition times. From this review, the most conservative material documented is blackened cellulose paper which has been determined to have a piloted ignition radiant heat flux of 11 kW/m$^2$. That is the absolute minimum flux at which piloted ignition is possible over an extremely long exposure period. Based on the other piloted ignition data for blackened cellulose paper, at the 14 kW/m$^2$ radiant heat exposure calculated at 20 ft in front of the fireworks stand, ignition would occur after approximately 90 seconds (1½ minutes) of exposure. Of course, this assumes there will be a small ignition source available which may or may not be the case, but is certainly conservative. Since the 14 kW/m$^2$ radiant heat exposure determined in the test was basically instantaneous, it is extremely unlikely that piloted ignition of the blackened cellulose paper would occur.

In order to have a piloted ignition caused by the radiant heat exposure from the front of the stand, it would be necessary to have a small ignition source at the location of the exposure being subjected to the radiant heat at the flux level necessary to achieve piloted ignition. However, this is very unlikely at a 20 ft distance from the front of the stand, especially given the fact that the aerial type fireworks are required to be restrained in some manner to “limit travel distance of ejected pyrotechnic components” based on Section 7.3.15.6 of NFPA 1124. Thus, the aerial fireworks should not be ejected beyond the front face of the stand where they could serve as the piloted ignition source.

Another way to look at the radiant heat exposure from the fireworks stand fire is to evaluate the 150 second average radiant heat flux which was also calculated in the fireworks stand test burn report. At a 20 ft distance from the front of the fireworks stand, the calculated 150 second average radiant heat flux was approximately 10 kW/m$^2$. This is below the 11 kW/m$^2$ absolute minimum for piloted ignition of the blackened cellulose paper, so it is extremely unlikely that ignition would occur based on the 10 kW/m$^2$ average radiant heat exposure over 150 seconds (2½ minutes). In fact, for a calculated ignition time of 150 seconds for the blackened cellulose paper, a heat flux of approximately 12 kW/m$^2$ would be
required. So this is another way of looking at the fact that it would be very unlikely for piloted ignition to occur in front of the fireworks stand for blackened cellulose paper based on the Washington Test. That being the case, then it appears that the 20 ft separation distance from a stand to adjacent combustibles would be adequate to minimize the possibility of ignition occurring to the exposed combustibles based on the Washington fireworks stand test burn referenced by the FPRF Report.

In looking at Table 7.4.7.2 of NFPA 1124, stands are required to have a minimum 20 ft separation to the following:

- Buildings
- Tents
- Other stands where the aggregate area of the stands is greater than 800 sq ft
- Storage of consumer fireworks

For those cases, the exposure concern is that of a fire in the stand exposing the adjacent exposure, causing ignition of any combustibles, and thus allowing the fire to spread to the adjacent exposure.

It should be noted that for separation between stands, the table requires a minimum 5 ft separation, provided the aggregate area of such stands does not exceed 800 sq ft. This is based on the provision in Chapter 7 of NFPA 1124 that a stand can be as large as 800 sq ft without being considered a permanent structure. However, once the aggregate area of stands adjacent to each other with less than a 20 ft separation exceeds 800 sq ft, then the separation distance is required to be a minimum 20 ft. The 5 ft separation distance provides for access between the adjacent stands and also allows for egress to occur. It should also be noted that flames projecting out a window or door opening in the stand so as to expose an adjacent stand would normally not extend more than 5 ft horizontally. So the 5 ft separation would also assist in minimizing direct flame contact between adjacent stands where the aggregate area of the stands is less than 800 sq ft.

This leaves two other separation distances in the table for stands. They include the following:

- Combustibles at 10 ft
- Vehicle parking at 10 ft

For these cases the concern is the potential radiant heat exposure to the stand from the adjacent exposures. The 10 ft separation distance specified for vehicle parking can be justified based on a
comparison to the allowance for unprotected openings in exterior walls of open parking structures in accordance with NFPA 5000. Open parking structures are considered as a low hazard content storage occupancy based on Section 6.1.13.1 and Annex Note A.6.1.13.1 of NFPA 5000. Table 7.3.2.1 for exterior wall ratings indicates that a horizontal separation of at least 10 ft would not require a fire-resistance rating for the exterior wall. Furthermore, Table 7.3.5(a) which indicates the allowable percentage of unprotected openings for exterior walls depending upon the horizontal separation allows 100 percent unprotected openings where the horizontal separation is at least 10 ft.

The only justification found for the 10 ft separation to combustibles is based on the requirements in NFPA 101 – 2009 for tents that would, represent a more severe exposure situation involving adjacent combustibles that might be on fire as compared to a stand. Section 11.11.3 Location and Spacing contains provisions for separation requirements for tents. Section 11.11.3.1 requires that at least 10 ft be maintained between stake lines for tents. Section 11.11.4.1 requires that a minimum 10 ft clearance be maintained for flammable or combustible material or vegetation around the perimeter of the tent. It should also be noted that the requirements are virtually identical for tents in NFPA 1 and NFPA 5000.

It could be argued that the rationale provided for the separation distances for stands could also apply to tents and may, in fact, be conservative when applied to tents as compared to stands. This would be in regard to the tent representing the exposing fire to adjacent potentially combustible structures or materials, such as is the case for the following in accordance with Table 7.4.7.2:

- Buildings 20 ft
- Combustibles 20 ft
- Other tents 20 ft
- Stands 20 ft
- Storage of consumer fireworks 20 ft

It would not be unreasonable to utilize the size of the “radiator” in the Washington fireworks stand fire test represented by the opening in the front of the fireworks stand of approximately 3 ft tall x 16 ft long, resulting in an irradiation area without flame extension of approximately 50 sq ft, as being conservatively representative of a fireworks fire in a tent. The fireworks within the stand were stacked from the ground up to the underside of the roof at a height of about 7 to 8 ft. This is a storage height that would not be found within a tent sales arrangement since the height of the displayed fireworks
merchandise must be limited to 6 ft as required by Section 7.3.15.2.1 of NFPA 1124. Furthermore, a fire in a tent would dissipate its energy over a 360 degree arc so the radiant energy would not be as directed as was the case for the fireworks stand with the single opening in the front through which virtually all the radiant energy from the fire was emitted.

Also, a comparison to the requirements in Section 11.11.3 of NFPA 101 – 2009 for tents may provide additional substantiation for the separation distances in Table 7.4.7.2. Specifically, Section 11.1.3.1 requires a minimum separation distance of 10 ft between stake lines of adjacent tents. Section 11.11.3.4 does not require tents less than 1,200 sq ft in area to be separated from each other. Section 11.11.3.5 allows tents to be located next to other structures at the discretion of the authority having jurisdiction. And, finally, Section 11.11.4.1, as mentioned previously, requires that a minimum 10 ft clearance of flammable and combustible materials or vegetation be maintained around the entire perimeter of the tent. As also previously noted, these requirements are virtually identical to those in NFPA 1 and NFPA 5000 for tents.

Another referenced document used for comparison and as potential justification for the separation distance for tents is the 2009 edition of the ICC International Fire Code (IFC). Section 2403.8.2 Location specifies a minimum separation distance for tents of 20 ft to adjacent property lines, buildings, other tents, and parked vehicles. It should be noted that this measurement is to be made from the support ropes, guy wires, or stakes provided to support the tents. However, there are a couple of exceptions to these requirements. Exception 1 does not require a separation distance between tents where the aggregate area of the tents adjacent to each other does not exceed 15,000 sq ft. Exception 2 does not require a tent to be separated from a building where the tent is less than 10,000 sq ft in area. Also, Section 2403.8.6 Fire Break requires an unobstructed passageway of at least 12 ft which is free of ropes, guy wires, stakes, etc., to be provided around the entire perimeter of all tents.

In conclusion, the Pyrotechnics Technical Committee believes that the above discussion has adequately substantiated and justified the minimum separation distances specified for temporary CFRS facilities by Table 7.4.7.2 of NFPA 1124. This Draft Committee Proposal has been prepared showing the existing language as contained in the 2006 edition of NFPA 1124.

Committee Meeting Action: Accept
MEMORANDUM

To:    Tracy Golinveaux, Staff Liaison for Building Code Committee, Building
       Construction Technical Committee
From:  G. Colonna, Staff Liaison for Pyrotechnics Committee
Date:  July 16, 2010
Subject:  Transmittal of Draft Proposals for NFPA 1124 (A12) for review and action by
          Building Construction Technical Committee (BLD-BLC)

Attached are Draft Proposals (pre-ROP) CP#4 and CP#5, and the letter ballot results for
proposed changes to Chapter 7 of NFPA 1124, Code for Manufacture, Transportation, Storage,
and Retail Sales of Fireworks and Pyrotechnic Articles. This material was developed by the
Committee on Pyrotechnics at its February 1 – 2, 2010 meeting in Salt Lake City.

In accordance with the direction in the Standards Council decision D#08-19 issued October 1,
2008, this material has been developed as Draft Proposals (pre-ROP) and has been letter balloted
through the Committee on Pyrotechnics. In addition to the Draft Proposals, I have also attached
the final ballot results indicating that the items achieved the required 2/3\textsuperscript{rd} majority and simple
majority with affirmative votes for DRAFT Committee Proposals (DRAFT CP#4 and DRAFT
CP#5).

In accordance with the direction of the Council, I am providing you with this information as
Staff Liaison to the Building Construction Technical Committee and requesting that you include
this as an agenda item for future consideration by the Building Construction Technical
Committee. The Task Group leader for the Pyrotechnics Committee for this activity is Jerry
Farley. If the Committee has questions on any aspect as presented in the attached Draft
Proposal, please contact me or Mr. Farley directly for clarification.

Thanks for your assistance in this process and thanks to the Building Construction Technical
Committee in advance for their efforts to assist with this revision of NFPA 1124. If you have
any questions, please contact me.

Enclosures:  Draft Committee Proposal (2 items, Draft CP#4 and Draft CP#5)
Letter Ballot on Draft Committee Proposals, final results

cc:  Linda Fuller, Standards Administration
     J. Moreau, Project Administrative Supervisor
     R. Solomon, Staff Liaison (BLD-AAC)
MEMORANDUM

TO: NFPA Technical Committee on Pyrotechnics

FROM: Jeanne Moreau

DATE: June 14, 2010

SUBJECT: NFPA 1124 A11 Draft Ballot Final Results – CP4 and CP5

The Final Results of the NFPA 1124 Draft Ballot are as follows:

32 Members Eligible to Vote
2 Ballots Not Returned (G. Hanson and R. Robbins)

30 Affirmative on All
0 Negatives
0 Abstentions

The number of affirmative votes need for the report to be published is 20.
(32 eligible to vote - 2 not returned - 0 abstentions = 30 \times 0.66 = 19.8)

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
(32 of eligible voting members \div 2 = 16 (17))

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.

According to the final ballot results, all ballot items received the necessary 2/3 required affirmative votes to pass ballot.
NFPA 5000/NFPA 1124 Task Group
MEETING MINUTES
August 24, 2010
Microsoft Live Meeting

1. Call to Order.
The meeting of the NFPA 5000/NFPA 1124 Task Group was called to order at 11:00 am on August 24, 2010 by Pete Willse.

2. Introduction of Committee Members and Guests.

<table>
<thead>
<tr>
<th>LAST NAME</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Beitel</td>
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<td>Davis</td>
<td>Richard</td>
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<td>Thornberry</td>
<td>Rick</td>
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<td>Willse</td>
<td>Peter</td>
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Task Group Members Not in Attendance

<table>
<thead>
<tr>
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</tr>
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<tbody>
<tr>
<td>Rao</td>
<td>Carmen</td>
</tr>
<tr>
<td>Versteeg</td>
<td>Joe</td>
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</table>

3. Background Information
Robert Solomon reviewed the Standards Council decision and background concerning retail sale of consumer fireworks. Several “Approval Committees” were tasked to review proposed changes for the next edition of NFPA 1124. The TC on Building Construction was one of those designated for this task. A PowerPoint describing this process was reviewed and the purpose of the Task Group meeting was discussed. The task group was to review the 1124 pre-proPOSals and provide feedback to the 1124 committee on the items that involved NFPA 5000:
   Item 3: Height and Area Tables
   Item 7: Separation Distances
   Item 8: Construction Materials
All three of these items were covered in two NFPA 1124 committee proposals, CP#4 and CP#5.

4. NFPA 1124 CP#4
The task group reviewed NFPA 1124 CP#4 and suggested revisions (See Appendix A).

5. NFPA 1124 CP#5
The task group reviewed NFPA 1124 CP#5 and suggested revisions (See Appendix B).

6. Adjournment
The task group adjourned the meeting at 1:30 pm on August 24.

These minutes were prepared by Tracy Golinveaux, NFPA.
Appendix A: CP#4

Task Group Comments:

Subsections 6.4.1 and 6.4.2 should be reformatted into one section to better clarify that the single story and basement limitations apply to both buildings in a jurisdiction with a building code and in buildings in jurisdictions that do not have a building code.

All sections within the entire document should remove references to NFPA 256 since it has been withdrawn, and replaced with ASTM E 108 and UL 790 as shown in the text below.

Subsections 7.3.5 and 7.4.3 should be revised to comply with the changes made to Chapter 6. Both sections should limit the building to being one story and without a basement.

Suggested Changes:

6.4.1 Buildings and Structures. Consumer fireworks shall be stored only in the following buildings or structures, provided that the building or structure does not exceed one story in height and does not contain a basement:

(1) Buildings or structures constructed in accordance with the building code enforced by the AHJ
(2) Buildings or structures in jurisdictions that have not adopted a building code shall apply to the following requirements;

(1) a) Buildings having an area not greater than 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials.

(2) b) Buildings having an area greater than 8000 ft² (743 m²) shall be constructed in accordance with one of the following:

(a) i. Buildings shall be constructed of noncombustible or limited-combustible materials.

(b) ii. Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.

(3) c) Roof coverings for any building shall have a minimum rating of Class C as determined in accordance with ASTM E 108, Standard Test Methods for Fire Tests of Roof Coverings or ANSI/UL 790, Standard for Standard Test Methods for Fire Tests of Roof Coverings.

(3) Magazines meeting the requirements in Chapter 4

(4) Trailers, semitrailers, and metal shipping containers that are separated by at least 20 ft (6.1 m) from any building or structure other than trailers, semitrailers, or metal shipping containers

6.4.2 Construction Materials. The following construction requirements shall apply to consumer fireworks storage buildings;

in jurisdictions that have not adopted a building code:

7.3.5 Construction of Buildings and Structures. Consumer fireworks shall only be permitted to be sold at retail in any of the following buildings or structures, provided that any new building or structure does not exceed one story in height and does not contain a basement:

(1) Permanent buildings or structures constructed in accordance with the building code enforced by the AHJ

(2) Tents, canopies, or temporary membrane structures complying with NFPA 102, Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures

(3) Temporary structures constructed in accordance with this chapter
(4) Temporary CFRS stands greater than 800 ft² (74 m²) in area that also meet the requirements for a permanent structure
(5) Vehicles, such as vans, buses, trailers, recreational vehicles, motor homes, travel trailers, trucks, and automobiles, complying with the applicable requirements for CFRS stands

7.4.3 Construction Materials. The following construction materials requirements shall apply to new permanent CFRS facilities in jurisdictions that have not adopted a local building code, provided that any new building or structure does not exceed one story in height and does not contain a basement:

(1) Buildings having an area up to and including 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials.
(2) Buildings having an area greater than 8000 ft² (743 m²) shall be constructed in accordance with one of the following:
   (a) Buildings shall be constructed of noncombustible or limited-combustible materials.
   (b) Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.

Task Group Notes:
The committee noted that the NFPA 1124 TC should revise the footnotes * and † in Table A.7.1.1 to specify that the effective date refers to the code and not the sale of the building (…effective date of this code). The task group suggests that the NFPA 1124 should review section 6.4.2(1) (changed to 6.4.1(a)) to determine if there needs to be an upper limit on the building area. Also, the task group tabled a recommendation to change the roof Class Rating from C to B.
Appendix B: CP#5

Task Group Comments:

The word “existing” should be removed from section 7.3.12.2. This removes a potential loophole in the separation requirements.

Suggested Changes:

7.3.12 Distance from Bulk Dispensing and Bulk Storage.
7.3.12.1 CFRS facilities and stores shall not be located within 50 ft (15.2 m) of the following:
(1) Retail propane-dispensing station dispensers
(2) Aboveground storage tanks for flammable or combustible liquid, flammable gas, or flammable liquefied gas
(3) Compressed natural gas–dispensing station dispensers
7.3.12.2 New CFRS facilities and stores, existing CFRS stands and tents, and temporary CFRS facilities shall not be located within 50 ft (15.2 m) of motor vehicle fuel–dispensing station dispensers.
7.3.12.3 Existing CFRS facilities, other than CFRS stands, tents, and temporary facilities, and existing stores shall not be located within 25 ft (7.6 m) of motor vehicle fuel–dispensing station dispensers.
7.3.12.4 Fuel tanks on vehicles or other motorized equipment shall not be considered bulk storage.
7.3.12.5 Fuel storage for generators shall be in accordance with 7.4.9.2.
7.3.12.6 CFRS areas and storage areas shall not be located within 300 ft (91.2 m) of any aboveground bulk storage or bulk dispensing area for the following:
(1) Flammable or combustible liquid
(2) Flammable gas
(3) Flammable liquefied gas
MEMORANDUM

To: Technical Committee on Pyrotechnics

From: G. Colonna

Date: December 10, 2010

Subject: Amended Draft Proposals Ballot for NFPA 1124 (A12) CP4 and CP5

Attached are the Draft Proposals (pre-ROP) Ballot and ballot material on NFPA 1124, Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles. This material was further reviewed based on input from the BLD-BLC approval committee and finalized at your September 30 – October 1, 2010 meeting in Phoenix and approved during the meeting for submittal to the Committee for letter ballot. The ballot is for formally voting on whether or not you concur with the Committee's Actions on these draft proposals. If you do not concur, or you abstain, you must provide a technical reason. Following the vote of the Committee, these items and the respective actions will be forwarded to the Building Code Committee (specifically BLD-BLC, responsible for NFPA 5000) in accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for correction.

Please return your ballot as soon as possible, but no later than Thursday, December 23, 2010. For action by the Committee that passes either or both of the attached DRAFT Committee Proposals, the proposal will be presented to the NFPA 5000 BLD-BLC Committee once again for their review and approval as the responsible approval TC.

Your cooperation in meeting this deadline is appreciated. If you wish to fax your ballot, please fax to (617) 984-7110.

Note: Please remember that the return of ballots and attendance at Committee Meetings are required for all principal and alternate members in accordance with the Regulations Governing Committee Projects.

Enclosures: Ballot Form
Draft Committee Proposals

cc: Linda Fuller, Standards Administration
    J. Moreau, Project Administrative Supervisor
Amended DRAFT PROPOSAL BALLOT DUE BY:  
Thursday, December 23, 2010  
NFPA 1124 PYR-AAA  
Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles  
Staff Liaison: Guy R. Colonna

Return Completed Ballot To: J. Moreau  
E-Mail to jmoreau@nfpa.org  
Fax to 617-984-7110  
One Batterymarch Park, Quincy, MA 02169

Date:___________________ Signed:__________________________________

Name: __________________________________
Type or Print black ink

Committee Action Key:  
A = Accept  
R= Reject  
APA = Accept in Part  
APR = Accept in Principle  
APP = Accept in Principle in Part  
H = Hold

With respect to the Committee Actions on the DRAFT Proposals that accompanied the ballot, please record me as voting: (check one):

☐ Affirmative On All Items. I agree with all committee meeting actions without comment.

☐ Affirmative With Exception(s): I agree with all committee meeting actions Except for the Affirmative with comment, Negative and /or Abstention checked below.

*Reasons must accompany these votes.  
When possible, reasons are requested via e-mail in a Word Document.

Please return this Ballot Page only to NFPA.

<table>
<thead>
<tr>
<th>Log No.</th>
<th>Section</th>
<th>Committee Action</th>
<th>Affirmative with Comment*</th>
<th>Negative*</th>
<th>Abstain*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amended Draft CP#4</td>
<td>6.4.1, 6.4.2, 7.3.5, 7.4.3, and Table A.7.1.1</td>
<td>Accept</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amended Draft CP#5</td>
<td>6.7, 7.3.12, and 7.4.7</td>
<td>Accept</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NFPA 1124-2006

Amended Draft Committee Proposals

Approved for letter ballot at Committee Meeting, February 1 – 2, 2010, Salt Lake City, UT and amended and approved for letter ballot at Committee Meeting, September 30 – October 1, 2010, Phoenix, AZ. These actions relate to items 3 and 8 (Draft CP#4) and item 7 (Draft CP#5) in the Standards Council Decision, D#08-19 and are to be coordinated with the Building Code Committee (BLD-BLC) in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Amended Log# DRAFT CP#4

Submitter: Technical Committee on Pyrotechnics

Recommendation: It is proposed that paragraph 6.4.1 and 6.4.2 be revised to read as follows:

6.4.1 Buildings and Structures. Consumer fireworks shall be stored only in the following buildings or structures, provided that the building or structure does not exceed one story in height and does not contain a basement:

(1) Buildings or structures constructed in accordance with the building code enforced by the AHJ

(2) Buildings or structures in jurisdictions that have not adopted a building code where such buildings or structures comply with the following construction requirements:

a) Buildings having an area not greater than 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials.

b) Buildings having an area greater than 8000 ft² (743 m²) shall be constructed in accordance with one of the following:

   i. Buildings shall be constructed of noncombustible or limited-combustible materials.

   ii. Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.


(3) Magazines meeting the requirements in Chapter 4

(4) Trailers, semitrailers, and metal shipping containers that are separated by at least 20 ft (6.1 m) from any building or structure other than trailers, semitrailers, or metal shipping containers

6.4.2 Construction Materials. The following construction requirements shall apply to consumer fireworks storage buildings in jurisdictions that have not adopted a building code:

(1) Buildings having an area not greater than 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials.

(2) Buildings having an area greater than 8000 ft² (743 m²) shall be constructed in accordance with one of the following:

   a) Buildings shall be constructed of noncombustible or limited-combustible materials.

   b) Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.
(3) Roof coverings for any building shall have a minimum rating of Class C as determined in accordance with NFPA 256, *Standard Methods of Fire Tests of Roof Coverings*.

In addition, it is proposed that paragraph 7.3.5 and 7.4.3 be revised to read as follows:

**7.3.5 Construction of Buildings and Structures.** Consumer fireworks shall only be permitted to be sold at retail in any of the following buildings or structures, provided that any new building or structure does not exceed one story in height and does not contain a basement:

1. Permanent buildings or structures constructed in accordance with the building code enforced by the AHJ
2. Tents, canopies, or temporary membrane structures complying with NFPA 102, *Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures*
3. Temporary structures constructed in accordance with this chapter
4. Temporary CFRS stands greater than 800 ft² (74 m²) in area that also meet the requirements for a permanent structure
5. Vehicles, such as vans, buses, trailers, recreational vehicles, motor homes, travel trailers, trucks, and automobiles, complying with the applicable requirements for CFRS stands

**7.4.3 Construction Materials.** The following construction materials requirements shall apply to new permanent CFRS facilities in jurisdictions that have not adopted a local building code, provided that any new building or structure does not exceed one story in height and does not contain a basement:

1. Buildings having an area up to and including 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials.
2. Buildings having an area greater than 8000 ft² (743 m²) shall be constructed in accordance with one of the following:
   a. Buildings shall be constructed of noncombustible or limited-combustible materials.
   b. Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.

Revise Table A.7.1.1, notes as shown:

*Sales conducted within 1 year prior to the effective date of this code.*

†Sales not conducted within 1 year prior to the effective date of this code.

**Substantiation:**

**Issue #3 Height and Area Limitations and Issue #8 Construction Materials**

The NFPA Pyrotechnics Technical Committee (TC) established a task group responsible for coordinating review of issues #3 and #8 of the Standards Council Decision, D#08-19 October 1, 2008 with the
Technical Committee on Building Construction (BLD-BLC) responsible for portions of the Building Construction and Safety Code, NFPA 5000. Discussion between the respective task groups for each committee forms the basis for the proposed action. Per recommendation of the Committee on Building Construction, the Committee on Pyrotechnics proposes revisions to requirements for height limitations and exclusion of basements. In addition, all sections within the code should remove references to NFPA 256 since it has been withdrawn and replaced with references to ASTM E108 and UL 790 as shown in the amended text. These changes have been incorporated into paragraphs 7.3.5 and 7.4.3 as recommended by the BLD-BLC task group. In addition, the Committee on Pyrotechnics noted that the footnotes in Table A.7.1.1 should clarify that the effective date of the code as stated in the current edition refers to the effective date of NFPA 1124 and not the sale of the building.

**Committee Meeting Action:** Accept
Amended Log# Draft CP#5

Submitter: Technical Committee on Pyrotechnics

Recommendation: The NFPA Pyrotechnics Technical Committee (TC) proposes revisions to 7.3.12.2, A.7.3.12.2, and 7.3.12.3 as shown to clarify the application of existing, permanent and temporary as used in this section of the code. These revisions are based on input from the approval committee (BLD-BLC) as established by the NFPA Standards Council Decision regarding Fire Safety Concern Issue #7: Separation Distances as detailed in the Standards Council Decision D#08-19.

7.3.12 Distance from Bulk Dispensing and Bulk Storage.

7.3.12.1 CFRS facilities and stores shall not be located within 50 ft (15.2 m) of the following:
(1) Retail propane-dispensing station dispensers
(2) Aboveground storage tanks for flammable or combustible liquid, flammable gas, or flammable liquefied gas
(3) Compressed natural gas–dispensing station dispensers

7.3.12.2* New CFRS facilities and stores, existing CFRS stands and tents, and temporary CFRS facilities shall not be located within 50 ft (15.2 m) of motor vehicle fuel–dispensing station dispensers.

7.3.12.3 Existing permanent CFRS facilities, other than CFRS stands, tents, and temporary facilities, and existing stores shall not be located within 25 ft (7.6 m) of motor vehicle fuel–dispensing station dispensers.

7.3.12.4 Fuel tanks on vehicles or other motorized equipment shall not be considered bulk storage.

7.3.12.5 Fuel storage for generators shall be in accordance with 7.4.9.2.

7.3.12.6 CFRS areas and storage areas shall not be located within 300 ft (91.2 m) of any aboveground bulk storage or bulk dispensing area for the following:
(1) Flammable or combustible liquid
(2) Flammable gas
(3) Flammable liquefied gas

A.7.3.12.2 To assist the user of this code in determining what is a new CFRS facility, according to 7.1.1.1, all tents, stands, canopies, and membrane structures are considered to be new. See also Table A.7.1.1.

Substantiation:

Issue #7 Separation Distances

The NFPA Pyrotechnics Technical Committee (TC) established a task group responsible for coordinating review of issue #7 of the Standards Council Decision, D#08-19 October 1, 2008 with the Technical Committee on Building Construction (BLD-BLC) responsible for portions of the Building Construction and Safety Code, NFPA 5000. Discussion between the respective task groups for each committee forms the basis for the proposed action. Per recommendation of the Committee on Building Construction, the Committee on Pyrotechnics proposes revisions to clarify the requirements in 7.3.12.2 and 7.3.12.3 regarding existing, permanent, and temporary as related to the various facilities addressed within the
code. The Committee on Pyrotechnics has proposed a broader revision to the existing code than that suggested by the approval committee, BLD-BLC. The Pyrotechnics Committee action seeks to eliminate redundant language in these requirements and clarify the intent through the addition of an annex item.

**Committee Meeting Action:** Accept
MEMORANDUM

To: Tracy Goliveaux, Staff Liaison for Building Construction Technical Committee
From: G. Colonna, Staff Liaison for Pyrotechnics Committee
Date: January 10, 2011
Subject: Transmittal of Amended Draft Proposals for NFPA 1124 (A12) for review and action by Building Construction Technical Committee (BLD-BLC)

Attached are Amended Draft Proposals (pre-ROP) CP#4 and CP#5, and the letter ballot results for proposed changes to Chapter 7 of NFPA 1124, Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles. This material was amended by the Committee on Pyrotechnics at its September 30 – October 1, 2010 meeting in Phoenix, AZ based on input from the BLD-BLC Technical Committee.

In accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008, this material has been developed as Draft Proposals (pre-ROP) and has been letter balloted through the Committee on Pyrotechnics. In addition to the Draft Proposals, I have also attached the final ballot results indicating that the items achieved the required 2/3rd majority and simple majority with affirmative votes for Amended DRAFT Committee Proposals (DRAFT CP#4 and DRAFT CP#5).

In accordance with the direction of the Council, I am providing you with this information as Staff Liaison to the Building Construction Technical Committee and requesting that you include this as an agenda item for future consideration by the Building Construction Technical Committee. The Task Group leader for the Pyrotechnics Committee for this activity is Jerry Farley. If the Committee has questions on any aspect as presented in the attached Draft Proposals, please contact me or Mr. Farley directly for clarification.

Thanks for your assistance in this process and thanks to the Building Construction Technical Committee in advance for their efforts to assist with this revision of NFPA 1124. If you have any questions, please contact me.

Enclosures: Draft Committee Proposal (2 items, Amended Draft CP#4 and Draft CP#5)
Letter Ballot on Amended Draft Committee Proposals, final results

cc: Linda Fuller, Standards Administration
J. Moreau, Project Administrative Supervisor
R. Solomon, Staff Liaison (BLD-AAC)
Amended Draft Committee Proposals

Approved for letter ballot at Committee Meeting, February 1 – 2, 2010, Salt Lake City, UT and amended and approved for letter ballot at Committee Meeting, September 30 – October 1, 2010, Phoenix, AZ. These actions relate to items 3 and 8 (Draft CP#4) and item 7 (Draft CP#5) in the Standards Council Decision, D#08-19 and are to be coordinated with the Building Code Committee (BLD-BLC) in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Amended Log# **DRAFT CP#4**

**Submitter:** Technical Committee on Pyrotechnics

**Recommendation:** It is proposed that paragraph 6.4.1 and 6.4.2 be revised to read as follows:

6.4.1 Buildings and Structures. Consumer fireworks shall be stored only in the following buildings or structures, provided that the building or structure does not exceed one story in height and does not contain a basement:

1. Buildings or structures constructed in accordance with the building code enforced by the AHJ
2. Buildings or structures in jurisdictions that have not adopted a building code where such buildings or structures comply with the following construction requirements: constructed in accordance with 6.4.2
   a) Buildings having an area not greater than 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials.
   b) Buildings having an area greater than 8000 ft² (743 m²) shall be constructed in accordance with one of the following:
      i. Buildings shall be constructed of noncombustible or limited-combustible materials.
      ii. Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.
(3) Magazines meeting the requirements in Chapter 4
(4) Trailers, semitrailers, and metal shipping containers that are separated by at least 20 ft (6.1 m) from any building or structure other than trailers, semitrailers, or metal shipping containers

6.4.2 Construction Materials. The following construction requirements shall apply to consumer fireworks storage buildings in jurisdictions that have not adopted a building code:

1. Buildings having an area not greater than 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials.
2. Buildings having an area greater than 8000 ft² (743 m²) shall be constructed in accordance with one of the following:
   a) Buildings shall be constructed of noncombustible or limited-combustible materials.
   b) Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.
(3) Roof coverings for any building shall have a minimum rating of Class C as determined in accordance with NFPA 256, Standard Methods of Fire Tests of Roof Coverings.

In addition, it is proposed that paragraph 7.3.5 and 7.4.3 be revised to read as follows:

7.3.5 Construction of Buildings and Structures. Consumer fireworks shall only be permitted to be sold at retail in any of the following buildings or structures, provided that any new building or structure does not exceed one story in height and does not contain a basement:

(1) Permanent buildings or structures constructed in accordance with the building code enforced by the AHJ
(2) Tents, canopies, or temporary membrane structures complying with NFPA 102, Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures
(3) Temporary structures constructed in accordance with this chapter
(4) Temporary CFRS stands greater than 800 ft² (74 m²) in area that also meet the requirements for a permanent structure
(5) Vehicles, such as vans, buses, trailers, recreational vehicles, motor homes, travel trailers, trucks, and automobiles, complying with the applicable requirements for CFRS stands

7.4.3 Construction Materials. The following construction materials requirements shall apply to new permanent CFRS facilities in jurisdictions that have not adopted a local building code, provided that any new building or structure does not exceed one story in height and does not contain a basement:

(1) Buildings having an area up to and including 8000 ft² (743 m²) shall be permitted to be constructed of any approved construction materials.
(2) Buildings having an area greater than 8000 ft² (743m²) shall be constructed in accordance with one of the following:
   (a) Buildings shall be constructed of noncombustible or limited-combustible materials.
   (b) Buildings with exterior walls having a fire resistance rating of not less than 2 hours shall be permitted to have the roof decking and its supporting structure and interior partitions constructed of combustible materials.

Revise Table A.7.1.1, notes as shown:

*Sales conducted within 1 year prior to the effective date of this code.
†Sales not conducted within 1 year prior to the effective date of this code.

Substantiation:

Issue #3 Height and Area Limitations and Issue #8 Construction Materials

The NFPA Pyrotechnics Technical Committee (TC) established a task group responsible for coordinating review of issues #3 and #8 of the Standards Council Decision, D#08-19 October 1, 2008 with the
Technical Committee on Building Construction (BLD-BLC) responsible for portions of the Building Construction and Safety Code, NFPA 5000. Discussion between the respective task groups for each committee forms the basis for the proposed action. Per recommendation of the Committee on Building Construction, the Committee on Pyrotechnics proposes revisions to requirements for height limitations and exclusion of basements. In addition, all sections within the code should remove references to NFPA 256 since it has been withdrawn and replaced with references to ASTM E108 and UL 790 as shown in the amended text. These changes have been incorporated into paragraphs 7.3.5 and 7.4.3 as recommended by the BLD-BLC task group. In addition, the Committee on Pyrotechnics noted that the footnotes in Table A.7.1.1 should clarify that the effective date of the code as stated in the current edition refers to the effective date of NFPA 1124 and not the sale of the building.

**Committee Meeting Action:** Accept
Amended Log# Draft CP#5
Submitter: Technical Committee on Pyrotechnics
Recommendation: The NFPA Pyrotechnics Technical Committee (TC) proposes revisions to 7.3.12.2, A.7.3.12.2, and 7.3.12.3 as shown to clarify the application of existing, permanent and temporary as used in this section of the code. These revisions are based on input from the approval committee (BLD-BLC) as established by the NFPA Standards Council Decision regarding Fire Safety Concern Issue #7: Separation Distances as detailed in the Standards Council Decision D#08-19.

7.3.12 Distance from Bulk Dispensing and Bulk Storage.
7.3.12.1 CFRS facilities and stores shall not be located within 50 ft (15.2 m) of the following:
(1) Retail propane-dispensing station dispensers
(2) Aboveground storage tanks for flammable or combustible liquid, flammable gas, or flammable liquefied gas
(3) Compressed natural gas–dispensing station dispensers
7.3.12.2* New CFRS facilities and stores, existing CFRS stands and tents, and temporary CFRS facilities shall not be located within 50 ft (15.2 m) of motor vehicle fuel–dispensing station dispensers.
7.3.12.3 Existing permanent CFRS facilities, other than CFRS stands, tents, and temporary facilities, and existing stores shall not be located within 25 ft (7.6 m) of motor vehicle fuel–dispensing station dispensers.
7.3.12.4 Fuel tanks on vehicles or other motorized equipment shall not be considered bulk storage.
7.3.12.5 Fuel storage for generators shall be in accordance with 7.4.9.2.
7.3.12.6 CFRS areas and storage areas shall not be located within 300 ft (91.2 m) of any aboveground bulk storage or bulk dispensing area for the following:
(1) Flammable or combustible liquid
(2) Flammable gas
(3) Flammable liquefied gas

A.7.3.12.2 To assist the user of this code in determining what is a new CFRS facility, according to 7.1.1.1, all tents, stands, canopies, and membrane structures are considered to be new. See also Table A.7.1.1.

Substantiation:
Issue #7 Separation Distances
The NFPA Pyrotechnics Technical Committee (TC) established a task group responsible for coordinating review of issue #7 of the Standards Council Decision, D#08-19 October 1, 2008 with the Technical Committee on Building Construction (BLD-BLC) responsible for portions of the Building Construction and Safety Code, NFPA 5000. Discussion between the respective task groups for each committee forms the basis for the proposed action. Per recommendation of the Committee on Building Construction, the Committee on Pyrotechnics proposes revisions to clarify the requirements in 7.3.12.2 and 7.3.12.3 regarding existing, permanent, and temporary as related to the various facilities addressed within the
code. The Committee on Pyrotechnics has proposed a broader revision to the existing code than that suggested by the approval committee, BLD-BLC. The Pyrotechnics Committee action seeks to eliminate redundant language in these requirements and clarify the intent through the addition of an annex item.

**Committee Meeting Action:** Accept
MEMORANDUM

TO: NFPA Technical Committee on Pyrotechnics

FROM: Jeanne Moreau

DATE: January 4, 2011

SUBJECT: NFPA 1124 A11 Draft Ballot Final Results – CP4 and CP5

The Final Results of the NFPA 1124 Draft Ballot are as follows:

32 Members Eligible to Vote
2 Not Returned (J. Kitchens, D. Westcott)
0 Negative
0 Abstentions

There are two criteria necessary to pass ballot [(1) affirmative 2/3 vote and (2) simple majority].

1. The number of affirmative votes needed for the proposal/comment to pass is 20.
   (32 eligible to vote - 2 not returned - 0 abstentions = 30 × 0.66 = 19.8)

2. In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:

   [32 eligible ÷ 2 = 16 + 1 = (17)]

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.

According to the final ballot results, all ballot items received the necessary 2/3 required affirmative votes to pass ballot.
MEMORANDUM

TO: Technical Committee on Building Construction (BLD-BLC)

FROM: Tracy Golinveaux, Staff Liaison

DATE: February 10, 2011

SUBJECT: Approval Committee Ballot for NFPA 1124

The Final Results for the NFPA 1124 Draft CP4 Approval Ballot are as follows:

23 Members Eligible to Vote
3 Not Returned (G. Masterson, C. Rao and R. Backstrom)
0 Negatives
2 Abstentions (R. Davis and R. Wessel)

There are two criteria necessary to pass ballot [(1) affirmative \( \frac{2}{3} \) vote and (2) simple majority].

(1) The number of affirmative votes needed for the proposal to pass is 12.
    (23 eligible to vote - 3 not returned - 2 abstentions = 18 \times 0.66 = 11.88)

(2) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:
    
    \[
    [23 \text{ eligible} \div 2 = 11.5 = (12)]
    \]

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.

According to the final ballot results, the ballot received the necessary 2/3 required affirmative votes to pass ballot.

C: G. Colonna
Jill,

Please recorded my vote as affirmative with a comment for CP#4. Revise 6.4.1 (2) as follows … adopted a building code, where such buildings or ….
Please recorded my vote as affirmative for CP#5

Pete

Peter J. Gore Willse, P.E., FSFPE
Vice President - Director of Research

Global Asset Protection Services, LLC
100 Constitution Plaza
12th Floor
Hartford, CT 06103. USA
(P) +1 860 293-7900
(C) +1 860 460-1965
(F) +1 860 293-7907
Email: peter.willse@xlgroup.com
Website: www.xlgaps.com

An XL Group Company
TECHNICAL COMMITTEE ON BUILDING CONSTRUCTION  
(BLD-BLC)

APPROVAL COMMITTEE BALLOT FOR NFPA 1124, CODE FOR THE  
MANUFACTURING, TRANSPORTATION, STORAGE AND RETAIL SALE OF  
FIREWORKS AND PYROTECHNICS ARTICLES

With regard to the action on Draft CP #4 concerning the proposed revisions to paragraph 6.4.1  
and 6.4.2 in NFPA 1124; to “Accept revisions to 6.4.1 and 6.4.2 as proposed by The  
Technical Committee on Pyrotechnics”:

☐ Affirmative  ☐ Negative*  ☒ Abstain*

*Per NFPA Regulations comments must accompany any negative or abstaining vote.

COMMENTS:

Requirements are too permissive in 6.4.1 (2) c)  
and 6.4.3 (3), only a “C” rating is required  
per ASTM E108 for the roof cover. That means only a 4-hour  
time exposure for noncombustible decks and only an 8-logon  
hour exposure for combustible decks. Not severe enough for the  
potential exposure.

Sign Name: Richard Davis

Print Name: Richard Davis

Date: 11/17/11

Please complete and return this ballot by Thursday, January 20, 2011 to Jill McGovern by fax  
or email:

Fax: +1-617-984-7110
Email: jmcgovern@nfpa.org

October 24, 2012  Supplemental Agenda October 29-30, 2012  Page 477 of 951
Please record my vote as abstaining on both items.
The reason for both abstentions is as follows:
I do not believe that it is appropriate for NFPA to develop standards for consumer fireworks. However, since the Standards Council feels that it is appropriate, I will not waste the committees’ time by submitting a negative, but, instead, I will go on record as abstaining.

Robert A. Wessel, PhD
Assistant Executive Director
Gypsum Association

6525 Belcrest Road, Suite 480
Hyattsville, MD 20782
Phone: 301-277-8686
Fax: 301-277-8747
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TO: NFPA Technical Committee on Building Construction

The Pyrotechnics Committee has acted on the BLD-BLC committee’s recommendations to NFPA 1124.

Attached is the BLD-BLC NFPA Approval Committee Ballots for NFPA 1124 CP-4 and CP-5. Please complete the attached ballot forms and return them to NFPA as soon as possible, but no later than Thursday, January 20, 2011.

You may submit your completed ballots to Jill McGovern either by email at jmcgovern@nfpa.org or via fax (617) 984-7110.

The ballots have also been posted on your BLD/BLC E-committee page under the “Ballot Information Heading” and within the “Informational Ballots” folder.

Also attached are the final ballot results from the Pyrotechnics Committee.

Jill McGovern
NFPA
1 Batterymarch Park
Quincy, MA  02169
MEMORANDUM

TO: Technical Committee on Building Construction (BLD-BLC)
FROM: Tracy Golinveaux, Staff Liaison
DATE: February 10, 2011
SUBJECT: Approval Committee Ballot for NFPA 1124

The Final Results for the NFPA 1124 Draft CP5 Approval Ballot are as follows:

23 Members Eligible to Vote
3 Not Returned (G. Masterson, C. Rao and R. Backstrom)
0 Negatives
1 Abstention (R. Wessel)

There are two criteria necessary to pass ballot [(1) affirmative \(\frac{2}{3}\) vote and (2) simple majority].

(1) The number of affirmative votes needed for the proposal to pass is 13.

\[
(23 \text{ eligible to vote} - 3 \text{ not returned} - 1 \text{ abstention} = 19 \times 0.66 = 12.54)
\]

(2) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:

\[
[23 \text{ eligible} \div 2 = 11.5 = (12)]
\]

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.

According to the final ballot results, the ballot received the necessary \(\frac{2}{3}\) required affirmative votes to pass ballot.

C: G. Colonna
From: Robert Wessel
To: McGovern, Jill
Cc: Baio, Debbie; Fuller, Linda; Colonna, Guy
Subject: RE: BLD-BLC/1124 CP-4 and CP-5 Approval Committee Ballots
Date: Tuesday, January 18, 2011 8:22:53 AM

Please record my vote as abstaining on both items.
The reason for both abstentions is as follows:
I do not believe that it is appropriate for NFPA to develop standards for consumer fireworks. However, since the Standards Council feels that it is appropriate, I will not waste the committees’ time by submitting a negative, but, instead, I will go on record as abstaining.

Robert A. Wessel, PhD
Assistant Executive Director
Gypsum Association
6525 Belcrest Road, Suite 480
Hyattsville, MD 20782
Phone: 301-277-8686
Fax: 301-277-8747
Visit us on the Web at www.gypsum.org

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From: McGovern, Jill [mailto:jmcgovern@NFPA.org]
Sent: Friday, January 14, 2011 3:33 PM
To: McGovern, Jill
Cc: Baio, Debbie; Fuller, Linda; Colonna, Guy
Subject: BLD-BLC/1124 CP-4 and CP-5 Approval Committee Ballots

TO: NFPA Technical Committee on Building Construction

The Pyrotechnics Committee has acted on the BLD-BLC committee’s recommendations to NFPA 1124.

Attached is the BLD-BLC NFPA Approval Committee Ballots for NFPA 1124 CP-4 and CP-5. Please complete the attached ballot forms and return them to NFPA as soon as possible, but no later than Thursday, January 20, 2011.

You may submit your completed ballots to Jill McGovern either by email at jmcgovern@nfpa.org or via fax (617) 984-7110.

The ballots have also been posted on your BLD/BLC E-committee page under the “Ballot Information Heading” and within the “Informational Ballots” folder.

Also attached are the final ballot results from the Pyrotechnics Committee.

Jill McGovern
NFPA
1 Batterymarch Park
Quincy, MA 02169
MEMORANDUM

To: Technical Committee on Pyrotechnics

From: G. Colonna

Date: May 10, 2010

Subject: Draft Proposals Ballot for NFPA 1124 (A11) CP9 and CP10

Attached are the Draft Proposals (pre-ROP) Ballot and ballot material on NFPA 1124, Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles. This material was finalized and approved at your February 1 – 2, 2010 meeting in Salt Lake City. The ballot is for formally voting on whether or not you concur with the Committee's Actions on these draft proposals. If you do not concur, or you abstain, you must provide a technical reason. Following the vote of the Committee, these items and the respective actions will be forwarded to the Means of Egress Committee (responsible for NFPA 101, SAF-MEA) in accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for correction.

Please return your ballot as soon as possible, but no later than Friday, May 28, 2010. For action by the Committee that passes either or both of the attached DRAFT Committee Proposals, the proposals will be presented to the NFPA 101 Means of Egress Committee.

Your cooperation in meeting this deadline is appreciated. If you wish to fax your ballot, please fax to (617) 984-7110.

Note: Please remember that the return of ballots and attendance at Committee Meetings are required for all principal and alternate members in accordance with the Regulations Governing Committee Projects.

Enclosures: Ballot Form
Draft Committee Proposals

cc: Linda Fuller, Standards Administration
J. Moreau-Correia, Project Administrative Supervisor
Return Completed Ballot To: J. Moreau-Correia  
E-Mail to jmoreaucorreia@nfpa.org  
Fax to 617-984-7110  
One Batterymarch Park, Quincy, MA 02169

Date: _____________________  Signed: ______________________________________

Name: __________________________________________
Type or Print black ink

Committee Action Key:
A = Accept  
R= Reject  
APA = Accept in Part  
APR = Accept in Principle  
APP = Accept in Principle in Part  
H = Hold

With respect to the Committee Actions on the DRAFT Proposals that accompanied the ballot, please record me as voting: (check one):

☐ Affirmative On All Items. I agree with all committee meeting actions without comment.

☐ Affirmative With Exception(s): I agree with all committee meeting actions Except for the Affirmative with comment, Negative and/or Abstention checked below.

*Reasons must accompany these votes.  
When possible, reasons are requested via e-mail in a Word Document.

Please return this Ballot Page only to NFPA.

<table>
<thead>
<tr>
<th>Log No.</th>
<th>Section</th>
<th>Committee Action</th>
<th>Affirmative with Comment*</th>
<th>Negative*</th>
<th>Abstain*</th>
</tr>
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<td>Draft CP#9</td>
<td>6.8</td>
<td>Accept</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Draft CP#10</td>
<td>7.3.14.3 (new)</td>
<td>Accept</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NFPA 1124-2006
Draft Committee Proposals
Approved for letter ballot at Committee Meeting, February 1 – 2, 2010, Salt Lake City, UT
These actions relate to item 4 in the Standards Council Decision, D#08-19 and are to be coordinated with the Safety to Life, Means of Egress Committee in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Log# DRAFT CP#9
Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that Section 6.8 be amended to read as follows:

6.8 Means of Egress.

6.8.1 Means of egress in permanent consumer fireworks storage or work buildings or areas shall comply with the applicable requirements of NFPA 101, Life Safety Code.

6.8.2 Temporary trailers, semitrailers, and metal shipping containers that are not normally occupied shall not be required to comply with NFPA 101, Life Safety Code.

6.8.3 Doors.

6.8.3.1 Exterior Exit and exit access doors shall open in the direction of egress travel outward.

6.8.3.2 Doors in the means of egress shall be at least 36 in. (910 mm) wide and kept free of obstructions.

6.8.3.3 Exit Doors located within the means of egress that are capable of locking or latching shall be equipped with have approved panic or fire exit hardware.

6.8.3.4 Exit Doors located within the means of egress shall be unlocked from the egress side when the building is occupied.

6.8.4 Aisles.
6.8.4.1 Aisles shall be at least 36 in. (910 mm) wide and shall be kept free of obstructions.

6.8.4.2 Dead end aisles shall not exceed 50 ft (15.2 m) in length.

6.8.5 Egress Travel Distance. Exits provided for consumer fireworks storage or work buildings or areas shall be located such that the maximum egress travel distance as measured from the remotest point to an exit along the natural and unobstructed path of egress travel shall not exceed 200 ft (60.8 m).


6.8.7 Egress Capacity. Egress capacity shall be based on 0.7 in./person (18 mm/person) for stairs or 0.4 in./person (10 mm/person) for level components and ramps.

Substantiation:
For background information, the NFPA Pyrotechnics Technical Committee’s NFPA 1124 Task Group C contacted the NFPA Technical Committee (TC) on Means of Egress to request their technical review and input on the means of egress requirements of Chapters 6 and 7 of NFPA 1124 in an effort to provide a response to the NFPA Standards Council’s Fire Safety Concern Issue #4: Means of Egress Provisions as detailed in the Standards Council Decision D#08-19 which designated the NFPA Means of Egress TC as the Approval Committee for this Issue. The Chair of the Means of Egress TC assigned that request to a Task Group designated as the Means of Egress Technical Committee NFPA 1124 Task Group. The Task Group provided a response to the Means of Egress TC members which was also copied to the NFPA 1124 Task Group C for consideration in determining what revisions would be appropriate and necessary to Chapters 6 and 7 of NFPA 1124 to satisfy the concerns and issues raised by the Means of Egress TC NFPA 1124 Task Group.

In the Means of Egress TC NFPA 1124 Task Group response the Task Group relied heavily on the fact that they considered that buildings used for the storage or retail sales of consumer fireworks should have their hazard of contents classified as high hazard contents in accordance with Section 6.2.2.4 of NFPA 101-2009, rather than as ordinary hazard contents in accordance with Section 6.2.2.3. As part of their
rationale for making that determination, they referred to quantities of “flammable/explosive solid composition within the building.”

It should be noted that consumer fireworks and their packaging do not contain flammable materials but they are combustible. Nor are they classified as explosives. In fact, the Annex A note to the definition for “Consumer Fireworks” (Section 3.3.30.1 of NFPA 1124-2006) in Section A.3.3.30.1 Consumer Fireworks states: “Consumer fireworks that comply with the construction, chemical composition, and labeling regulations of the U.S. DOT for fireworks, 49 CFR 172, and the U.S. Consumer Product Safety Commission (CPSC) as set forth in CPSC 16 CFR 1500 and 1507, are not considered to be explosive materials for the purposes of this code.” By definition, consumer fireworks are those fireworks that comply with the criteria and the standards listed in the Annex A note. It should also be noted that the NFPA 1 Fire Code – 2009 extracts the definition for “Consumer Fireworks” from NFPA 1124 including the Annex A note. It can be found in Sections 3.3.115.1 and A.3.3.115.1 of NFPA 1.

The Means of Egress TC NFPA 1124 Task Group also claims that this creates a conflict with NFPA 1 and NFPA 5000 for high hazard contents, as well as with the NFPA 101 high hazard contents classification. However, it should be noted that there is no direct correlation between the hazard classification of contents in NFPA 101, including the high hazard contents classification, and the occupancy classifications in NFPA 1 and NFPA 5000, especially regarding High Hazard Contents Levels 1 through 5. Thus, the NFPA 1 and NFPA 5000 High Hazard Contents classification should not enter into the discussion or factor into or impact the means of egress requirements based on NFPA 101. The NFPA 101 hazard of contents classifications stand on their own when applying the means of egress requirements in NFPA 101.

Furthermore, the NFPA 101 classification scheme for hazards of contents is very subjective and qualitative. For example, for the ordinary hazard contents classification in Section 6.2.2.3 the phrases “likely to burn with moderate rapidity” and “give off a considerable volume of smoke” are subject to a great deal of interpretation. To further provide guidance, NFPA 101 has an Annex A note for the ordinary hazard contents classification in Section A.6.2.2.3 which indicates that ordinary hazard contents is a classification for the conditions found in most buildings. It goes on to say that it assumes there is no unduly dangerous exposure to toxic fire gases during the period necessary to escape from the fire area.
The NFPA Pyrotechnics TC believes that the NFPA 101 ordinary hazard contents classification is appropriate for the storage and retail sales of consumer fireworks. The TC further believes this has been adequately substantiated in the full-scale fire tests conducted by Southwest Research Institute (SwRI) for the American Fireworks Standards Laboratory (AFSL) in the report titled “Fire Performance Evaluation of Consumer Fireworks Retail Sales Displays Incorporating Various Fire Risk Mitigation Techniques,” SwRI Project No. 01.13626.01.001 dated November 26, 2008.

Similarly, the high hazard contents classification in Section 6.2.2.4 of NFPA 101 also uses rather subjective terminology such as the phrases “likely to burn with extreme rapidity” and “from which explosions are likely.” Again, an Annex A note in Section A.6.2.2.4 attempts to provide additional guidance on how to determine high hazard contents. It provides a nonexclusive list of various contents and conditions that are considered high hazard including “where flammable liquids are handled or used or are stored under conditions involving possible release of flammable vapors,” or “where grain dust, wood flour, or plastic dust, aluminum or magnesium dust, or other explosive dusts are produced,” or “where hazardous chemicals or explosives are manufactured, stored, or handled,” or “where materials are processed or handled under conditions producing flammable flyings.” Obviously, none of those materials or conditions are found in storage facilities containing consumer fireworks or in mercantile occupancies where consumer fireworks are sold at retail. Also, the SwRI full-scale fire tests, in the opinion of the NFPA Pyrotechnics TC, did not demonstrate that the fires burned, at least in consumer fireworks retail sales facility scenarios, with “extreme rapidity” nor did explosions occur where all of the mitigating fire safety features specified in NFPA 1124 were implemented. However, that was not the case in the two tests that were used as base line tests for comparison purposes where none of the mitigating features were provided based on NFPA 1124. There was a clear performance difference in how the fire initiated, grew, and generated smoke in the tests without mitigation measures versus those with the mitigation measures in place. Yet even where there were no mitigating features provided, no explosions occurred.

As a side note, it is interesting to see that the materials described in the Annex A note to the high hazard contents classification description are comparable to those found in the NFPA 1 and NFPA 5000 High Hazard Contents Levels 1 and 2 classifications, whereas consumer fireworks are classified as a High Hazard Contents Level 3.
Nevertheless, there are many provisions contained in NFPA 1124 that are based on the high hazard contents classification, not only in the means of egress requirements, but also in implementing other requirements where the Pyrotechnics TC felt it was appropriate to be more conservative and err on the side of safety. In fact, most of the requirements found in Section 7.11 Special Provisions for Occupancies With High Hazard Contents in NFPA 101 are also contained in Chapters 6 and 7 of NFPA 1124.

The following provides the additional rationale and substantiation for the specific revisions to Section 6.8 Means of Egress in NFPA 1124 Chapter 6 Storage of Consumer Fireworks. Most of these revisions are based on comments made by the Means of Egress TC NFPA 1124 Task Group.

Section 6.8.1 is being revised to eliminate the word “permanent” so that the means of egress requirements will apply to temporary, as well as permanent, consumer fireworks storage or work buildings or areas based on the applicable requirements of NFPA 101. Thus, temporary storage buildings used for consumer fireworks will also be required to comply with NFPA 101 as applicable.

Because of that revision, Section 6.8.2 is being revised to add the word “Temporary” to be applicable to the trailers, semitrailers, and metal shipping containers that are not normally occupied but may be located on-site for temporary storage of consumer fireworks, thus exempting such temporary facilities from complying with NFPA 101. This will be consistent with the revision made to Section 6.8.1.

Section 6.8.3.1 is being revised to clarify that the door swing requirement is to be in the direction of egress travel and is applicable to all exit and exit access doors as was the original intent.

Section 6.8.3.3 This Section is also being revised to clarify the requirement that any door located in the means of egress that could be locked or latched must be provided with approved panic hardware or fire exit hardware as was the original intent of this provision.

Section 6.8.3.4 Again, this section is being clarified to indicate that it applies to all doors located within the means of egress, requiring them to be unlocked from the egress side when the building is occupied as was the original intent of the section.
A new Section 6.8.6 Number of Means of Egress has been added to direct the user to NFPA 101 for the
determination of the minimum number of means of egress required. This was felt to be a simpler
approach than repeating the various conditions for the required number of means of egress specified in
NFPA 101.

New Section 6.8.7 Egress Capacity is also being added to specify the egress capacity width per person
based on that designated for high hazard contents in Table 7.3.3.1 Capacity Factors of NFPA 101. This is
being proposed as a conservative measure for providing adequate egress capacity for storage
occupancies storing consumer fireworks.

The following documents the Pyrotechnics TC’s reasons for not accepting other recommendations made
by the Means of Egress TC NFPA 1124 Task Group in their report provided to the NFPA 1124 Task Group
C.

It was suggested that Section 6.8.3.2 specifying the minimum width of doors in the means of egress be
revised to be more consistent with the language contained in Section 7.2.1.2.3.2 of NFPA 101. However,
the Pyrotechnics TC believes that those NFPA 101 requirements must still be met since Section 6.8.1
requires all means of egress to comply with the applicable requirements of NFPA 101, Life Safety Code.
Section 6.8.3.2 is being provided as a user friendly requirement to cover one of the more important
issues regarding the means of egress in these storage warehouses containing consumer fireworks.
Clearly, a door having a minimum width of 36 inches will meet the minimum clear width specified in
NFPA 101. This just makes it easier for the user to determine the minimum size door width needed to
satisfy that requirement without having to do a detailed analysis in accordance with NFPA 101.

The Means of Egress TC NFPA 1124 Task Group refers to Table 42.2.5 of NFPA 101 regarding Section
6.8.4.2 specifying the maximum length for a dead end aisle of 50 feet. It should be noted that Table
42.2.5 allows a common path of travel for a maximum of 50 feet for an ordinary hazard contents storage
building that is not protected with an automatic sprinkler system. That distance is allowed to be
increased to 100 feet where an automatic sprinkler system is provided. Thus, the requirement in Section
6.8.4.2 is more restrictive than NFPA 101 in storage buildings greater than 12,000 sq ft in area since they
are required to be sprinklered by Section 6.5.1 of NFPA 1124. As previously noted, the Pyrotechnics TC
does not believe that the high hazard contents requirement for this condition should apply.
Section 6.8.5 Egress Travel Distance.

It was recommended that the distance of travel be measured in accordance with Section 7.6 of NFPA 101. But this is covered by the general reference to NFPA 101 in Section 6.8.1. It was also suggested that this section, which allows a maximum travel distance of 200 feet, does not address the high hazard contents travel distance limitation of 75 feet in Section 7.11.1. Again, this is a requirement related to high hazard contents whereas the Pyrotechnics TC believes the ordinary hazard contents classification for this condition has been justified. It should also be noted that Section 42.2.6 Travel Distance to Exits of NFPA 101 for storage occupancies of ordinary hazard contents allows a travel distance of 200 feet in a nonsprinklered building and 400 feet in a sprinklered building. Interestingly, the travel distance in a high hazard contents storage occupancy is allowed to be increased to 100 feet where automatic sprinklers are provided. In Section 6.8.5 of NFPA 1124, no credit is given to an increased travel distance in sprinklered storage buildings storing consumer fireworks.

Furthermore, employees in storage facilities containing consumer fireworks are required to have specialized U.S. DOT and OSHA training related to the special hazards of consumer fireworks. Thus, the employees are better prepared to react to a fire emergency. In fact, OSHA has adopted NFPA 1124 as the basis for their inspections of consumer fireworks workplaces including storage facilities. And, the consumer fireworks are required to be stored in DOT-approved packaging in accordance with Section 6.11.4. Section 3.3.25 of NFPA 1124 defines “DOT-Approved Packaging” as complying with the regulations of the U.S. Department of Transportation (DOT), Title 49 Part 178. An Annex A note in Section A.3.3.25 provides additional guidance on DOT-approved packaging for consumer fireworks where it states that the cartons are required to be marked and labeled in compliance with DOT regulations to indicate that fireworks are contained in the packaging.

The Means of Egress TC NFPA 1124 Task Group also suggested that a new section be added to require the minimum width of any means of egress to be not less than 36 inches based on Section 7.3.4.1 of NFPA 101. The Pyrotechnics TC did not feel that there was a need to do this since a general reference to NFPA 101 is already provided in Section 6.8.1. However, the minimum clear width requirements are spelled out in Chapter 6 of NFPA 1124 for the two most important means of egress elements that include the aisles in the storage warehouse area that are already required to be a minimum 36 inches wide and kept free of obstructions in accordance with Section 6.8.4.1 and the doors in the means of
egress that are also required to have a minimum width of 36 inches kept free of obstructions in accordance with Section 6.8.3.2 of NFPA 1124.

In conclusion, the Pyrotechnics TC believes the means of egress requirements in Chapter 6 of NFPA 1124 regulating storage buildings containing consumer fireworks have been adequately substantiated. Basically, NFPA 101 has been relied upon for all the requirements and additional restrictions have been specified where deemed necessary to provide for an increased factor of safety as appropriate for the means of egress in these storage buildings based on an ordinary hazard contents classification.

Committee Meeting Action: Accept
Log# DRAFT CP#10

Submitter: Technical Committee on Pyrotechnics

Recommendation: It is proposed that a new paragraph 7.3.14.3 be added to read as follows:

7.3.14.3 Egress Capacity. Egress capacity shall be based on 0.7 in./person (18 mm/person) for stairs or 0.4 in./person (10 mm/person) for level components and ramps.

Renumber the remaining subsections accordingly.

Substantiation:

It is interesting to note that the report of the Means of Egress Technical Committee (TC) NFPA 1124 Task Group to the Means of Egress TC members (which was copied to the NFPA Pyrotechnics TC’s NFPA 1124 Task Group C) regarding the NFPA Standards Council Fire Safety Concern Issue #4: Means of Egress Provisions did not contain any specific recommendations to revise or otherwise improve upon the current requirements specified in NFPA 1124 Section 7.3.14 Means of Egress in Chapter 7 Retail Sales of Consumer Fireworks.

However, the Means of Egress TC NFPA 1124 Task Group did provide a general reference to the high hazard contents classification suggesting that it may be more appropriate to apply the high hazard contents classification of NFPA 101 to Chapter 7 rather than the ordinary hazard contents classification. In that regard, it was suggested that Section 7.11 Special Provisions for Occupancies With High Hazard Contents should be applied to Chapter 7.

Although the Pyrotechnics TC does not consider a retail sales facility where consumer fireworks are sold to the public to have a high hazard contents classification, requirements for means of egress in occupancies with high hazard contents as found in Section 7.11 of NFPA 101 have been incorporated as appropriate into Chapter 7 where the TC determined that an additional factor of safety was prudent. Also, a new Section 7.3.14.3 Egress Capacity is being proposed to be added by this Committee Proposal to specify that the egress capacity is to be determined as required for high hazard contents based on Table 7.3.3.1 Capacity Factors of NFPA 101 by including the minimum width per person from that table.
Regarding Section 7.11.1 of NFPA 101 that limits the travel distance to the outside or a place of safety to not more than 75 feet, Section 7.3.14.2 Egress Travel Distance of NFPA 1124 does specify a maximum travel distance of 75 feet for the retail sales area of tents, membrane structures, canopies, and permanent CFRS facilities including Class C stores. However, the travel distance limits for Class A and Class B stores are allowed to be that specified in NFPA 101 for mercantile occupancies. Section 32.2.6.1 requires a maximum travel distance of 150 feet and Section 36.2.6.2 allows that distance to be increased to 200 feet where the building is protected throughout by an approved supervised automatic sprinkler system. It should be noted that the rationale for allowing these larger travel distances in Class A and B stores is because the area of the retail sales floor occupied by the retail displays of consumer fireworks is limited to a maximum of 25% of the area of the retail sales floor or 600 sq ft, whichever is less, in accordance with Section 7.5.1.1 of NFPA 1124. Plus there are other additional restrictions provided for the retail display of consumer fireworks in these Class A and Class B stores to minimize the exposure to the general public in these mercantile occupancies where the fireworks are sold as incidental merchandise as compared to a CFRS facility which is dedicated to the retail sales of consumer fireworks as the main merchandise being sold.

Section 7.11.4 of NFPA 101 requires a minimum of two means of egress to be provided from each building or hazardous area containing high hazard contents with a minor exception. It should be pointed out that Section 7.3.14.1.1 of NFPA 1124 requires not less than three exits be provided from the retail sales area where consumer fireworks are sold unless NFPA 101 requires a greater number. However, Section 7.6.2.3.1 of NFPA 101 allows retail sales areas within temporary CFRS stands to have a minimum of two exits where the travel distance is limited to a maximum of 35 feet in accordance with Section 7.6.2.3.2. It should also be noted that temporary CFRS stands are limited to a maximum area of 800 sq ft based on Item (4) of Section 7.3.5 Construction of Buildings and Structures in NFPA 1124.

Section 7.11.6 of NFPA 101 allows doors serving high hazard contents areas with occupant loads greater than five to have a latch or lock provided it is panic hardware or fire exit hardware. This is also addressed by Section 7.3.14.4.2 in NFPA 1124.

And, finally, it is interesting to note that Section 36.4.6 Retail Sales of Consumer Fireworks, 1.4G in NFPA 101 for new mercantile occupancies requires mercantile occupancies where consumer fireworks, 1.4G are sold to comply with NFPA 1124, as does Section 37.4.6 Retail Sales of Consumer Fireworks, 1.4G for
existing mercantile occupancies for other than approved existing facilities. And Section 36.4.5.3 Storage, Arrangement, Protection, and Quantities of Hazardous Commodities in NFPA 101 for new mercantile occupancies requires that “the storage, arrangement, protection, and quantities of hazardous commodities shall be in accordance with the applicable provisions of ... (8) NFPA 1124...” For existing mercantile occupancies, a similar requirement is found in Section 37.4.5.3 Storage, Arrangement, Protection and Quantities of Hazardous Commodities in NFPA 101. Thus, the Technical Committee on Mercantile and Business Occupancies has apparently determined that the means of egress requirements and other fire and life safety features in NFPA 1124 are adequate for providing reasonably safe means of egress in mercantile occupancies where consumer fireworks are sold at retail to the general public.

**Committee Meeting Action:** Accept
MEMORANDUM

To: Ron Cote, Staff Liaison for Life Safety Code, Means of Egress Committee

From: G. Colonna, Staff Liaison for Pyrotechnics Committee

Date: July 16, 2010

Subject: Transmittal of Draft Proposals for NFPA 1124 (A12) for review and action by Means of Egress Technical Committee (SAF-MEA)

Attached are Draft Proposals (pre-ROP) CP#9 and CP#10, and the letter ballot results for proposed changes to Chapter 7 of NFPA 1124, Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles. This material was developed by the Committee on Pyrotechnics at its February 1 – 2, 2010 meeting in Salt Lake City.

In accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008, this material has been developed as Draft Proposals (pre-ROP) and has been letter balloted through the Committee on Pyrotechnics. In addition to the Draft Proposals, I have also attached the final ballot results indicating that the items achieved the required 2/3rd majority and simple majority with affirmative votes for DRAFT Committee Proposals (DRAFT CP#9 and DRAFT CP#10).

In accordance with the direction of the Council, I am providing you with this information as Staff Liaison to the Committee on Safety to Life and Means of Egress Technical Committee and requesting that you include this as an agenda item for future consideration by the Means of Egress Technical Committee. The Task Group leader for the Pyrotechnics Committee for this activity is Jerry Farley. If the Committee has questions on any aspect as presented in the attached Draft Proposal, please contact me or Mr. Farley directly for clarification.

Thanks for your assistance in this process and thanks to the Means of Egress Technical Committee in advance for their efforts to assist with this revision of NFPA 1124. If you have any questions, please contact me.

Enclosures: Draft Committee Proposals (2 items, Draft CP#9 and Draft CP#10)
Letter Ballot on Draft Committee Proposals, final results

cc: Linda Fuller, Standards Administration
    J. Moreau, Project Administrative Supervisor
NFPA 1124-2006
Draft Committee Proposals
Approved for letter ballot at Committee Meeting, February 1 – 2, 2010, Salt Lake City, UT
These actions relate to item 4 in the Standards Council Decision, D#08-19 and are to be coordinated
with the Safety to Life, Means of Egress Committee in accordance with Standards Council direction
following the completion of the letter ballot by the Committee on Pyrotechnics.

Log# DRAFT CP#9
Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that Section 6.8 be amended to read as follows:

6.8 Means of Egress.

6.8.1 Means of egress in permanent consumer fireworks storage or work buildings or areas shall
comply with the applicable requirements of NFPA 101, Life Safety Code.

6.8.2 Temporary trailers, semitrailers, and metal shipping containers that are not normally
occupied shall not be required to comply with NFPA 101, Life Safety Code.

6.8.3 Doors.

6.8.3.1 Exterior Exit and exit access doors shall open in the direction of egress travel outward.

6.8.3.2 Doors in the means of egress shall be at least 36 in. (910 mm) wide and kept free of obstructions.

6.8.3.3 Exit Doors located within the means of egress that are capable of locking or latching shall be equipped with approved panic or fire exit hardware.

6.8.3.4 Exit Doors located within the means of egress shall be unlocked from the egress side when the building is occupied.

6.8.4 Aisles.
6.8.4.1 Aisles shall be at least 36 in. (910 mm) wide and shall be kept free of obstructions.

6.8.4.2 Dead end aisles shall not exceed 50 ft (15.2 m) in length.

6.8.5 Egress Travel Distance. Exits provided for consumer fireworks storage or work buildings or areas shall be located such that the maximum egress travel distance as measured from the remotest point to an exit along the natural and unobstructed path of egress travel shall not exceed 200 ft (60.8 m).


6.8.7 Egress Capacity. Egress capacity shall be based on 0.7 in./person (18 mm/person) for stairs or 0.4 in./person (10 mm/person) for level components and ramps.

Substantiation:
For background information, the NFPA Pyrotechnics Technical Committee’s NFPA 1124 Task Group C contacted the NFPA Technical Committee (TC) on Means of Egress to request their technical review and input on the means of egress requirements of Chapters 6 and 7 of NFPA 1124 in an effort to provide a response to the NFPA Standards Council’s Fire Safety Concern Issue #4: Means of Egress Provisions as detailed in the Standards Council Decision D#08-19 which designated the NFPA Means of Egress TC as the Approval Committee for this Issue. The Chair of the Means of Egress TC assigned that request to a Task Group designated as the Means of Egress Technical Committee NFPA 1124 Task Group. The Task Group provided a response to the Means of Egress TC members which was also copied to the NFPA 1124 Task Group C for consideration in determining what revisions would be appropriate and necessary to Chapters 6 and 7 of NFPA 1124 to satisfy the concerns and issues raised by the Means of Egress TC NFPA 1124 Task Group.

In the Means of Egress TC NFPA 1124 Task Group response the Task Group relied heavily on the fact that they considered that buildings used for the storage or retail sales of consumer fireworks should have their hazard of contents classified as high hazard contents in accordance with Section 6.2.2.4 of NFPA 101-2009, rather than as ordinary hazard contents in accordance with Section 6.2.2.3. As part of their
rationale for making that determination, they referred to quantities of “flammable/explosive solid composition within the building.”

It should be noted that consumer fireworks and their packaging do not contain flammable materials but they are combustible. Nor are they classified as explosives. In fact, the Annex A note to the definition for “Consumer Fireworks” (Section 3.3.30.1 of NFPA 1124-2006) in Section A.3.3.30.1 Consumer Fireworks states: “Consumer fireworks that comply with the construction, chemical composition, and labeling regulations of the U.S. DOT for fireworks, 49 CFR 172, and the U.S. Consumer Product Safety Commission (CPSC) as set forth in CPSC 16 CFR 1500 and 1507, are not considered to be explosive materials for the purposes of this code.” By definition, consumer fireworks are those fireworks that comply with the criteria and the standards listed in the Annex A note. It should also be noted that the NFPA 1 Fire Code – 2009 extracts the definition for “Consumer Fireworks” from NFPA 1124 including the Annex A note. It can be found in Sections 3.3.115.1 and A.3.3.115.1 of NFPA 1.

The Means of Egress TC NFPA 1124 Task Group also claims that this creates a conflict with NFPA 1 and NFPA 5000 for high hazard contents, as well as with the NFPA 101 high hazard contents classification. However, it should be noted that there is no direct correlation between the hazard classification of contents in NFPA 101, including the high hazard contents classification, and the occupancy classifications in NFPA 1 and NFPA 5000, especially regarding High Hazard Contents Levels 1 through 5. Thus, the NFPA 1 and NFPA 5000 High Hazard Contents classification should not enter into the discussion or factor into or impact the means of egress requirements based on NFPA 101. The NFPA 101 hazard of contents classifications stand on their own when applying the means of egress requirements in NFPA 101.

Furthermore, the NFPA 101 classification scheme for hazards of contents is very subjective and qualitative. For example, for the ordinary hazard contents classification in Section 6.2.2.3 the phrases “likely to burn with moderate rapidity” and “give off a considerable volume of smoke” are subject to a great deal of interpretation. To further provide guidance, NFPA 101 has an Annex A note for the ordinary hazard contents classification in Section A.6.2.2.3 which indicates that ordinary hazard contents is a classification for the conditions found in most buildings. It goes on to say that it assumes there is no unduly dangerous exposure to toxic fire gases during the period necessary to escape from the fire area.
The NFPA Pyrotechnics TC believes that the NFPA 101 ordinary hazard contents classification is appropriate for the storage and retail sales of consumer fireworks. The TC further believes this has been adequately substantiated in the full-scale fire tests conducted by Southwest Research Institute (SwRI) for the American Fireworks Standards Laboratory (AFSL) in the report titled “Fire Performance Evaluation of Consumer Fireworks Retail Sales Displays Incorporating Various Fire Risk Mitigation Techniques,” SwRI Project No. 01.13626.01.001 dated November 26, 2008.

Similarly, the high hazard contents classification in Section 6.2.2.4 of NFPA 101 also uses rather subjective terminology such as the phrases “likely to burn with extreme rapidity” and “from which explosions are likely.” Again, an Annex A note in Section A.6.2.2.4 attempts to provide additional guidance on how to determine high hazard contents. It provides a nonexclusive list of various contents and conditions that are considered high hazard including “where flammable liquids are handled or used or are stored under conditions involving possible release of flammable vapors,” or “where grain dust, wood flour, or plastic dust, aluminum or magnesium dust, or other explosive dusts are produced,” or “where hazardous chemicals or explosives are manufactured, stored, or handled,” or “where materials are processed or handled under conditions producing flammable flyings.” Obviously, none of those materials or conditions are found in storage facilities containing consumer fireworks or in mercantile occupancies where consumer fireworks are sold at retail. Also, the SwRI full-scale fire tests, in the opinion of the NFPA Pyrotechnics TC, did not demonstrate that the fires burned, at least in consumer fireworks retail sales facility scenarios, with “extreme rapidity” nor did explosions occur where all of the mitigating fire safety features specified in NFPA 1124 were implemented. However, that was not the case in the two tests that were used as base line tests for comparison purposes where none of the mitigating features were provided based on NFPA 1124. There was a clear performance difference in how the fire initiated, grew, and generated smoke in the tests without mitigation measures versus those with the mitigation measures in place. Yet even where there were no mitigating features provided, no explosions occurred.

As a side note, it is interesting to see that the materials described in the Annex A note to the high hazard contents classification description are comparable to those found in the NFPA 1 and NFPA 5000 High Hazard Contents Levels 1 and 2 classifications, whereas consumer fireworks are classified as a High Hazard Contents Level 3.
Nevertheless, there are many provisions contained in NFPA 1124 that are based on the high hazard contents classification, not only in the means of egress requirements, but also in implementing other requirements where the Pyrotechnics TC felt it was appropriate to be more conservative and err on the side of safety. In fact, most of the requirements found in Section 7.11 Special Provisions for Occupancies With High Hazard Contents in NFPA 101 are also contained in Chapters 6 and 7 of NFPA 1124.

The following provides the additional rationale and substantiation for the specific revisions to Section 6.8 Means of Egress in NFPA 1124 Chapter 6 Storage of Consumer Fireworks. Most of these revisions are based on comments made by the Means of Egress TC NFPA 1124 Task Group.

Section 6.8.1 is being revised to eliminate the word “permanent” so that the means of egress requirements will apply to temporary, as well as permanent, consumer fireworks storage or work buildings or areas based on the applicable requirements of NFPA 101. Thus, temporary storage buildings used for consumer fireworks will also be required to comply with NFPA 101 as applicable.

Because of that revision, Section 6.8.2 is being revised to add the word “Temporary” to be applicable to the trailers, semitrailers, and metal shipping containers that are not normally occupied but may be located on-site for temporary storage of consumer fireworks, thus exempting such temporary facilities from complying with NFPA 101. This will be consistent with the revision made to Section 6.8.1.

Section 6.8.3.1 is being revised to clarify that the door swing requirement is to be in the direction of egress travel and is applicable to all exit and exit access doors as was the original intent.

Section 6.8.3.3 This Section is also being revised to clarify the requirement that any door located in the means of egress that could be locked or latched must be provided with approved panic hardware or fire exit hardware as was the original intent of this provision.

Section 6.8.3.4 Again, this section is being clarified to indicate that it applies to all doors located within the means of egress, requiring them to be unlocked from the egress side when the building is occupied as was the original intent of the section.
A new Section 6.8.6 Number of Means of Egress has been added to direct the user to NFPA 101 for the
determination of the minimum number of means of egress required. This was felt to be a simpler
approach than repeating the various conditions for the required number of means of egress specified in
NFPA 101.

New Section 6.8.7 Egress Capacity is also being added to specify the egress capacity width per person
based on that designated for high hazard contents in Table 7.3.3.1 Capacity Factors of NFPA 101. This is
being proposed as a conservative measure for providing adequate egress capacity for storage
occupancies storing consumer fireworks.

The following documents the Pyrotechnics TC’s reasons for not accepting other recommendations made
by the Means of Egress TC NFPA 1124 Task Group in their report provided to the NFPA 1124 Task Group
C.

It was suggested that Section 6.8.3.2 specifying the minimum width of doors in the means of egress be
revised to be more consistent with the language contained in Section 7.2.1.2.3.2 of NFPA 101. However,
the Pyrotechnics TC believes that those NFPA 101 requirements must still be met since Section 6.8.1
requires all means of egress to comply with the applicable requirements of NFPA 101, Life Safety Code.
Section 6.8.3.2 is being provided as a user friendly requirement to cover one of the more important
issues regarding the means of egress in these storage warehouses containing consumer fireworks.
Clearly, a door having a minimum width of 36 inches will meet the minimum clear width specified in
NFPA 101. This just makes it easier for the user to determine the minimum size door width needed to
satisfy that requirement without having to do a detailed analysis in accordance with NFPA 101.

The Means of Egress TC NFPA 1124 Task Group refers to Table 42.2.5 of NFPA 101 regarding Section
6.8.4.2 specifying the maximum length for a dead end aisle of 50 feet. It should be noted that Table
42.2.5 allows a common path of travel for a maximum of 50 feet for an ordinary hazard contents storage
building that is not protected with an automatic sprinkler system. That distance is allowed to be
increased to 100 feet where an automatic sprinkler system is provided. Thus, the requirement in Section
6.8.4.2 is more restrictive than NFPA 101 in storage buildings greater than 12,000 sq ft in area since they
are required to be sprinklered by Section 6.5.1 of NFPA 1124. As previously noted, the Pyrotechnics TC
does not believe that the high hazard contents requirement for this condition should apply.
Section 6.8.5 Egress Travel Distance.

It was recommended that the distance of travel be measured in accordance with Section 7.6 of NFPA 101. But this is covered by the general reference to NFPA 101 in Section 6.8.1. It was also suggested that this section, which allows a maximum travel distance of 200 feet, does not address the high hazard contents travel distance limitation of 75 feet in Section 7.11.1. Again, this is a requirement related to high hazard contents whereas the Pyrotechnics TC believes the ordinary hazard contents classification for this condition has been justified. It should also be noted that Section 42.2.6 Travel Distance to Exits of NFPA 101 for storage occupancies of ordinary hazard contents allows a travel distance of 200 feet in a nonsprinklered building and 400 feet in a sprinklered building. Interestingly, the travel distance in a high hazard contents storage occupancy is allowed to be increased to 100 feet where automatic sprinklers are provided. In Section 6.8.5 of NFPA 1124, no credit is given to an increased travel distance in sprinklered storage buildings storing consumer fireworks.

Furthermore, employees in storage facilities containing consumer fireworks are required to have specialized U.S. DOT and OSHA training related to the special hazards of consumer fireworks. Thus, the employees are better prepared to react to a fire emergency. In fact, OSHA has adopted NFPA 1124 as the basis for their inspections of consumer fireworks workplaces including storage facilities. And, the consumer fireworks are required to be stored in DOT-approved packaging in accordance with Section 6.11.4. Section 3.3.25 of NFPA 1124 defines “DOT-Approved Packaging” as complying with the regulations of the U.S. Department of Transportation (DOT), Title 49 Part 178. An Annex A note in Section A.3.3.25 provides additional guidance on DOT-approved packaging for consumer fireworks where it states that the cartons are required to be marked and labeled in compliance with DOT regulations to indicate that fireworks are contained in the packaging.

The Means of Egress TC NFPA 1124 Task Group also suggested that a new section be added to require the minimum width of any means of egress to be not less than 36 inches based on Section 7.3.4.1 of NFPA 101. The Pyrotechnics TC did not feel that there was a need to do this since a general reference to NFPA 101 is already provided in Section 6.8.1. However, the minimum clear width requirements are spelled out in Chapter 6 of NFPA 1124 for the two most important means of egress elements that include the aisles in the storage warehouse area that are already required to be a minimum 36 inches wide and kept free of obstructions in accordance with Section 6.8.4.1 and the doors in the means of
In conclusion, the Pyrotechnics TC believes the means of egress requirements in Chapter 6 of NFPA 1124 regulating storage buildings containing consumer fireworks have been adequately substantiated. Basically, NFPA 101 has been relied upon for all the requirements and additional restrictions have been specified where deemed necessary to provide for an increased factor of safety as appropriate for the means of egress in these storage buildings based on an ordinary hazard contents classification.

Committee Meeting Action: Accept
Log# DRAFT CP#10
Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that a new paragraph 7.3.14.3 be added to read as follows:

7.3.14.3 Egress Capacity. Egress capacity shall be based on 0.7 in./person (18 mm/person) for stairs or 0.4 in./person (10 mm/person) for level components and ramps.

Renumber the remaining subsections accordingly.

Substantiation:
It is interesting to note that the report of the Means of Egress Technical Committee (TC) NFPA 1124 Task Group to the Means of Egress TC members (which was copied to the NFPA Pyrotechnics TC’s NFPA 1124 Task Group C) regarding the NFPA Standards Council Fire Safety Concern Issue #4: Means of Egress Provisions did not contain any specific recommendations to revise or otherwise improve upon the current requirements specified in NFPA 1124 Section 7.3.14 Means of Egress in Chapter 7 Retail Sales of Consumer Fireworks.

However, the Means of Egress TC NFPA 1124 Task Group did provide a general reference to the high hazard contents classification suggesting that it may be more appropriate to apply the high hazard contents classification of NFPA 101 to Chapter 7 rather than the ordinary hazard contents classification. In that regard, it was suggested that Section 7.11 Special Provisions for Occupancies With High Hazard Contents should be applied to Chapter 7.

Although the Pyrotechnics TC does not consider a retail sales facility where consumer fireworks are sold to the public to have a high hazard contents classification, requirements for means of egress in occupancies with high hazard contents as found in Section 7.11 of NFPA 101 have been incorporated as appropriate into Chapter 7 where the TC determined that an additional factor of safety was prudent. Also, a new Section 7.3.14.3 Egress Capacity is being proposed to be added by this Committee Proposal to specify that the egress capacity is to be determined as required for high hazard contents based on Table 7.3.3.1 Capacity Factors of NFPA 101 by including the minimum width per person from that table.
Regarding Section 7.11.1 of NFPA 101 that limits the travel distance to the outside or a place of safety to not more than 75 feet, Section 7.3.14.2 Egress Travel Distance of NFPA 1124 does specify a maximum travel distance of 75 feet for the retail sales area of tents, membrane structures, canopies, and permanent CFRS facilities including Class C stores. However, the travel distance limits for Class A and Class B stores are allowed to be that specified in NFPA 101 for mercantile occupancies. Section 32.2.6.1 requires a maximum travel distance of 150 feet and Section 36.2.6.2 allows that distance to be increased to 200 feet where the building is protected throughout by an approved supervised automatic sprinkler system. It should be noted that the rationale for allowing these larger travel distances in Class A and B stores is because the area of the retail sales floor occupied by the retail displays of consumer fireworks is limited to a maximum of 25% of the area of the retail sales floor or 600 sq ft, whichever is less, in accordance with Section 7.5.1.1 of NFPA 1124. Plus there are other additional restrictions provided for the retail display of consumer fireworks in these Class A and Class B stores to minimize the exposure to the general public in these mercantile occupancies where the fireworks are sold as incidental merchandise as compared to a CFRS facility which is dedicated to the retail sales of consumer fireworks as the main merchandise being sold.

Section 7.11.4 of NFPA 101 requires a minimum of two means of egress to be provided from each building or hazardous area containing high hazard contents with a minor exception. It should be pointed out that Section 7.3.14.1.1 of NFPA 1124 requires not less than three exits be provided from the retail sales area where consumer fireworks are sold unless NFPA 101 requires a greater number. However, Section 7.6.2.3.1 of NFPA 101 allows retail sales areas within temporary CFRS stands to have a minimum of two exits where the travel distance is limited to a maximum of 35 feet in accordance with Section 7.6.2.3.2. It should also be noted that temporary CFRS stands are limited to a maximum area of 800 sq ft based on Item (4) of Section 7.3.5 Construction of Buildings and Structures in NFPA 1124.

Section 7.11.6 of NFPA 101 allows doors serving high hazard contents areas with occupant loads greater than five to have a latch or lock provided it is panic hardware or fire exit hardware. This is also addressed by Section 7.3.14.4.2 in NFPA 1124.

And, finally, it is interesting to note that Section 36.4.6 Retail Sales of Consumer Fireworks, 1.4G in NFPA 101 for new mercantile occupancies requires mercantile occupancies where consumer fireworks, 1.4G are sold to comply with NFPA 1124, as does Section 37.4.6 Retail Sales of Consumer Fireworks, 1.4G for
existing mercantile occupancies for other than approved existing facilities. And Section 36.4.5.3 Storage, Arrangement, Protection, and Quantities of Hazardous Commodities in NFPA 101 for new mercantile occupancies requires that “the storage, arrangement, protection, and quantities of hazardous commodities shall be in accordance with the applicable provisions of ... (8) NFPA 1124...” For existing mercantile occupancies, a similar requirement is found in Section 37.4.5.3 Storage, Arrangement, Protection and Quantities of Hazardous Commodities in NFPA 101. Thus, the Technical Committee on Mercantile and Business Occupancies has apparently determined that the means of egress requirements and other fire and life safety features in NFPA 1124 are adequate for providing reasonably safe means of egress in mercantile occupancies where consumer fireworks are sold at retail to the general public.

Committee Meeting Action: Accept
MEMORANDUM

TO: NFPA Technical Committee on Pyrotechnics
FROM: Jeanne Moreau
DATE: June 14, 2010
SUBJECT: NFPA 1124 A11 Draft Ballot Final Results – CP9 and CP10

The Final Results of the NFPA 1124 Draft Ballot are as follows:

32 Members Eligible to Vote
3 Ballots Not Returned (P. Grucci, G. Hanson, R. Robbins)
29 Affirmative on All
0 Negatives
0 Abstentions

The number of affirmative votes need for the report to be published is 20.
(32 eligible to vote - 3 not returned - 0 abstentions = 29 × 0.66 = 19.14)

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
(32 of eligible voting members ÷ 2 = 16 (17)

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.

According to the final ballot results, all ballot items received the necessary 2/3 required affirmative votes to pass ballot.
NFPA TECHNICAL COMMITTEE ON MEANS OF EGRESS

MEMORANDUM

TO: Technical Committee on Means of Egress (BLD/SAF-MEA)

FROM: Linda MacKay

DATE: August 24, 2010

SUBJECT: Approval Committee Ballots for NFPA 1124 Final Results

The August 18, 2010 date for receipt of the Approval ballots for NFPA 1124 has passed. The final results of this balloting are:

With regard to the action on Draft CP #9 concerning Section 6.8 Means of Egress:

28 Members eligible to vote
   2 Ballots not returned (McMahon, Sinsigalli)
   21 Agree
   5 Disagree (Bonisch, Bush, Collins, Frable and Perry)

With regard to the action on Draft CP #10 concerning 7.3.14.3 Egress Capacity:

28 Members eligible to vote
   2 Ballots not returned (McMahon, Sinsigalli)
   22 Agree
   4 Disagree (Bonisch, Collins, Frable and Perry)

Reasons for negative vote, etc. from alternate members are not included unless the ballot from the principal member was not received. (Brian Rhodes voted for Eric Rosenbaum)

Mr. Collins and Mr. Frable submitted changes in vote during the circulation of comments, their changes in vote are attached.

/Im
TECHNICAL COMMITTEE ON MEANS OF EGRESS APPROVAL COMMITTEE BALLOT FOR NFPA 1124

With regard to the action on Draft CP #9 concerning Section 6.8 Means of Egress:

AGREE
DISAGREE* X
ABSTAIN* 

*If you Disagree or Abstain, reasons must be provided:

I do believe it should be the responsibility of the NFPA 1124 Technical Committee to determine the appropriate hazard classification (i.e., either high hazard or ordinary hazard) for the storage and retail sales of consumer fireworks which would include all of the associated respective egress requirements. However, since the Technical Committee has proposed to select certain egress requirements from both the "ordinary" and "high" hazard classifications, I do not believe the Technical Committee has provided sufficient rationale to justify how and/or why they selected each specific egress requirement. In addition, I also believe the overall general justification provided; i.e., "to be more conservative and err of the side of safety", for specific egress provisions and not for others appears to be inconsistent with the overall hazard classification selected for the storage and retail sales of consumer fireworks. Therefore, specific rationale to justify each requirement related to egress and how it relates to the selected hazard classification of spaces for storage or retail sales of consumer fireworks needs to be provided.

Sign Name: [Signature]
Print Name: Dave Frable
Date: August 18, 2010

RECIRCULATION BALLOT - Draft CP#10

TECHNICAL COMMITTEE ON MEANS OF EGRESS APPROVAL COMMITTEE BALLOT FOR NFPA 1124

With regard to the action on Draft CP #10 concerning Section 7.3.14.3 Egress Capacity:

AGREE
DISAGREE* X
ABSTAIN* 

*If you Disagree or Abstain, reasons must be provided:

See response to CP#9

Sign Name: [Signature]
Print Name: Dave Frable
Date: August 18, 2010
Hi Dave,

Good afternoon. Are you changing your vote on both CP#9 and CP#10 based on Mr. Bonish’s, Bush’s and Perry’s comments?

Thank you.

Regards,

Linda

Please change my ballot to negative with the comment:

I agree with the comments regarding coordination with NFPA 101 and the need for clarity as to what is required to have specific hardware in the comments of Bonish, Bush and Perry.
MEMORANDUM

To: Technical Committee on Pyrotechnics

From: G. Colonna

Date: May 10, 2010

Subject: Draft Proposals Ballot for NFPA 1124 (A11) CP6, CP7, and CP8

Attached are the Draft Proposals (pre-ROP) Ballot and ballot material on NFPA 1124, *Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*. This material was finalized and approved at your February 1 – 2, 2010 meeting in Salt Lake City. The ballot is for formally voting on whether or not you concur with the Committee's Actions on these draft proposals. If you do not concur, or you abstain, you **must** provide a technical reason. Following the vote of the Committee, these items and the respective actions will be forwarded to the Smoke Management Systems Committee (responsible for NFPA 204) in accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for correction.

Please return your ballot as soon as possible, but no later than **Friday, May 28, 2010**. For action by the Committee that passes the attached DRAFT Committee Proposals, the proposals will be presented to the NFPA 204 Committee for review and action.

Your cooperation in meeting this deadline is appreciated. If you wish to fax your ballot, please fax to *(617) 984-7110*.

**Note:** Please remember that the return of ballots and attendance at Committee Meetings are required for all principal and alternate members in accordance with the Regulations Governing Committee Projects.

Enclosures: Ballot Form
Draft Committee Proposals

cc: Linda Fuller, Standards Administration
J. Moreau-Correia, Project Administrative Supervisor
DRAFT PROPOSAL BALLOT DUE BY:
Friday, May 28, 2010
NFPA 1124 PYR-AAA
Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles
Staff Liaison: Guy R. Colonna

Return Completed Ballot To: J. Moreau-Correia
E-Mail to jmoreaucorreia@nfpa.org
Fax to 617-984-7110
One Batterymarch Park, Quincy, MA 02169

Date: _____________________ Signed: ________________________________

Name: ______________________________
Type or Print black ink

Committee Action Key:
A = Accept
R= Reject
APA = Accept in Part
APR = Accept in Principle
APP = Accept in Principle in Part
H = Hold

With respect to the Committee Actions on the DRAFT Proposals that accompanied the ballot, please record me as voting: (check one):

☐ Affirmative On All Items. I agree with all committee meeting actions without comment.

☐ Affirmative With Exception(s): I agree with all committee meeting actions Except for the Affirmative with comment, Negative and /or Abstention checked below.

*Reasons must accompany these votes.
When possible, reasons are requested via e-mail in a Word Document.

Please return this Ballot Page only to NFPA.

<table>
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<tr>
<th>Log No.</th>
<th>Section</th>
<th>Committee Action</th>
<th>Affirmative with Comment*</th>
<th>Negative*</th>
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NFPA 1124-2006
Draft Committee Proposals
Approved for letter ballot at Committee Meeting, February 1 – 2, 2010, Salt Lake City, UT
These actions relate to item 5 in the Standards Council Decision, D#08-19 and are to be coordinated with the Smoke Management Systems Committee in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Log# DRAFT CP#6
Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that paragraph 6.5.3 be amended to read as follows:

6.5.3 Smoke and Heat Vents. Smoke and heat vents designed and installed in accordance with the ICC International Fire Code NFPA 204, Standard for Smoke and Heat Venting, shall be provided in consumer fireworks storage buildings exceeding 50,000 ft$^2$ (4644 m$^2$) in undivided area.

6.5.3.1 The design shall be based on the requirements for a Group S-1 occupancy classification.

6.5.3.1.1 Where the storage height of the consumer fireworks is such that the storage is classified as high-piled combustible storage, the design shall be based on the requirements for high-piled combustible storage.

6.5.3.1.2 The smoke and heat vents shall be designed to operate automatically by actuation of a heat-responsive device having a temperature classification higher than the temperature classification of the automatic sprinklers.

6.5.3.1.2.1 Where smoke and heat vents are installed in areas of the building protected by early suppression fast-response (ESFR) sprinklers, the heat-responsive device used to automatically activate the smoke and heat vents shall have a high temperature classification.

6.5.3.2 Smoke and heat vents shall not be required to be automatically activated in areas of the building where early suppression fast-response (ESFR) sprinklers are provided.

Add a new Section 2.3.4 as follows:
2.3.4 ICC Publication. International Code Council, 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001-2070. 

Renumber the remaining Sections accordingly.

Substantiation:
The NFPA Pyrotechnics Technical Committee (TC) has determined that the requirement for smoke and heat vents for storage facilities storing consumer fireworks, 1.4G should be continued to be required in accordance with Section 6.5.3 when the building exceeds 50,000 sq ft in undivided area. This requirement is based on Section 910.2.1 Group F-1 or S-1 of the 2009 ICC International Fire Code (IFC). Although the storage of consumer fireworks, 1.4G is classified as a Group H-3 occupancy, rather than a Group S-1 occupancy, by the IFC, the TC believes that triggering the requirement for smoke and heat vents based on a Group S-1 occupancy per the IFC provides for improved fire protection to the building, its contents, and its occupants in terms of the ability to remove large quantities of smoke either automatically or manually. It should be noted that prior to the 2006 edition of the IFC, Group H-3 occupancies greater than 15,000 sq ft in area were also required to be provided with smoke and heat vents. And at least one of the legacy codes, the 1997 ICBO Uniform Building Code (UBC), also required smoke and heat vents for Group S-1 occupancies greater than 50,000 sq ft in undivided area, as well as for Group H-3 occupancies greater than 15,000 sq ft in area.

The main concern the Pyrotechnics TC has for the need for smoke and heat vents in these larger storage buildings is the large quantities of smoke that can be generated by consumer fireworks, 1.4G once they become involved in a fire. By their very nature, consumer fireworks are, in many cases, designed to produce smoke or their discharge creates additional smoke beyond that which could normally be expected from the packaging in which the consumer fireworks are contained while in storage. Since the smoke and heat vents are required to be both manually and automatically operated, the fire department can take advantage of the smoke and heat vents in assisting them in evacuating these excessive quantities of smoke from the building. This will enable the fire fighters to have better visibility and access to the seat of the fire, as well as to remove the smoke after the fire is controlled and extinguished. This will minimize the risk to the responding fire fighters from having to go onto the roof
and manually cut holes in the roof to facilitate the evacuation of smoke and hot gases during their firefighting efforts.

Thus, the TC is proposing to add a new Subsection 6.5.3.1 to indicate that the design of the smoke and heat vents is to be based on the requirements for a Group S-1 occupancy classification since Table 910.3 Requirements for Draft Curtains and Smoke and Heat Vents in the IFC no longer contains design criteria for Group H-3 occupancies. Also, a new Subsection 6.5.3.1.1 is being added to indicate when the smoke and heat vents must comply with the requirements for high-piled combustible storage which involves a different set of design criteria in the same table. This provides the user of NFPA 1124 with adequate guidance to determine what design criteria to use given the height of storage in their building. If the storage height is such that it does not meet the criteria for high-piled combustible storage as defined in the IFC, then the smoke and heat vents would be designed in accordance with the criteria for a Group S-1 occupancy classification.

New Subsection 6.5.3.1.2 is being added to require the smoke and heat vents to be automatically operated by heat-responsive devices with a temperature classification higher than the temperature classification of the automatic sprinklers. This is based on the requirement in Section 12.1.1.1 of NFPA 13-2010 in order to allow for the installation of smoke and heat vents in sprinklered buildings. Since these buildings will be greater than 50,000 sq ft in area, they will be required to be protected with automatic sprinklers in accordance with Section 6.5.1 of NFPA 1124. Also, proposed new Subsection 6.5.3.1.2.1 mandates that smoke and heat vents installed in areas of the building that are protected with early suppression fast-response (ESFR) sprinklers have heat-responsive devices with a high temperature classification. This is also a requirement in NFPA 13-2010 in Section 12.1.1.2. And a new Subsection 6.5.3.2 is being added to allow the smoke and heat vents installed in areas of the building protected with early suppression fast-response (ESFR) sprinklers to be provided with manual activation only. This is consistent with Exception 2 to Section 910.1 General of the 2009 IFC.

It should also be noted that Section 6.5.3 Smoke and Heat Vents is proposed to be modified to delete the reference to NFPA 204, Standard for Smoke and Heat Venting, and substitute the reference to the ICC International Fire Code. This is being done because there is inadequate fire test data available, including rate of heat release data, for the storage of consumer fireworks, 1.4G in order to engineer a smoke and heat vent system in accordance with NFPA 204. However, because the design criteria for
smoke and heat vents in the ICC International Fire Code are prescriptive, those criteria can be used without additional substantiation or test data.

And, of course, a new Section 2.3.4 ICC Publication is being added to include the referenced code the ICC International Fire Code, 2009 edition.

Committee Meeting Action: Accept
Recommendation: It is proposed that paragraph 7.3.10 be deleted in its entirety as shown:

Delete Section 7.3.10 in its entirety:

7.3.10 Smoke Control.

7.3.10.1 Smoke and heat vents designed and installed in accordance with NFPA 204, Standard for Smoke and Heat Venting, shall be provided in the CFRS area of new permanent CFRS facilities or stores where the ceiling height is less than 10 ft (3.05 m) and the travel distance to reach an exit is greater than 25 ft (7.6 m).

7.3.10.2 The smoke and heat vents required by 7.3.10.1 shall be automatically activated by a smoke detection system installed throughout the CFRS area in accordance with NFPA 72, National Fire Alarm Code.

Substantiation:
The NFPA Pyrotechnics Technical Committee (TC) agrees with the concerns raised by the Standards Council regarding Fire Safety Concern Issue #5: Smoke and Heat Venting as detailed in the Council Decision D#08-19 regarding the fact that there does not exist adequate technical justification nor test data to justify the requirements for the installation of smoke and heat venting that is gang activated by a smoke detection system in buildings used for the retail sales of consumer fireworks where the ceiling height is less than 10 feet and the travel distance to reach an exit is greater than 25 feet. Therefore, the TC is proposing to delete in its entirety Section 7.3.10 Smoke Control from NFPA 1124-2006.

However, the TC wishes to voice its concern about the Fire Protection Research Foundation (FPRF) Report upon which the Council relied in making its decision regarding the reference to the Battelle Fire Test as a part of the substantiation for their concern. It should be pointed out that the test was not a representation of a consumer fireworks retail sales facility in compliance with the current edition of NFPA 1124. Furthermore, much of the consumer fireworks were confiscated product not in original packaging material with fuses exposed and did not arrive in good condition after being transported to the test facility. Also the product was arranged on the display shelves in a random method that was inconsistent with the requirements of Chapter 7 of NFPA 1124. And, unfortunately, the funding was so
limited that only a single test could be conducted which does not provide any indication of ability to replicate the test results. In other words, one test does not provide any indication that it was truly representative of the fire condition that would be expected to be developed in that scenario rather than just a unique event. The TC’s decision to delete Section 7.3.10 did not rely upon the fire test data developed from the Battelle Fire Test.

Committee Meeting Action: Accept
Recommendation: It is proposed that a new paragraph 7.3.10 be added to read as follows:

### 7.3.10 Minimum Ceiling Height

#### 7.3.10.1 The ceiling height in the CFRS area of new permanent CFRS facilities and stores shall not be less than 12 ft (3.6 m) above the finished floor surface.

#### 7.3.10.1.1 Where the travel distance to reach an exit does not exceed 25 ft (7.6 m), the ceiling height shall be permitted to be less than 12 ft (3.6 m) but not less than 8 ft (2.4 m) above the finished floor surface.

Substantiation:
The NFPA Pyrotechnics Technical Committee (TC) proposes to add a new Section 7.3.10 Minimum Ceiling Height to require all CFRS areas of new permanent CFRS facilities and stores to have a minimum ceiling height of 12 feet. New Subsection 7.3.10.1 is being added as an exception to the 12 foot ceiling height minimum in small facilities where the travel distance does not exceed 25 feet, provided the ceiling height is not less than 8 feet.

Virtually all new permanent CFRS facilities and stores are being constructed with ceiling heights of at least 12 feet. But more importantly, the minimum 12 foot ceiling height provides for a very large reservoir in which smoke and heat can accumulate overhead before threatening the tenability of the egress paths used by the occupants to exit the building or fire area during a fire emergency. It is generally accepted that maintaining the hot smoke layer above 6 feet will provide for reasonably tenable conditions in which the occupants can safety evacuate. Requiring a minimum 12 foot ceiling height will achieve a minimum 4 foot deep reservoir in which the smoke and hot gases can accumulate before becoming life threatening to the escaping occupants.

In the case of the exception allowing a ceiling height as low as 8 feet, the travel distance limit of 25 feet will facilitate very quick evacuation of the building since the time required for most occupants to travel 25 feet should be less than 5 seconds. Refer to Section A.7.11.1 of NFPA 101-2009 which states: “Seventy-five feet (23 m) can be traversed in approximately 10 seconds to 15 seconds, even when allowing for a momentary delay to decide which way to go, during which it can be assumed that the
average individual can hold his or her breath.” Obviously, the 25 foot travel distance is significantly less than the 75 foot travel distance allowed for high hazard contents occupancies by NFPA 101 Section 7.11 Special Provisions for Occupancies with High Hazard Contents. So this is a very conservative exception to the 12 foot minimum ceiling height requirement.

Committee Meeting Action: Accept
MEMORANDUM

To: Tracy Golinveaux, Staff Liaison for Smoke Management Systems Committee

From: G. Colonna, Staff Liaison for Pyrotechnics Committee

Date: July 16, 2010

Subject: Transmittal of Draft Proposals for NFPA 1124 (A12) for review and action by Smoke Management Systems Technical Committee (SMO-AAA)

Attached are Draft Proposals (pre-ROP) CP#6, CP#7 and CP#8, and the letter ballot results for proposed changes to Chapter 7 of NFPA 1124, Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles. This material was developed by the Committee on Pyrotechnics at its February 1 – 2, 2010 meeting in Salt Lake City.

In accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008, this material has been developed as Draft Proposals (pre-ROP) and has been letter balloted through the Committee on Pyrotechnics. In addition to the Draft Proposals, I have also attached the final ballot results indicating that the items achieved the required 2/3rd majority and simple majority with affirmative votes for DRAFT Committee Proposals (DRAFT CP#6, DRAFT CP#7, and DRAFT CP#8).

In accordance with the direction of the Council, I am providing you with this information as Staff Liaison to the Committee on Smoke Management Systems and requesting that you include this as an agenda item for future consideration by the Smoke Management Systems Technical Committee. The Task Group leader for the Pyrotechnics Committee for this activity is Jerry Farley. If the Committee has questions on any aspect as presented in the attached Draft Proposal, please contact me or Mr. Farley directly for clarification.

Thanks for your assistance in this process and thanks to the Smoke Management Systems Technical Committee in advance for their efforts to assist with this revision of NFPA 1124. If you have any questions, please contact me.

Enclosures: Draft Committee Proposals (3 items, Draft CP#6, Draft CP#7, and Draft CP#8)
Letter Ballot on Draft Committee Proposals, final results

cc: Linda Fuller, Standards Administration
    J. Moreau, Project Administrative Supervisor
NFPA 1124-2006
Draft Committee Proposals
Approved for letter ballot at Committee Meeting, February 1 – 2, 2010, Salt Lake City, UT
These actions relate to item 5 in the Standards Council Decision, D#08-19 and are to be coordinated
with the Smoke Management Systems Committee in accordance with Standards Council direction
following the completion of the letter ballot by the Committee on Pyrotechnics.

Log# DRAFT CP#6
Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that paragraph 6.5.3 be amended to read as follows:

6.5.3 Smoke and Heat Vents. Smoke and heat vents designed and installed in accordance with the ICC
International Fire Code NFPA 204, Standard for Smoke and Heat Venting, shall be provided in consumer
fireworks storage buildings exceeding 50,000 ft² (4644 m²) in undivided area.

6.5.3.1 The design shall be based on the requirements for a Group S-1 occupancy
classification.

6.5.3.1.1 Where the storage height of the consumer fireworks is such that the storage is
classified as high-piled combustible storage, the design shall be based on the requirements for
high-piled combustible storage.

6.5.3.1.2 The smoke and heat vents shall be designed to operate automatically by
actuation of a heat-responsive device having a temperature classification higher than the
temperature classification of the automatic sprinklers.

6.5.3.1.2.1 Where smoke and heat vents are installed in areas of the building protected by early
suppression fast-response (ESFR) sprinklers, the heat-responsive device used to automatically
activate the smoke and heat vents shall have a high temperature classification.

6.5.3.2 Smoke and heat vents shall not be required to be automatically activated in areas
of the building where early suppression fast-response (ESFR) sprinklers are provided.

Add a new Section 2.3.4 as follows:
2.3.4 ICC Publication. International Code Council, 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001-2070.


Renumber the remaining Sections accordingly.

Substantiation:
The NFPA Pyrotechnics Technical Committee (TC) has determined that the requirement for smoke and heat vents for storage facilities storing consumer fireworks, 1.4G should be continued to be required in accordance with Section 6.5.3 when the building exceeds 50,000 sq ft in undivided area. This requirement is based on Section 910.2.1 Group F-1 or S-1 of the 2009 ICC International Fire Code (IFC). Although the storage of consumer fireworks, 1.4G is classified as a Group H-3 occupancy, rather than a Group S-1 occupancy, by the IFC, the TC believes that triggering the requirement for smoke and heat vents based on a Group S-1 occupancy per the IFC provides for improved fire protection to the building, its contents, and its occupants in terms of the ability to remove large quantities of smoke either automatically or manually. It should be noted that prior to the 2006 edition of the IFC, Group H-3 occupancies greater than 15,000 sq ft in area were also required to be provided with smoke and heat vents. And at least one of the legacy codes, the 1997 ICBO Uniform Building Code (UBC), also required smoke and heat vents for Group S-1 occupancies greater than 50,000 sq ft in undivided area, as well as for Group H-3 occupancies greater than 15,000 sq ft in area.

The main concern the Pyrotechnics TC has for the need for smoke and heat vents in these larger storage buildings is the large quantities of smoke that can be generated by consumer fireworks, 1.4G once they become involved in a fire. By their very nature, consumer fireworks are, in many cases, designed to produce smoke or their discharge creates additional smoke beyond that which could normally be expected from the packaging in which the consumer fireworks are contained while in storage. Since the smoke and heat vents are required to be both manually and automatically operated, the fire department can take advantage of the smoke and heat vents in assisting them in evacuating these excessive quantities of smoke from the building. This will enable the fire fighters to have better visibility and access to the seat of the fire, as well as to remove the smoke after the fire is controlled and extinguished. This will minimize the risk to the responding fire fighters from having to go onto the roof.
and manually cut holes in the roof to facilitate the evacuation of smoke and hot gases during their firefighting efforts.

Thus, the TC is proposing to add a new Subsection 6.5.3.1 to indicate that the design of the smoke and heat vents is to be based on the requirements for a Group S-1 occupancy classification since Table 910.3 Requirements for Draft Curtains and Smoke and Heat Vents in the IFC no longer contains design criteria for Group H-3 occupancies. Also, a new Subsection 6.5.3.1.1 is being added to indicate when the smoke and heat vents must comply with the requirements for high-piled combustible storage which involves a different set of design criteria in the same table. This provides the user of NFPA 1124 with adequate guidance to determine what design criteria to use given the height of storage in their building. If the storage height is such that it does not meet the criteria for high-piled combustible storage as defined in the IFC, then the smoke and heat vents would be designed in accordance with the criteria for a Group S-1 occupancy classification.

New Subsection 6.5.3.1.2 is being added to require the smoke and heat vents to be automatically operated by heat-responsive devices with a temperature classification higher than the temperature classification of the automatic sprinklers. This is based on the requirement in Section 12.1.1.1 of NFPA 13-2010 in order to allow for the installation of smoke and heat vents in sprinklered buildings. Since these buildings will be greater than 50,000 sq ft in area, they will be required to be protected with automatic sprinklers in accordance with Section 6.5.1 of NFPA 1124. Also, proposed new Subsection 6.5.3.1.2.1 mandates that smoke and heats vents installed in areas of the building that are protected with early suppression fast-response (ESFR) sprinklers have heat-responsive devices with a high temperature classification. This is also a requirement in NFPA 13-2010 in Section 12.1.1.2. And a new Subsection 6.5.3.2 is being added to allow the smoke and heat vents installed in areas of the building protected with early suppression fast-response (ESFR) sprinklers to be provided with manual activation only. This is consistent with Exception 2 to Section 910.1 General of the 2009 IFC.

It should also be noted that Section 6.5.3 Smoke and Heat Vents is proposed to be modified to delete the reference to NFPA 204, Standard for Smoke and Heat Venting, and substitute the reference to the ICC International Fire Code. This is being done because there is inadequate fire test data available, including rate of heat release data, for the storage of consumer fireworks, 1.4G in order to engineer a smoke and heat vent system in accordance with NFPA 204. However, because the design criteria for
smoke and heat vents in the ICC International Fire Code are prescriptive, those criteria can be used without additional substantiation or test data.

And, of course, a new Section 2.3.4 ICC Publication is being added to include the referenced code the ICC International Fire Code, 2009 edition.

Committee Meeting Action: Accept
**Recommendation:** It is proposed that paragraph 7.3.10 be deleted in its entirety as shown:

Delete Section 7.3.10 in its entirety:

**7.3.10 Smoke Control.**

**7.3.10.1** Smoke and heat vents designed and installed in accordance with NFPA 204, Standard for Smoke and Heat Venting, shall be provided in the CFRS area of new permanent CFRS facilities or stores where the ceiling height is less than 10 ft (3.05 m) and the travel distance to reach an exit is greater than 25 ft (7.6 m).

**7.3.10.2** The smoke and heat vents required by 7.3.10.1 shall be automatically activated by a smoke detection system installed throughout the CFRS area in accordance with NFPA 72, National Fire Alarm Code.

**Substantiation:**

The NFPA Pyrotechnics Technical Committee (TC) agrees with the concerns raised by the Standards Council regarding Fire Safety Concern Issue #5: Smoke and Heat Venting as detailed in the Council Decision D#08-19 regarding the fact that there does not exist adequate technical justification nor test data to justify the requirements for the installation of smoke and heat venting that is gang activated by a smoke detection system in buildings used for the retail sales of consumer fireworks where the ceiling height is less than 10 feet and the travel distance to reach an exit is greater than 25 feet. Therefore, the TC is proposing to delete in its entirety Section 7.3.10 Smoke Control from NFPA 1124-2006.

However, the TC wishes to voice its concern about the Fire Protection Research Foundation (FPRF) Report upon which the Council relied in making its decision regarding the reference to the Battelle Fire Test as a part of the substantiation for their concern. It should be pointed out that the test was not a representation of a consumer fireworks retail sales facility in compliance with the current edition of NFPA 1124. Furthermore, much of the consumer fireworks were confiscated product not in original packaging material with fuses exposed and did not arrive in good condition after being transported to the test facility. Also the product was arranged on the display shelves in a random method that was inconsistent with the requirements of Chapter 7 of NFPA 1124. And, unfortunately, the funding was so
limited that only a single test could be conducted which does not provide any indication of ability to replicate the test results. In other words, one test does not provide any indication that it was truly representative of the fire condition that would be expected to be developed in that scenario rather than just a unique event. The TC’s decision to delete Section 7.3.10 did not rely upon the fire test data developed from the Battelle Fire Test.

**Committee Meeting Action:** Accept
Recommendation: It is proposed that a new paragraph 7.3.10 be added to read as follows:

**7.3.10 Minimum Ceiling Height.**

**7.3.10.1** The ceiling height in the CFRS area of new permanent CFRS facilities and stores shall not be less than 12 ft (3.6 m) above the finished floor surface.

**7.3.10.1.1** Where the travel distance to reach an exit does not exceed 25 ft (7.6 m), the ceiling height shall be permitted to be less than 12 ft (3.6 m) but not less than 8 ft (2.4 m) above the finished floor surface.

**Substantiation:**

The NFPA Pyrotechnics Technical Committee (TC) proposes to add a new Section 7.3.10 Minimum Ceiling Height to require all CFRS areas of new permanent CFRS facilities and stores to have a minimum ceiling height of 12 feet. New Subsection 7.3.10.1 is being added as an exception to the 12 foot ceiling height minimum in small facilities where the travel distance does not exceed 25 feet, provided the ceiling height is not less than 8 feet.

Virtually all new permanent CFRS facilities and stores are being constructed with ceiling heights of at least 12 feet. But more importantly, the minimum 12 foot ceiling height provides for a very large reservoir in which smoke and heat can accumulate overhead before threatening the tenability of the egress paths used by the occupants to exit the building or fire area during a fire emergency. It is generally accepted that maintaining the hot smoke layer above 6 feet will provide for reasonably tenable conditions in which the occupants can safety evacuate. Requiring a minimum 12 foot ceiling height will achieve a minimum 4 foot deep reservoir in which the smoke and hot gases can accumulate before becoming life threatening to the escaping occupants.

In the case of the exception allowing a ceiling height as low as 8 feet, the travel distance limit of 25 feet will facilitate very quick evacuation of the building since the time required for most occupants to travel 25 feet should be less than 5 seconds. Refer to Section A.7.11.1 of NFPA 101-2009 which states: “Seventy-five feet (23 m) can be traversed in approximately 10 seconds to 15 seconds, even when allowing for a momentary delay to decide which way to go, during which it can be assumed that the
average individual can hold his or her breath.” Obviously, the 25 foot travel distance is significantly less than the 75 foot travel distance allowed for high hazard contents occupancies by NFPA 101 Section 7.11 Special Provisions for Occupancies with High Hazard Contents. So this is a very conservative exception to the 12 foot minimum ceiling height requirement.

Committee Meeting Action: Accept
Committee on NFPA 1124

MEMORANDUM

TO: NFPA Technical Committee on Pyrotechnics
FROM: Jeanne Moreau
DATE: June 14, 2010
SUBJECT: NFPA 1124 A11 Draft Ballot Final Results – CP6, CP7, and CP8

The Final Results of the NFPA 1124 Draft Ballot are as follows:

32 Members Eligible to Vote
3 Ballots Not Returned (P. Grucci, G. Hanson, R. Robbins)
29 Affirmative on All
0 Negatives
0 Abstentions

The number of affirmative votes need for the report to be published is 20.
(32 eligible to vote - 3 not returned - 0 abstentions = 29 × 0.66 = 19.14)

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
(32 of eligible voting members ÷ 2 = 16 (17)

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.

According to the final ballot results, all ballot items received the necessary 2/3 required affirmative votes to pass ballot.
MEMORANDUM

To: Technical Committee on Pyrotechnics

From: G. Colonna

Date: December 10, 2010

Subject: Amended Draft Proposals Ballot for NFPA 1124 (A12) CP6 and CP8

Attached are the Amended Draft Proposals (pre-ROP) Ballot and ballot material on NFPA 1124, Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles. This material was further review based on input from the SMO-AAA technical committee and finalized and approved at your September 30 – October 1, 2010 meeting in Phoenix. The ballot is for formally voting on whether or not you concur with the Committee's Actions on these draft proposals. If you do not concur, or you abstain, you must provide a technical reason. Following the vote of the Committee, these items and the respective actions will be forwarded to the Smoke Management Systems Committee (responsible for NFPA 204) in accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for correction.

Please return your ballot as soon as possible, but no later than Thursday, December 23, 2010. For action by the Committee that passes the attached amended DRAFT Committee Proposals, the proposals will be presented to the NFPA 204 Committee for review and action.

Your cooperation in meeting this deadline is appreciated. If you wish to fax your ballot, please fax to (617) 984-7110.

Note: Please remember that the return of ballots and attendance at Committee Meetings are required for all principal and alternate members in accordance with the Regulations Governing Committee Projects.

Enclosures: Ballot Form
Draft Committee Proposals

cc: Linda Fuller, Standards Administration
J. Moreau, Project Administrative Supervisor
Amended DRAFT PROPOSAL BALLOT DUE BY:  
Thursday, December 23, 2010

NFPA 1124 PYR-AAA
Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles
Staff Liaison: Guy R. Colonna

Return Completed Ballot To: J. Moreau
E-Mail to jmoreau@nfpa.org
Fax to 617-984-7110
One Batterymarch Park, Quincy, MA 02169

Date:___________________ Signed:__________________________________

Name: __________________________________
Type or Print black ink

Committee Action Key:
A = Accept
R= Reject
APA = Accept in Part
APR = Accept in Principle
APP = Accept in Principle in Part
H = Hold

With respect to the Committee Actions on the DRAFT Proposals that accompanied
the ballot, please record me as voting: (check one):

☐ Affirmative On All Items. I agree with all committee meeting actions without comment.

☐ Affirmative With Exception(s): I agree with all committee meeting actions Except
for the Affirmative with comment, Negative and /or Abstention checked below.

*Reasons must accompany these votes.
When possible, reasons are requested via e-mail in a Word Document.

Please return this Ballot Page only to NFPA.

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NFPA 1124-2006
Amended Draft Committee Proposals

Approved for letter ballot at Committee Meeting, February 1 – 2, 2010, Salt Lake City, UT and approved as amended for letter ballot at Committee Meeting, September 30 – October 1, 2010, Phoenix, AZ. These actions relate to item 5 in the Standards Council Decision, D#08-19 and are to be coordinated with the Smoke Management Systems Committee in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Amended Log# DRAFT CP#6
Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that paragraph 6.5.3 be deleted as shown:

6.5.3 Smoke and Heat Vents. Smoke and heat vents designed and installed in accordance with NFPA 204, Standard for Smoke and Heat Venting, shall be provided in consumer fireworks storage buildings exceeding 50,000 ft² (4644 m²) in undivided area.

Substantiation:
The NFPA Pyrotechnics Technical Committee (TC) established a task group responsible for coordinating review of issue #5 of the Standards Council Decision, D#08-19 October 1, 2008 with the Technical Committee on Smoke Management responsible for NFPA 204. Discussion between the respective task groups for each committee forms the basis for the proposed action. Per recommendation of the Committee on Smoke Management, the Committee on Pyrotechnics proposes the deletion of existing paragraph 6.5.3 in the 2006 edition of NFPA 1124, as there is not adequate technical justification at this time for determining how to design smoke and heat vents for consumer fireworks storage in sprinklered buildings. Upon this recommendation, the Pyrotechnics Committee proposes the deletion of the current requirement as shown.

Committee Meeting Action: Accept
Log# Draft CP#7 – This has been accepted by the Smoke Management TC so no further action is necessary.

Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that paragraph 7.3.10 be deleted in its entirety as shown:

Delete Section 7.3.10 in its entirety:

7.3.10 Smoke Control.

7.3.10.1 Smoke and heat vents designed and installed in accordance with NFPA 204, Standard for Smoke and Heat Venting, shall be provided in the CFRS area of new permanent CFRS facilities or stores where the ceiling height is less than 10 ft (3.05 m) and the travel distance to reach an exit is greater than 25 ft (7.6 m).

7.3.10.2 The smoke and heat vents required by 7.3.10.1 shall be automatically activated by a smoke detection system installed throughout the CFRS area in accordance with NFPA 72, National Fire Alarm Code.

Substantiation:
The NFPA Pyrotechnics Technical Committee (TC) agrees with the concerns raised by the Standards Council regarding Fire Safety Concern Issue #5: Smoke and Heat Venting as detailed in the Council Decision D#08-19 regarding the fact that there does not exist adequate technical justification nor test data to justify the requirements for the installation of smoke and heat venting that is gang activated by a smoke detection system in buildings used for the retail sales of consumer fireworks where the ceiling height is less than 10 feet and the travel distance to reach an exit is greater than 25 feet. Therefore, the TC is proposing to delete in its entirety Section 7.3.10 Smoke Control from NFPA 1124-2006.

However, the TC wishes to voice its concern about the Fire Protection Research Foundation (FPRF) Report upon which the Council relied in making its decision regarding the reference to the Battelle Fire Test as a part of the substantiation for their concern. It should be pointed out that the test was not a representation of a consumer fireworks retail sales facility in compliance with the current edition of NFPA 1124. Furthermore, much of the consumer fireworks were confiscated product not in original packaging material with fuses exposed and did not arrive in good condition after being transported to the test facility. Also the product was arranged on the display shelves in a random method that was inconsistent with the requirements of Chapter 7 of NFPA 1124. And, unfortunately, the funding was so
limited that only a single test could be conducted which does not provide any indication of ability to replicate the test results. In other words, one test does not provide any indication that it was truly representative of the fire condition that would be expected to be developed in that scenario rather than just a unique event. The TC’s decision to delete Section 7.3.10 did not rely upon the fire test data developed from the Battelle Fire Test.

**Committee Meeting Action:** Accept
Amended Log# Draft CP#8

Submitter: Technical Committee on Pyrotechnics

Recommendation: The previously developed Draft Committee Proposal is Withdrawn. For the record, please vote to approve the Committee on Pyrotechnics action to withdraw this draft Committee Proposal. If approved by letter ballot, it will be withdrawn and not resubmitted to the approval committee. It is proposed that a new paragraph 7.3.10 be added to read as follows:

7.3.10 Minimum Ceiling Height.

7.3.10.1 The ceiling height in the CFRS area of new permanent CFRS facilities and stores shall not be less than 12 ft (3.6 m) above the finished floor surface.

7.3.10.1.1 Where the travel distance to reach an exit does not exceed 25 ft (7.6 m), the ceiling height shall be permitted to be less than 12 ft (3.6 m) but not less than 8 ft (2.4 m) above the finished floor surface.

Substantiation:

Based on discussion with the approval committee for Item 5 of the Standards Council Decision #D08-19, the Technical Committee on Smoke Management, the NFPA Pyrotechnics Technical Committee (TC) proposes to withdraw the previously developed draft Committee Proposal Log# Draft CP8 as there is not sufficient technical substantiation to justify the recommended action.

Committee Meeting Action: Accept the withdrawal of Draft CP#8.
MEMORANDUM

To:  Tracy Golinveaux, Staff Liaison for Smoke Management Systems Committee

From:  G. Colonna, Staff Liaison for Pyrotechnics Committee

Date:  January 10, 2011

Subject:  Transmittal of Amended Draft Proposals for NFPA 1124 (A12) for review and action by Smoke Management Systems Technical Committee (SMO-AAA)

Attached are Amended Draft Proposals (pre-ROP) CP#6 and CP#8 (CP#7 was approved in prior action by SMO-AAA), and the letter ballot results for proposed changes to Chapter 7 of NFPA 1124, Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles. This material was amended by the Committee on Pyrotechnics at its September 30 – October 1, 2010 meeting in Phoenix, AZ based on input from the SMO-AAA Technical Committee.

In accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008, this material has been developed as Draft Proposals (pre-ROP) and has been letter balloted through the Committee on Pyrotechnics. In addition to the Draft Proposals, I have also attached the final ballot results indicating that the items achieved the required 2/3rd majority and simple majority with affirmative votes for Amended DRAFT Committee Proposals (DRAFT CP#6 and DRAFT CP#8).

In accordance with the direction of the Council, I am providing you with this information as Staff Liaison to the Committee on Smoke Management Systems and requesting that you include this as an agenda item for future consideration by the Smoke Management Systems Technical Committee. The Task Group leader for the Pyrotechnics Committee for this activity is Jerry Farley. If the Committee has questions on any aspect as presented in the attached Draft Proposal, please contact me or Mr. Farley directly for clarification.

Thanks for your assistance in this process and thanks to the Smoke Management Systems Technical Committee in advance for their efforts to assist with this revision of NFPA 1124. If you have any questions, please contact me.

Enclosures:  Amended Draft Committee Proposals (2 items, Draft CP#6 and Draft CP#8)
Letter Ballot on Amended Draft Committee Proposals, final results

cc:  Linda Fuller, Standards Administration
     J. Moreau, Project Administrative Supervisor
NFPA 1124-2006
Amended Draft Committee Proposals
Approved for letter ballot at Committee Meeting, February 1 – 2, 2010, Salt Lake City, UT and approved as amended for letter ballot at Committee Meeting, September 30 – October 1, 2010, Phoenix, AZ. These actions relate to item 5 in the Standards Council Decision, D#08-19 and are to be coordinated with the Smoke Management Systems Committee in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Amended Log# DRAFT CP#6
Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that paragraph 6.5.3 be deleted as shown:

6.5.3 Smoke and Heat Vents. Smoke and heat vents designed and installed in accordance with NFPA 204, Standard for Smoke and Heat Venting, shall be provided in consumer fireworks storage buildings exceeding 50,000 ft² (4644 m²) in undivided area.

Substantiation:
The NFPA Pyrotechnics Technical Committee (TC) established a task group responsible for coordinating review of issue #5 of the Standards Council Decision, D#08-19 October 1, 2008 with the Technical Committee on Smoke Management responsible for NFPA 204. Discussion between the respective task groups for each committee forms the basis for the proposed action. Per recommendation of the Committee on Smoke Management, the Committee on Pyrotechnics proposes the deletion of existing paragraph 6.5.3 in the 2006 edition of NFPA 1124, as there is not adequate technical justification at this time for determining how to design smoke and heat vents for consumer fireworks storage in sprinklered buildings. Upon this recommendation, the Pyrotechnics Committee proposes the deletion of the current requirement as shown.

Committee Meeting Action: Accept
Log# Draft CP#7 – This has been accepted by the Smoke Management TC so no further action is necessary.

Submitter: Technical Committee on Pyrotechnics

Recommendation: It is proposed that paragraph 7.3.10 be deleted in its entirety as shown:

Delete Section 7.3.10 in its entirety:

7.3.10 Smoke Control.

7.3.10.1 Smoke and heat vents designed and installed in accordance with NFPA 204, Standard for Smoke and Heat Venting, shall be provided in the CFRS area of new permanent CFRS facilities or stores where the ceiling height is less than 10 ft (3.05 m) and the travel distance to reach an exit is greater than 25 ft (7.6 m).

7.3.10.2 The smoke and heat vents required by 7.3.10.1 shall be automatically activated by a smoke detection system installed throughout the CFRS area in accordance with NFPA 72, National Fire Alarm Code.

Substantiation:

The NFPA Pyrotechnics Technical Committee (TC) agrees with the concerns raised by the Standards Council regarding Fire Safety Concern Issue #5: Smoke and Heat Venting as detailed in the Council Decision D#08-19 regarding the fact that there does not exist adequate technical justification nor test data to justify the requirements for the installation of smoke and heat venting that is gang activated by a smoke detection system in buildings used for the retail sales of consumer fireworks where the ceiling height is less than 10 feet and the travel distance to reach an exit is greater than 25 feet. Therefore, the TC is proposing to delete in its entirety Section 7.3.10 Smoke Control from NFPA 1124-2006.

However, the TC wishes to voice its concern about the Fire Protection Research Foundation (FPRF) Report upon which the Council relied in making its decision regarding the reference to the Battelle Fire Test as a part of the substantiation for their concern. It should be pointed out that the test was not a representation of a consumer fireworks retail sales facility in compliance with the current edition of NFPA 1124. Furthermore, much of the consumer fireworks were confiscated product not in original packaging material with fuses exposed and did not arrive in good condition after being transported to the test facility. Also the product was arranged on the display shelves in a random method that was inconsistent with the requirements of Chapter 7 of NFPA 1124. And, unfortunately, the funding was so
limited that only a single test could be conducted which does not provide any indication of ability to replicate the test results. In other words, one test does not provide any indication that it was truly representative of the fire condition that would be expected to be developed in that scenario rather than just a unique event. The TC’s decision to delete Section 7.3.10 did not rely upon the fire test data developed from the Battelle Fire Test.

Committee Meeting Action: Accept
Amended Log# Draft CP#8

Submitter: Technical Committee on Pyrotechnics

Recommendation: The previously developed Draft Committee Proposal is Withdrawn. For the record, please vote to approve the Committee on Pyrotechnics action to withdraw this draft Committee Proposal. If approved by letter ballot, it will be withdrawn and not resubmitted to the approval committee. It is proposed that a new paragraph 7.3.10 be added to read as follows:

7.3.10 Minimum Ceiling Height.

7.3.10.1 The ceiling height in the CFRS area of new permanent CFRS facilities and stores shall not be less than 12 ft (3.6 m) above the finished floor surface.

7.3.10.1.1 Where the travel distance to reach an exit does not exceed 25 ft (7.6 m), the ceiling height shall be permitted to be less than 12 ft (3.6 m) but not less than 8 ft (2.4 m) above the finished floor surface.

Substantiation:

Based on discussion with the approval committee for Item 5 of the Standards Council Decision #D08-19, the Technical Committee on Smoke Management, the NFPA Pyrotechnics Technical Committee (TC) proposes to withdraw the previously developed draft Committee Proposal Log# Draft CP8 as there is not sufficient technical substantiation to justify the recommended action.

Committee Meeting Action: Accept the withdrawal of Draft CP#8.
MEMORANDUM

TO: NFPA Technical Committee on Pyrotechnics

FROM: Jeanne Moreau

DATE: January 4, 2011

SUBJECT: NFPA 1124 A11 Draft Ballot Final Results – CP6, CP7, and CP8

The Final Results of the NFPA 1124 Draft Ballot are as follows:

32 Members Eligible to Vote
1 Not Returned (J. Kitchens)
0 Negative
0 Abstentions

There are two criteria necessary to pass ballot [(1) affirmative $\frac{2}{3}$ vote and (2) simple majority].

(1) The number of affirmative votes needed for the proposal/comment to pass is 21.
   (32 eligible to vote - 1 not returned - 0 abstentions = 31 × 0.66 = 20.46)

(2) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:
   
   $[32 \text{ eligible} \div 2 = 16 + 1 = (17)]$

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.

According to the final ballot results, all ballot items received the necessary $\frac{2}{3}$ required affirmative votes to pass ballot.
MEMORANDUM

TO: NFPA Technical Committee on Smoke Management Systems (SMO-AAA)
FROM: Tracy Golinveaux, Staff Liaison
DATE: January 27, 2011
SUBJECT: Approval Committee Ballot FINAL Results for NFPA 1124 CP6 and CP8

The Final Results of the NFPA 1124 Approval Ballots are as follows:

27 Members Eligible to Vote
2 Not Returned (J. Kampmeyer and A. Vaughn)
0 Negatives
0 Abstentions

There are two criteria necessary to pass ballot [(1) affirmative $\frac{2}{3}$ vote and (2) simple majority].

(1) The number of affirmative votes needed for the proposal to pass is 17.
   $(27 \text{ eligible to vote} - 2 \text{ not returned} - 0 \text{ abstentions} = 25 \times 0.66 = 16.5)$

(2) In all cases, an affirmative vote of at least a simple majority of the total membership
    eligible to vote is required. This is the calculation for simple majority:
    $\lceil \frac{27 \text{ eligible}}{2} \rceil = 14$

Reasons for negative votes, etc. from alternate members are not included unless the ballot from
the principal member was not received.

According to the final ballot results, the ballot received the necessary $2/3$ required affirmative
votes to pass ballot.
MEMORANDUM

To: Gregory Harrington, Staff Liaison for Fire Code Committee

From: G. Colonna, Staff Liaison for Pyrotechnics Committee

Date: July 10, 2009

Subject: Transmittal of Draft Proposals for NFPA 1124 (A11) for review and action by Fire Code Technical Committee

Attached is Draft Proposals (pre-ROP) CP#3 and the letter ballot results for proposed changes to Chapter 7 of NFPA 1124, Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles. This material was developed by the Committee on Pyrotechnics at its February 2 – 3, 2009 meeting in Orlando.

In accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008, this material has been developed as Draft Proposals (pre-ROP) and has been letter balloted through the Committee on Pyrotechnics. In addition to the Draft Proposal, I have also attached the final ballot results indicating that the item achieved the required 2/3rd majority and simple majority with affirmative votes for DRAFT Committee Proposal (DRAFT CP#3). The letter ballot for DRAFT CP#1 and CP#2 achieved 2/3rd majority of those returning ballots, but did not meet the simple majority with affirmative vote requirement (per 3.3.4.5 of the Regulations) thus neither proposal is included for your committee to consider at this time. These two proposals will be returned to the Committee on Pyrotechnics for review and will be letter balloted at some future date. Once they pass ballot with the Committee on Pyrotechnics these items will be forwarded separately for consideration by the Fire Code Committee.

In accordance with the direction of the Council, I am providing you with this information as Staff Liaison to the Fire Code Committee and requesting that you include this as an agenda item for future consideration by the Fire Code Committee. The Task Group leader for the Pyrotechnics Committee for this activity is Tad Trout, American Promotional Events. I am aware that his task group met with your Committee in December 2008 to begin this process. If your Committee has questions on any aspect as presented in the attached Draft Proposal, please contact me or Mr. Trout directly for clarification.

One other informational note – the Committee on Pyrotechnics has scheduled its next meeting for August 30 – September 1 in San Diego. This meeting agenda focuses on the ongoing work by the Committee to address the items outlined in the Council decision regarding NFPA 1124. If there are any agenda items that the Fire Code Committee requests the Pyrotechnics Committee to...
consider, please let me know so I can include them as part of the Committee’s business for this meeting next month.

Thanks for your assistance in this process and thanks to the Fire Code Committee in advance for their efforts to assist with this revision of NFPA 1124. If you have any questions, please contact me.

Enclosures: Draft Committee Proposal (1 items, Draft CP#3)  
Letter Ballot on Draft Committee Proposals, final results (revised)

cc: Linda Fuller, Standards Administration  
J. Moreau-Correia, Project Administrative Supervisor
NFPA 1124-2006
Draft Committee Proposal
Approved for letter ballot at Committee Meeting, February 2 – 3, 2009, Orlando, FL
This action relates specifically to item 6 in the Standards Council Decision, D#08-19 and is to be coordinated with the Fire Code Committee in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Log# Draft CP#3
Submitter: Technical Committee on Pyrotechnics
Recommendation: Add a new 7.3.15.3.2 to read as follows and renumber the remaining paragraphs accordingly:

7.3.15.3.2* Flame breaks shall have a flame break rating of not less than 5 minutes as determined in accordance with NFPA 112X, Standard Method of Fire Test for Flame Breaks.

7.3.15.3.2.1 Combustible flame breaks shall have a flame spread index not greater than 75, as determined in accordance with ASTM E84.

Delete Section 7.3.15.3.8.

7.3.15.3.8 Where both of the facing vertical surfaces of the abutting display fixtures are constructed of perforated hardboard panels not less than ¼ in. (6 mm) thick that are separated from each other by an open space not less than 1 ½ in. (38 mm) wide, a flame break specified in 7.3.15.3.6 shall not be required.

Revise Section 7.3.15.4.2 as follows:

7.3.15.4.2 The 10 percent limitation on the area of holes or other openings in the shelf used to support fireworks display merchandise shall not be applicable under the following conditions:

(1) Where both of the facing vertical surfaces of the abutting display fixtures are constructed of perforated hardboard panels not less than ¼ in. (6 mm) thick and separated from each other by an open space not less than 1 ½ in. (38 mm) wide

(2) where such merchandise is suspended from or fastened to the shelf or surface or is displayed as packaged merchandise on the surface or in bins.
Revise Section A.7.3.15.3 as follows:

A.7.3.15.3 Flame breaks can be constructed of any of the following: The following materials are considered to be suitable for use as flame breaks based on tests conducted at Omega Point Laboratories in 2004 in accordance with Draft Standard NFPA 112?, Standard Method of Fire Test for Flame Breaks, full scale fire tests conducted at Southwest Research Institute in 2007—2008, analysis of the previously noted fire test data, and other sources such as the UL Fire Resistance Directory.

(1) Sheet steel not less than 18 gage
(2) Sheet aluminum not less than 0.010 in. (0.25 mm) thick
(3) Hardboard not less than 1/8 in. (3 mm) thick
(4) Gypsum board not less than 3/8 in. (10 mm) thick (nominal)
(5) Wood panels not less than 1/8 in. (3 mm) thick
(6) Exterior plywood not less than 3/4 1/4 in. (18 6 mm) thick (nominal)
(7) Particleboard not less than 5/8 1/4 in. (15 6 mm) thick (nominal)
(8) Oriented strand board not less than 7/16 in. (10.5 mm) thick (nominal)
(9) Cement fiberboard
(10) Plastic laminate not less than 1/8 in. (3 mm) thick
(11) Safety glass not less than 1/8 in. (3 mm) thick
(12) Other approved material

A.7.3.15.3.1 Where installed within a retail display fixture containing consumer fireworks, the flame break should impede or retard the rapid spread of an incipient fire involving the fireworks and their packaging materials as any of the following occurs:

(1) The fire progresses along a display level or shelf.
(2) The fire attacks another display level or shelf above.
(3) The fire attacks another display fixture abutting the display fixture of origin.

As a result of installing flame breaks to impede fire spread, the quantity and rate of smoke production can be retarded as well. Thus, flame breaks can provide the building occupants with additional time to react to an incipient fire and safely evacuate the building. See Figure A.7.3.15.3.1.
Also, revise the designation for FIGURE A.7.3.15.3 Flame Break Design to FIGURE A.7.3.15.3.1.

**Substantiation:** In Annex A, Section A.7.3.15.3 specifies a list of ten materials that can be used to construct flame breaks. It also provides performance guidance on how the flame breaks are intended to perform to impede or retard the rapid spread of an incipient fire developing within the consumer fireworks on display at retail. Those ten materials were based on the Pyrotechnics TC’s best judgment as to what materials would make satisfactory flame breaks for the purpose of satisfying the requirements of NFPA 1124. It should also be noted that there are two figures related to this Annex note that show what flame breaks look like in a retail sales setting and where they are to be installed.

However, it now appears that some of the materials suggested for flame breaks may not be appropriate to accomplish the intended function. Ad hoc tests conducted under the sponsorship of the American Pyrotechnics Association (APA) at what was then known as Omega Point Laboratories (now Intertek Testing Services) in April 2005 provided very useful information on assessing the performance of flame break materials. The ad hoc tests were based on a draft test method developed by the Pyrotechnics TC Fire Tests Task Group which has been tentatively designated as NFPA 112?, “Standard Method of Fire Test for Flame Breaks.” It is based on UBC Standard 26-2 for evaluating thermal barriers for the protection of foam plastic insulation.

Please refer to the following table for a summary of the materials tested and the results of the tests for determining the “rating” for the flame breaks.

<table>
<thead>
<tr>
<th>Material</th>
<th>Thickness</th>
<th>Ember</th>
<th>Flaming</th>
<th>Temp. Rise</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plywood (exterior)</td>
<td>3/4”</td>
<td>10:33</td>
<td>10:38</td>
<td>13:15</td>
<td>10</td>
</tr>
<tr>
<td>Plywood (exterior) (CD-X)</td>
<td>3/8”</td>
<td>4:15</td>
<td>5:12</td>
<td>4:27</td>
<td>4</td>
</tr>
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<td>Oriented Strand Board (OSB)</td>
<td>7/16”</td>
<td>9:10</td>
<td>9:34</td>
<td>7:55</td>
<td>8</td>
</tr>
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<td>Particle Board</td>
<td>5/8”</td>
<td>16:06</td>
<td>16:24</td>
<td>12:33</td>
<td>12</td>
</tr>
<tr>
<td>Tempered Hardboard</td>
<td>1/4”</td>
<td>4:20</td>
<td>4:27</td>
<td>3:21</td>
<td>3</td>
</tr>
<tr>
<td>Medium Density Fiberboard (MDF)</td>
<td>1/4”</td>
<td>3:38</td>
<td>3:46</td>
<td>2:33</td>
<td>2</td>
</tr>
</tbody>
</table>

It also appears from the full scale fire tests conducted by SWRI that the sheet (steel) metal flame breaks utilized in the gondola tests performed adequately and helped keep the fire from spreading, not only along the shelves past the perpendicular flame break, but also from one side of the gondola to the other where the longitudinal flame breaks were installed. Therefore, it does not appear that using sheet metal
which allows heat conduction, as well as re-radiation of heat as the sheet metal temperature increases due to fire exposure, was a significant factor in the performance of the flame breaks. It should be noted that this was expressed as being a potential problem in the Fire Protection Research Foundation (FPRF) Report referenced in the NFPA SC decision.

Based on the information at hand, Task Group A proposes to revise Chapter 7 of NFPA 1124 to modify the list of recommended materials to those which we believe performed satisfactorily in the ad hoc tests conducted at Omega Point Laboratories in accordance with the proposed test method for flame breaks NFPA 112?, Standard Method of Fire Test for Flame Breaks. We also have proposed to retain some materials in the list based on their performance in the SWRI full scale fire tests or based on their finish ratings as noted in the UL Fire Resistance Directory. The Task Group also proposes to provide a specific reference to the proposed test method within the body of NFPA 1124 so that other flame break materials can be developed to meet the performance criteria. However, the list in the Annex A portion of NFPA 1124 would contain those generic materials which have already been tested to show that they would perform adequately for the purpose of NFPA 1124 flame breaks.

The Task Group A members believe that the 5 minute minimum rating proposed for flame breaks in new Section 7.3.15.3.2 is sufficiently conservative for the proposed use of such flame breaks in Chapter 7 of NFPA 1124. Based on the previously referenced ad hoc test data, this rating rules out not only the 3/8 inch thick exterior plywood as noted above, but also ¼ inch tempered hardboard and ¾ inch medium density fiber board for use as flame breaks. Intuitively, the other materials which achieve a flame break rating of greater than 5 appear to make sense for use as flame breaks. This is purely a judgmental minimum flame break rating which is based on our assessment of the flame break test results and our review of the SWRI full scale fire tests and the other ad hoc tests conducted by the APA at Omega Point Laboratories (now Intertek Testing Services).

Proposed new Section 7.3.15.3.2.1 indicated above has been added to address the potential concerns for spreading a fire via combustible flame breaks which have otherwise successfully passed the performance test for flame breaks discussed earlier. Based on ad hoc tests conducted under the auspices of the American Pyrotechnics Association (APA) at what was then known as Omega Point Laboratories (now Intertek Testing Services), it was noted that the combustible flame breaks appeared in some cases to facilitate the fire spread behind the shelves and to the adjacent shelves as they became
involved in the fire. So placing a maximum flame spread index of 75 on these materials should lessen that possibility. This flame spread index can be readily achieved with traditional combustible materials by simply coating them with a fire retardant treated coating or paint in accordance with the manufacturer’s instructions and the listing for the fire retardant coating or paint.

Based on those same tests, we are also recommending the deletion of Section 7.3.15.3.8 and the deletion of Item (1) of Section 7.3.15.4.2. This will eliminate the allowable use of ¼ inch perforated hardboard panels in lieu of flame breaks. This will also eliminate the exception to the 10% limitation on the area of holes and other openings in shelves which also serve as flame breaks. During the fire tests it was found that these panels were not very effective as flame breaks and also contributed to the growth and spread of the fire.

Committee Meeting Action: Accept
MEMORANDUM

TO: Technical Committee on Fire Code (FCC-AAA)

FROM: Gregory Harrington, P.E., Staff Liaison

DATE: September 15, 2009

SUBJECT: Approval Committee Ballot for NFPA 1124 – Ballot Results

The September 14, 2009 date for receipt of the Approval Ballot for NFPA 1124 has passed. As there were no negative votes, these results are now final.

The results are as follows:

25 Members Eligible to Vote
1 Ballot Not Returned (Fangmann)
22 Affirmative
2 Abstentions (Thornberry and Tidwell)

Abstentions:

Thornberry: I have another client interest in this issue other than the organization I represent on the TC so I am required to abstain by the NFPA regulations governing technical committees.

Tidwell: Being new to the committee, I don’t feel I have enough information to make an informed decision.
An Affirmative Comment submitted by an alternate (S. Clary) whose principal (W. Moore) voted affirmative without comment is being included for informational purposes:

**Clary (Alt.):** The substantiation states that Section A.7.3.15.3 specifies a list of ten materials that can be used to construct flame breaks. Only five are actually listed.

The number of affirmative votes necessary to pass balloting is based on the number eligible to vote, minus the not returned and abstentions. The results show that this Approval Ballot has achieved the necessary 2/3 majority needed to pass ballot: 25 eligible to vote – 1 not returned – 2 abstentions = 22 x .66 = 14.52 (rounded up) to 15. The ballot received 22 affirmative votes. In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required. This criteria has been met.

GH/DM
MEMORANDUM

To: Technical Committee on Pyrotechnics

From: G. Colonna

Date: January 13, 2011

Subject: Draft Proposals Ballot for NFPA 1124 (A12) CP11 and CP12

Attached are the Draft Proposals (pre-ROP) Ballot and ballot material on NFPA 1124, *Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*. This material was developed during the meeting January 13 – 14, 2011 in Arlington, TX based on input from the AUT-SSD technical committee. The ballot is for formally voting on whether or not you concur with the Committee's Actions on these draft proposals. If you do not concur, or you abstain, you **must** provide a technical reason. Following the vote of the Committee, these items and the respective actions will be forwarded to the Sprinkler System Discharge Committee (responsible for NFPA 13 sprinkler design criteria) in accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for correction.

Please return your ballot as soon as possible, but no later than **Monday, January 24, 2011**. This ballot has a short response time because it has been approved by those members of the Committee attending the meeting in Arlington and in order to meet the February 10 – 11, 2011 ROP meeting schedule for the AUT-SSD Committee. For action by the Committee that passes the attached DRAFT Committee Proposals, the proposals will be presented to the NFPA 13, AUT-SSD Committee for review and action.

Your cooperation in meeting this deadline is appreciated. If you wish to fax your ballot, please fax to **(617) 984-7110**.

**Note:** Please remember that the return of ballots and attendance at Committee Meetings are required for all principal and alternate members in accordance with the Regulations Governing Committee Projects.

**Enclosures:**
- Ballot Form
- Draft Committee Proposals

**cc:** Linda Fuller, Standards Administration
J. Goyette, Project Administrative Supervisor
DRAFT PROPOSAL BALLOT DUE BY:
Monday, January 24, 2011
NFPA 1124 PYR-AAA
Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles
Staff Liaison: Guy R. Colonna

Return Completed Ballot To: J. Goyette
E-Mail to jgoyette@nfpa.org
Fax to 617-984-7110
One Batterymarch Park, Quincy, MA 02169

Date: _____________________ Signed: _____________________________________________

Name: ____________________________________
Type or Print black ink

Committee Action Key:
A = Accept
R= Reject
APA = Accept in Part
APR = Accept in Principle
APP = Accept in Principle in Part
H = Hold

With respect to the Committee Actions on the DRAFT Proposals that accompanied
the ballot, please record me as voting: (check one):

☐ Affirmative On All Items. I agree with all committee meeting actions without comment.

☐ Affirmative With Exception(s): I agree with all committee meeting actions Except
for the Affirmative with comment, Negative and /or Abstention checked below.

*Reasons must accompany these votes.
When possible, reasons are requested via e-mail in a Word Document.

Please return this Ballot Page only to NFPA.

<table>
<thead>
<tr>
<th>Log No.</th>
<th>Section</th>
<th>Committee Action</th>
<th>Affirmative with Comment*</th>
<th>Negative*</th>
<th>Abstain*</th>
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<tr>
<td>Draft CP#11</td>
<td>6.5.1.1</td>
<td>Reject</td>
<td></td>
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</tr>
<tr>
<td>Draft CP#12</td>
<td>7.3.6.1 and A.7.5.1.1</td>
<td>Reject</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
NFPA 1124-2006
Draft Committee Proposals
Approved for letter ballot at the Committee Meeting held January 13 – 14, 2011, in Arlington, TX. These actions relate to item 9 in the Standards Council Decision, D#08-19 and are to be coordinated with the Sprinkler System Discharge Committee in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Log# DRAFT CP#11
Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that paragraph 6.5.1.1 be revised as shown:

6.5.1.1: The automatic sprinkler system shall be designed using the following criteria for the areas in which the consumer fireworks are stored in DOT-approved packaging:

(1) Consumer fireworks stored in DOT-approved packaging shall be considered as a Class IV commodity.
(2) Consumer fireworks stored to a height not greater than 10 ft. (3 m) in racks, or 12 ft. (3.7 m) otherwise, shall be classified as an Ordinary Hazard (Group 2) Extra Hazard (Group 1) occupancy.
(3) Consumer fireworks stored to a height not greater than 12 ft. (3.7 m) in racks, but greater than 10 ft. (3 m) shall be classified as an Extra Hazard (Group 12) occupancy.
(4) Consumer fireworks stored to a height greater than 12 ft. (3.7 m) shall be protected by an automatic sprinkler system designed using early suppression fast-response (ESFR) sprinklers a fire control approach or a special design approach in accordance with NFPA 13, Standard for the Installation of Sprinkler System.

Substantiation:
The NFPA Pyrotechnics Technical Committee (TC) established a task group responsible for coordinating review of issue #9 of the Standards Council Decision, D#08-19 October 1, 2008 with the Technical Committee on Sprinkler System Discharge responsible for sprinkler design criteria for NFPA 13. Discussion between the respective task groups for each committee forms the basis for the proposed action. Due to recent discussions between the Committee on Pyrotechnics and the Committee on Automatic Sprinkler – Sprinkler System Discharge Technical Committee, the current sprinkler design criteria in NFPA 1124 have been called into question. This proposal recommends a more conservative approach, but has not been technically substantiated as required by the Standards Council decision so the action by the committee at this time is to act to reject the Committee Proposal.

The Committee is recommending rejection of this proposal because the Committee believes that, based upon discussions with the NFPA 13 Sprinkler System Discharge Technical Committee (AUT-SSD), further technical substantiation is required to be determined through fire testing under the auspices of the Fire Protection Research Foundation (FPRF). The purpose of this further testing is to determine the appropriate sprinkler design criteria that will provide an adequate level of protection in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.
By taking this approach, the Committee intends to have a fire testing program implemented through the FPRF that will involve both technical committees, other experts, and other interested parties as determined by the FPRF as appropriate. Both the AUT-SSD TC and the PYR-AAA TC realize that because of the timing of the current cycle and the deadlines imposed by Standards Council Decision 08-19 this approach is necessary. This will allow time for the FPRF project to be implemented with the hope that conclusive results will be available in time for the ROC.

**Committee Meeting Action:** Reject
Add a new 7.3.6.1 as shown:

7.3.6.1 Sprinkler Design Criteria.
The automatic sprinkler system shall be designed based on the requirements for an Extra Hazard (Group 2) occupancy in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

Delete A.7.5.1.1:

A.7.5.1.1 Preliminary results of recent full scale fire tests indicate that automatic sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, might be suitable for protecting retail displays of consumer fireworks where the ceiling height does not exceed 10 ft (3.1 m) and might also be adequate for ceiling heights up to 16 ft (4.9 m). This implies that there may be a need to design the sprinkler system in new buildings for an Extra Hazard, Group 1 occupancy for ceiling heights greater than 16 ft (4.9 m). For existing buildings, existing sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy should suffice. Until such time as additional fire testing is completed and more conclusive design criteria can be verified, designers of automatic sprinkler systems for areas where retail sales of consumer fireworks are located may want to consider these design criteria. For additional information contact the American Pyrotechnics Association (APA), PO Box 30438, Bethesda, MD 20824.

Substantiation:

Due to recent discussions between the Committee on Pyrotechnics and the Committee on Automatic Sprinkler – Sprinkler System Discharge Technical Committee, the current sprinkler design criteria in NFPA 1124 have been called into question. This proposal recommends a more conservative approach, but has not been technically substantiated as required by the Standards Council decision so the action by the committee at this time is to act to reject the Committee Proposal.

The Committee is recommending rejection of this proposal because the Committee believes that, based upon discussions with the NFPA 13 Sprinkler System Discharge Technical Committee (AUT-SSD), further technical substantiation is required to be determined through fire testing under the auspices of the Fire Protection Research Foundation (FPRF). The purpose of this further testing is to determine the appropriate sprinkler design criteria that will provide an adequate level of protection in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

By taking this approach, the Committee intends to have a fire testing program implemented through the FPRF that will involve both technical committees, other experts, and other interested parties as determined by the FPRF as appropriate. Both the AUT-SSD TC and the PYR-AAA TC realize that because
of the timing of the current cycle and the deadlines imposed by Standards Council Decision 08-19 this approach is necessary. This will allow time for the FPRF project to be implemented with the hope that conclusive results will be available in time for the ROC.

Committee Meeting Action: Reject.
MEMORANDUM

To: Matthew Klaus, Staff Liaison for Sprinkler System Discharge Criteria Committee

From: G. Colonna, Staff Liaison for Pyrotechnics Committee

Date: February 4, 2011

Subject: Transmittal of Draft Proposals for NFPA 1124 (A12) for review and action by Sprinkler System Discharge Criteria Technical Committee (AUT-AAA)

Attached are Draft Proposals (pre-ROP) CP#11 and CP#12, and the letter ballot results for proposed changes to Chapter 6 and 7 of NFPA 1124, *Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*. This material was developed by the Committee on Pyrotechnics at its January 13 – 14, 2011 meeting in Dallas, TX based on input from the AUT-SSD Technical Committee during discussions at the December 2010 pre-ROP meeting.

In accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008, this material has been developed as Draft Proposals (pre-ROP) and has been letter balloted through the Committee on Pyrotechnics. In addition to the Draft Proposals, I have also attached the final ballot results indicating that the items achieved the required 2/3rd majority and simple majority with affirmative votes for DRAFT Committee Proposals (DRAFT CP#11 and DRAFT CP#12).

In accordance with the direction of the Council, I am providing you with this information as Staff Liaison to the Committee on Sprinkler System Discharge Criteria and requesting that you include this as an agenda item for future consideration by the Sprinkler System Discharge Criteria Technical Committee. The Task Group leader for the Pyrotechnics Committee for this activity is Jerry Farley. If the Committee has questions on any aspect as presented in the attached Draft Proposal, please contact me or Mr. Farley directly for clarification.

Thanks for your assistance in this process and thanks to the Sprinkler System Discharge Criteria Technical Committee in advance for their efforts to assist with this revision of NFPA 1124. If you have any questions, please contact me.

Enclosures: Draft Committee Proposals (2 items, Draft CP#11 and Draft CP#12)
Letter Ballot on Draft Committee Proposals, final results

cc: Linda Fuller, Standards Administration
J. Goyette, Project Administrator
NFPA 1124-2006
Draft Committee Proposals
Approved for letter ballot at the Committee Meeting held January 13 – 14, 2011, in Arlington, TX.
These actions relate to item 9 in the Standards Council Decision, D#08-19 and are to be coordinated with the Sprinkler System Discharge Committee in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Log# DRAFT CP#11
Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that paragraph 6.5.1.1 be revised as shown:

6.5.1.1: The automatic sprinkler system shall be designed using the following criteria for the areas in which the consumer fireworks are stored in DOT-approved packaging:
(1) Consumer fireworks stored in DOT-approved packaging shall be considered as a Class IV commodity.
(2) Consumer fireworks stored to a height not greater than 10 ft. (3 m) in racks, or 12 ft. (3.7 m) otherwise, shall be classified as an Ordinary Hazard (Group 2) Extra Hazard (Group 1) occupancy.
(3) Consumer fireworks stored to a height not greater than 12 ft. (3.7 m) in racks, but greater than 10 ft. (3 m) shall be classified as an Extra Hazard (Group 1) occupancy.
(4) Consumer fireworks stored to a height greater than 12 ft. (3.7 m) shall be protected by an automatic sprinkler system designed using early suppression fast-response (ESFR) sprinklers a fire control approach or a special design approach in accordance with NFPA 13, Standard for the Installation of Sprinkler System.

Substantiation:
The NFPA Pyrotechnics Technical Committee (TC) established a task group responsible for coordinating review of issue #9 of the Standards Council Decision, D#08-19 October 1, 2008 with the Technical Committee on Sprinkler System Discharge responsible for sprinkler design criteria for NFPA 13. Discussion between the respective task groups for each committee forms the basis for the proposed action. Due to recent discussions between the Committee on Pyrotechnics and the Committee on Automatic Sprinkler – Sprinkler System Discharge Technical Committee, the current sprinkler design criteria in NFPA 1124 have been called into question. This proposal recommends a more conservative approach, but has not been technically substantiated as required by the Standards Council decision so the action by the committee at this time is to act to reject the Committee Proposal.

The Committee is recommending rejection of this proposal because the Committee believes that, based upon discussions with the NFPA 13 Sprinkler System Discharge Technical Committee (AUT-SSD), further technical substantiation is required to be determined through fire testing under the auspices of the Fire Protection Research Foundation (FPRF). The purpose of this further testing is to determine the appropriate sprinkler design criteria that will provide an adequate level of protection in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.
By taking this approach, the Committee intends to have a fire testing program implemented through the FPRF that will involve both technical committees, other experts, and other interested parties as determined by the FPRF as appropriate. Both the AUT-SSD TC and the PYR-AAA TC realize that because of the timing of the current cycle and the deadlines imposed by Standards Council Decision 08-19 this approach is necessary. This will allow time for the FPRF project to be implemented with the hope that conclusive results will be available in time for the ROC.

Committee Meeting Action: Reject
Log# Draft CP#12
Submitter: Technical Committee on Pyrotechnics

Recommendation:

Add a new 7.3.6.1 as shown:

7.3.6.1 Sprinkler Design Criteria.

The automatic sprinkler system shall be designed based on the requirements for an Extra Hazard (Group 2) occupancy in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

Delete A.7.5.1.1:

A.7.5.1.1 Preliminary results of recent full scale fire tests indicate that automatic sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, might be suitable for protecting retail displays of consumer fireworks where the ceiling height does not exceed 10 ft (3.1 m) and might also be adequate for ceiling heights up to 16 ft (4.9 m). This implies that there may be a need to design the sprinkler system in new buildings for an Extra Hazard, Group 1 occupancy for ceiling heights greater than 16 ft (4.9 m). For existing buildings, existing sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy should suffice. Until such time as additional fire testing is completed and more conclusive design criteria can be verified, designers of automatic sprinkler systems for areas where retail sales of consumer fireworks are located may want to consider these design criteria. For additional information contact the American Pyrotechnics Association (APA), PO Box 30438, Bethesda, MD 20824.

Substantiation:

Due to recent discussions between the Committee on Pyrotechnics and the Committee on Automatic Sprinkler – Sprinkler System Discharge Technical Committee, the current sprinkler design criteria in NFPA 1124 have been called into question. This proposal recommends a more conservative approach, but has not been technically substantiated as required by the Standards Council decision so the action by the committee at this time is to act to reject the Committee Proposal.

The Committee is recommending rejection of this proposal because the Committee believes that, based upon discussions with the NFPA 13 Sprinkler System Discharge Technical Committee (AUT-SSD), further technical substantiation is required to be determined through fire testing under the auspices of the Fire Protection Research Foundation (FPRF). The purpose of this further testing is to determine the appropriate sprinkler design criteria that will provide an adequate level of protection in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

By taking this approach, the Committee intends to have a fire testing program implemented through the FPRF that will involve both technical committees, other experts, and other interested parties as determined by the FPRF as appropriate. Both the AUT-SSD TC and the PYR-AAA TC realize that because
of the timing of the current cycle and the deadlines imposed by Standards Council Decision 08-19 this approach is necessary. This will allow time for the FPRF project to be implemented with the hope that conclusive results will be available in time for the ROC.

Committee Meeting Action: Reject.
MEMORANDUM

TO: NFPA Technical Committee on Pyrotechnics
FROM: Joanne Goyette
DATE: February 4, 2011
SUBJECT: NFPA 1124 A12 Draft Ballot Final Results – CP11 and CP12

The Final Results of the NFPA 1124 Draft Ballot are as follows:

32 Members Eligible to Vote
3 Not Returned (G. Dean, P. Grucci, and M. Yarbrough)
0 Negatives
0 Abstentions

There are two criteria necessary to pass ballot [(1) affirmative \(\frac{2}{3}\) vote and (2) simple majority].

(1) The number of affirmative votes needed for the proposal/comment to pass is 20.
   \[32 \text{ eligible to vote} - 3 \text{ not returned} - 0 \text{ abstentions} = 29 \times 0.66 = 19.14\]

(2) In all cases, an affirmative vote of at least a simple majority of the total membership
   eligible to vote is required. This is the calculation for simple majority:

   \[32 \text{ eligible} \div 2 = 16 + 1 = (17)\]

Reasons for negative votes, etc. from alternate members are not included unless the ballot from
the principal member was not received.

According to the final ballot results, all ballot items received the necessary \(\frac{2}{3}\) required
affirmative votes to pass ballot.
DRAFT PROPOSAL BALLOT DUE BY:
Monday, January 24, 2011
NFPA 1124 PYR-AAA
Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles
Staff Liaison: Guy R. Colonna

Return Completed Ballot To: J. Goyette
E-Mail to jgoyette@nfpa.org
Fax to 617-984-7110
One Batterymarch Park, Quincy, MA 02169

Date: 1/14/2011 Signed: [Signature]

Name: JOHN KITCHENS
Type or Print black ink

Committee Action Key:
A = Accept
R= Reject
APA = Accept in Part
APR = Accept in Principle
APP = Accept in Principle in Part
H = Hold

With respect to the Committee Actions on the DRAFT Proposals that accompanied the ballot, please record me as voting: (check one):

☑ Affirmative On All Items. I agree with all committee meeting actions without comment.

☒ Affirmative With Exception(s): I agree with all committee meeting actions Except for the Affirmative with comment, Negative and /or Abstention checked below.

*Reasons must accompany these votes.
When possible, reasons are requested via e-mail in a Word Document.

Please return this Ballot Page only to NFPA.

<table>
<thead>
<tr>
<th>Log No.</th>
<th>Section</th>
<th>Committee Action</th>
<th>Affirmative with Comment*</th>
<th>Negative*</th>
<th>Abstain*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft CP#11</td>
<td>6.3.1.1</td>
<td>Reject</td>
<td>☐</td>
<td>☒</td>
<td></td>
</tr>
<tr>
<td>Draft CP#12</td>
<td>7.3.6.1 and A.7.5.1.1</td>
<td>Reject</td>
<td>☐</td>
<td>☒</td>
<td></td>
</tr>
</tbody>
</table>
NFPA 1124 committee
Draft CP #11 and #12

Affirmative with comment

Comment:

I will accept the committee's proposal as reject the proposed amendments for the stated purpose of further review and study to develop the proper criteria and justification for the increased safety provided by a change in the automatic sprinkler requirement.

I am a strong proponent of automatic sprinklers, as is the NFPA in general. I support effective and sensible installation and use of automatic sprinklers for all occupancies (as content appropriate). If the rejection of this more comprehensive proposal will make for a more effective fire protection system, then I agree. However, this vote of rejection is based upon the trust and assumption that such testing and evaluation will take place, and a thorough report to be presented.

While I lean toward a more conservative approach and fire protection, a properly conducted evaluation and testing process will help us determine the true needs for automatic fire suppression systems.

There is no time frame listed for the further testing. Is there a plan and proposal for testing, and time needed to conduct such tests? I am willing to be involved in the testing process and development. I trust the testing process is not "open-ended".

John Kitchens, member
NFPA Pyrotechnic committee.
TC on Sprinkler System Discharge Criteria  
ROP Meeting  
Savannah Riverfront Marriott  
100 General McIntosh Blvd  
Savannah, GA  
February 10-11, 2011

Attendees:

See attached sign-in sheet.

1. Ken Linder called the meeting to order at 8:00 am and began introductions.

2. The December 2010, Pre-ROP minutes were approved.

3. Richard Bielen gave the staff report and a presentation on the meeting procedures. He also reviewed the dates of the cycle.

4. Ken Linder then discussed the logistics for the meeting and his process to complete the ROP.

5. The committee then processed the proposals. See the ROP for the official actions on the proposals.

6. Old business. Extract Task Group: A. Christine LaFleur reported that there are many questionable extracts. She solicited assistance to go over all the extracts and update as necessary. Richard Pehrson offered to assist where he could. Annex D.1 was identified as being out of date.

The Pyrotechnics Task Group: Jerald Farley, representing the Pyrotechnics Committee reported on the proposed action on NFPA 1124. Mr. Farley reported that the Pyrotechnics committee drafted two committee proposals, CP#11 and CP#12. These committee proposals changed the hazard classification in 6.5.1.1, added a new section 7.3.6.1 for sprinkler design criteria and deleted section A.7.5.1.1. The Pyrotechnics committee voted to reject CP#11 and CP#12. The Technical Committee on Sprinkler Discharge Criteria made a motion to support the rejection of CP#11 and CP#12. The TC will be balloted on this action.

The Technical Committee on Sprinkler Discharge Criteria also made a motion to submit a public comment to the Pyrotechnics Committee to delete section 6.5.1.1 (replace with “Reserved”) and delete A.7.5.1.1 of NFPA 1124 and to add new annex material to sections A.6.5.1.1 and A.7.3.6. The two new annex sections will address the fact that the existing sprinkler protection criteria is not adequately substantiated and the appropriate fire protection criteria needs to be determined.
after a careful analysis is conducted by a fire protection engineer. The committee realizes there are different scenarios and the protection criteria may be different for each. This will be the recommendation until there is some testing/documentation provided to substantiate the protection criteria based upon technical data such as fire testing.

HVLS Task Group: Garner Palenske reported to the committee on this project. There are a few code changes necessary such as defining a fan diameter. Mr. Palenske will send the final report to staff my Monday, February 14, 2011.

Metric Task Group: Bo Hjorth reported on this task group. He reviewed the rules for conversions and rounding. He also discussed nominal values and how and when to use these numbers. (See attachment B)

7. New business. The committee discussed the commentary in the NFPA Handbook. Section 3.3.4, Ceiling Pocket commentary is not correct and needs to be revised.

8. The ROC meeting is scheduled for September 22-23, 2011 in Newport Beach, CA

9. Meeting adjourned at 2:30 pm.
MEETING MINUTES

1. Call to Order. TC Chair Ken Linder called the meeting to order at 8:00 (9/22/11).

2. Self-Introductions of members and guests. Members of the committee introduced themselves and reviewed the contact information. The meeting attendance list is attached to these minutes.

3. Review of Distributed Meeting Materials. Staff Liaison Matt Klaus provided an overview of the agenda materials that were sent to the committee and posted on the committee web page.

4. Approval of A12-ROP Draft Meeting Minutes. The minutes of the A12-ROP Meeting were reviewed and approved without modification.

5. Review of Meeting Procedures and Revision Process. Matt Klaus gave a presentation on the overall meeting guidelines and the NFPA Regulations Governing TC operations.

6. FPRF Presentation. NFPA 1124 Pyro Presentation – Garner Palenske, Aon

   Garner Palenske presented Aon's research on pyrotechnic storage arrangements and sprinkler protection. Garner presented a proposed testing plan that could be used to develop sprinkler requirements for pyrotechnic storage/display. The TC anticipates that the testing will be conducted in the near future, but will most likely not be finished by the time the next editions of NFPA 13 and 1124 are released. Bill Koffel will address the NFPA 1124 TC with an interim solution that requires a design professional to produce a performance-based design plan for these occupancies, as no adequately justified prescriptive design criteria exists at this time.

7. Work Load. TC Chair Ken Linder discussed the logistics for the meeting and the process to complete the ROC meeting.
8. **Public and Committee Comments.** The committee then processed the comments. See the ROC for the official actions on the proposals.

9. **New Business:**
   
a. The TC discussed forming a task group with the SSI TC to review requirements for open grating.

10. **Adjournment.** Meeting adjourned at 7:30 pm (9/23/11).
October 23, 2012

Ms. Amy Cronin
Secretary
Standards Council
National Fire Protection Association
1 Batterymarch Park
Quincy, MA  02069

RE: D#12-4 – Issuance of NFPA 1124

Dear Ms. Cronin:

As you know, the Appeal filed by the American Pyrotechnics Association (APA) requests that the Council consider extending the time limit included in the “Direction for Further Processing”. Support for the extended time period has been provided by the APA. As the code consultant for the APA, the following information is being provided for your consideration during the upcoming Hearing.

At the October meeting of the APA Codes Committee, the issue of funding was discussed. Although the industry has pledged to support the project with some financial contributions and approximately $500,000 of product to be tested, there is little support from any other interested parties. The insurance companies that underwrite consumer fireworks retail facilities not only are uninterested in contributing to the research project; some have indicated that they see no need for the research to be conducted. There has also been no support pledged from either the retailers or the sprinkler industry, both of whom are impacted by the issue.

Therefore, an alternative test strategy has been explored. As we understand it, the Council is seeking fire test data to support the design criteria for the sprinkler systems protecting such facilities. There are three standard tests that have been used to evaluate commodity classifications (FM 4995, UL 2335, and SP Report 1993:70). The three test procedures are very similar. The test procedures were originally used to evaluate pallets but have subsequently been used to evaluate the density required to protect various commodities. We have contacted two laboratories and, as of this date, have received a favorable response from at least one laboratory which not only believes the tests will serve the purpose intended but has provided the APA with a fee proposal to perform the tests. Based upon the fee proposal, the costs of these tests will be less than 20% of the costs of the test protocol established by The Fire Protection Research Foundation (FPRF). It is my understanding that the APA has indicated an ability to financially support the alternative test protocol.

Whereas the Appeal Hearing will be discussing the “Directions” issued by the Council and whereas the “Directions” specifically reference the FPRF test protocol, APA would like to clarify that the intent of the Council is that sprinkler design criteria be established using a valid test procedure and the test procedure need not necessarily be the FPRF procedure. While the alternate test procedure can be implemented and
completed in a shorter time period, we would still respectfully request an extension of time. Prior to performing the tests, the APA will seek input regarding the alternate test procedure from the responsible National Fire Protection Association (NFPA) Technical Committees. While PYR meets November 1-2, 2012, the next scheduled meeting of SSD is July, 2013. The APA proposes to submit to SSD for review and comment the test procedure and a detailed description of the commodities to be tested and the rationale behind selecting the commodities for testing. The APA further proposes that the test program be ready to commence upon receipt of the comments from SSD. Therefore, unless SSD were to hold a special meeting for the purpose of reviewing the proposed test program, the testing will have commenced by August 2013 but will not yet be complete.

On behalf of the APA, we thank you for your consideration of the revised timeframe for completing the test program and for the use of an alternate test procedure -- one that has already been used to determine sprinkler design criteria for other commodities.

Respectfully submitted,

William E. Koffel, P. E., FSFPE
President
Licensed in: DC, MD, NY, OH, PA, VA, WA

cc: Julie Heckman, American Pyrotechnics Association
Hi Bill,

For standard commodity classification testing, we build a 2 x 2 x 2-high palletized (since this is usually for the purposes of addressing protection in a storage occupancy) array of commodity. We may be able to modify that a little bit if you want to try and learn about the effect of mitigation strategies in a retail occupancy, but it will be more difficult to accomplish that with the standard commodity classification testing.

In these standard tests, you conduct a minimum of three tests for each different commodity. The tests are the same, except for the amount of water you apply to the fire. During the test, you measure heat release rate and you calculate four specific parameters related to HRR. You then look up a ranking in a table in the standard (FM 4995 or UL 2335 – we would likely reference the UL standard, since FM has moved away from the 4995 test and gone to the 4996 test, which is more of a large-scale fire suppression test – no HRR measurements) by cross-referencing each HRR parameter within each table for a given applied water density. The available water densities are 0.11, 0.21, 0.31 and 0.39 gpm/ft². So, if they wind up needing a water density closer to the high end of this range of water densities, they might not be able to look up a ranking (the average of the three rankings is the commodity classification). I’ve attached FM 4995 for your reference (they are free on FM’s website, but I’m not sure if you can get this one anymore). You will notice that this standard was developed for idle plastic pallets and the idea of using this procedure for any commodity is more obvious in the UL standard, but that is copyrighted.

So, back to your question. Depending on how many ‘different’ commodities you planned on testing, the total amount of required material can change quite a bit. If you want to be able to run the standard test and calculate a commodity classification ranking based on the lookup tables in FM 4995 or UL 2335 (they are the same in both standards), then you need to plan on 24 pallet loads of each ‘different’ commodity per test series. If you think you can make some decisions based on individual tests and don’t need to rely on the lookup tables, then you can save quite a bit of material and only use 8 pallet loads for each ‘different’ commodity. By the way, I keep putting different in quotation marks, since the packaging strategy may dictate that you consider the same firework commodity in two different packaging arrangements to be ‘different commodity.’

I think you could likely learn a lot by performing custom commodity classification tests, where you don’t rely on the lookup tables to calculate a conventional commodity classification and instead adjust the parameters of the test to reproduce potential sprinkler protection schemes in the field. For each standard test, we are not using an actual sprinkler system. Instead, the standard prescribes that you put a ‘water applicator system’ over the product array and manually activate it when you would have activated a real sprinkler with certain response characteristics, located a certain distance above the array under a flat ceiling. So, we have the ability to change these parameters (activation temperature, RTI, radial distance, elevation distance and water density) to nominally reproduce the real fire scenario, but once you do that, you are just running custom tests and you can’t use the lookup tables for determination of commodity classification, since they are built on these parameters being fixed.

Let me know if you have any follow-up questions and if you would want to have a phone call about this testing.

Best regards,

Jason
Subject: RE: Commodity Testing

Hello Bill,

As you are aware, I have done some testing for the fireworks industry but I do not consider myself knowledgeable enough about the product or sprinkler design to make such a statement. A better approach would be to engage some of the experts in the industry like John Conkling, and get their endorsement. I am afraid that an endorsement from us would not mean a lot since we are testing experts and not subject matter experts or design professionals. We would be happy to review a test plan, comment on the ability to execute such a test, and identify any gaps in the testing.

I am going to defer to Jason for comment on the amount of product needed. He is more familiar with sprinkler and commodity classification testing and would likely be the program manager for this project.

Thank you,

Barry Badders

---

Subject: FW: Commodity Testing

Barry,

We are preparing a submittal to the NFPA Standards Council to use standard commodity testing in lieu of the FPRF test protocol. It would be helpful if you could provide me with a letter indicating that the test procedure should be acceptable for determining the sprinkler design criteria for consumer fireworks in storage and displayed on retail shelves.

In addition, and separately, how much product will be needed to perform the requisite number of tests.
Thanks.

Bill

From: William Koffel  
Sent: Thursday, October 04, 2012 1:54 PM  
To: 'Badders Jr, Barry L.'  
Subject: Commodity Testing

Barry,

If requested, would you be willing to provide a letter indicating that SwRI believes that standard commodity testing can be used to determine the sprinkler design criteria for retail sales and storage of consumer fireworks?

Bill

William E. Koffel  P.E., FSFPE  
President  
Licensed in DC, MD, NY, OH, PA, VA, WA  
KOFFEL ASSOCIATES, INC.  
8815 Centre Park Drive / Suite 200 / Columbia, MD 21045–2107  
wkoffel@koffel.com  
www.koffel.com  
Fire Protection Engineers: Expertly Engineering Safety From Fire

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Bill,

Yeah, I can see why they would say that (not wanting to mix research with regulatory testing), although I think it’s a little funny since these procedures are interconnected. This SP report is from research performed in the 90’s to see if Europe could use the same approach as FMRC to classify commodities. Of course, this method (FM 4995) was also really developed for evaluating pallets, but it’s a bit short-sighted to think that is all it could be used for and FM used it for a variety of other commodities, which they used as calibration cases for the development of the ranking tables (see page 16 of FM 4995).

The SP report details comparative tests between US pallet and EUR pallets as well as several ‘standard’ commodities, such as those calibration cases (some of which are used as examples in NFPA 13). They used the same ranking tables as in FM 4995. UL developed their own test standard and basically used the approach described in the SP report, which uses the approach taken in FM 4995 and all three documents have the same ranking tables, although there is at least one typo in the UL table for 0.21 gpm/ft², and the UL report only provides lookup values to a ranking of 5.0, rather than 7.0 or Ex, as in the FM and SP documents.

So, you could present it as performing the tests as described in the SP report, if that will be received better from NFPA and Industry, but it won’t effectively change your plan. I do still think it would be a good idea to plan to perform 1-2 full-scale tests (as opposed to the 10 that were described in the test plan), so that you can justify some real link between this type of test setup and a real fire scenario, but that may be a budgetary decision.

Thanks,
Jason
September 28, 2012

Amy Beasley Cronin  
Secretary, Standards Council  
National Fire Protection Association  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169-7471

Re: Standards Council Decision (Final): D#12-4

Ms. Cronin,
As a member of the Consumer Fireworks Industry, I feel compelled to provide my opinion on the Decision referenced above regarding fire testing to determine fire sprinkler design criteria in a storage and/or retail fireworks store.

I am a Commercial Insurance Professional and work closely with the consumer fireworks industry in facilitating the placement of all lines of commercial insurance, from Liability, Property and Stock to Workers Compensation and Auto. In my experience, insurance carriers underwrite consumer fireworks risk based on their own set of underwriting guidelines. These guidelines do not require a building to maintain a sprinkler system. This being said, there is little logic in requesting the insurance carriers to financially support the decision to require additional sprinkler testing.

In addition, the appeal to revise the time frame for testing should be granted based on the time deficiency remaining in the schedule set forth. There is simply not enough time to order, manufacture and deliver product specifically set aside for testing.

Thank you in advance for taking the time to consider message.

Regards,

Charles F. Branyon  
McGriff, Seibels & Williams, Inc.
My name is Dr. John Conkling. I am the retired Executive Director of the American Pyrotechnics Association, a chemist who specializes in pyrotechnics, and a 31-year member of the NFPA Technical Committee on Pyrotechnics. I also served for 2 years as Chairman of the special Fire Test Task Group of the Committee on Pyrotechnics that was charged with developing test methods to support requirements found in NFPA 1124-2006 for covered fuse, fireworks packaging, and flame breaks.

The task group spent several years developing test methods, performing numerous ad-hoc tests to see if we were heading in the right direction, and then planning and executing a series of fire tests at Southwest Research Institute in 2007-2008, with funding provided by the American Fireworks Standards Laboratory, to examine the effectiveness of the NFPA 1124 requirements for the retail sale of consumer fireworks. The task group consisted of representatives from the fire service, the Federal government, and the fireworks industry.

Our first challenge was to develop the desired outcome should a fire commence in a consumer fireworks retail sales facility. From Day 1, our strategic goal was to provide for life safety, with property protection a secondary concern. Sales facilities are required to be one-story in design. NFPA1124 has requirements for exits and exit travel distance that meet or exceed the Life Safety Code requirements, as well as a number of other requirements addressing life safety. Should a fire begin, our first goal is to enable the safe egress of everyone from the fireworks sales area. Sprinklers can then function to help control the fire. Saving property, while important, is of much lesser importance than saving lives.

We spent a significant amount of time on the topic of how much time we were seeking to allow for safe egress to occur, and we concluded that there should be a minimum time of approximately 3 minutes from the first indication of a fire to a point where egress from the fireworks sales area might be problematic.

We wished to reach – and hopefully exceed – this figure with a combination of methods, including fuse covers to retard ignition of devices in an incipient fire, flame breaks to slow the spread of fire along a row of products, and sturdy packaging to keep fireworks devices contained rather than scattered in a developing fire. Containment of aerial devices – another 1124 requirement - was also employed in some tests. Our final protective measure – sprinklering – was viewed by the task group as a second-phase response to the fire, to help control the fire after all persons had safely evacuated the fire area.
A full range of consumer fireworks – approximately 2,000 pounds per test - were used in the Southwest Research testing, in percentages that represented the respective quantities of the various types of devices that are sold in this country. A total of 12 fire tests were performed at SWRI. A significant percentage of the devices used in the tests were aerial-type fireworks. The Southwest Research tests are the only tests that have ever been performed on consumer fireworks in this country where all the products were all clearly identified as legal consumer fireworks, where all products were delivered to the test location in good condition, where all tests used the same product composition, and where the fire safety measures now found in Chapter 7 of NFPA 1124-2013 were employed.

Tests were performed at SWRI with and without the NFPA 1124 Chapter 7 protective measures - including sprinklers - in place. The NFPA has been provided with the Southwest Research Institute report, including all of the supporting fire test data. The SWRI conclusions included a statement to the effect that when all the protective measures in NFPA 1124 were employed, a significant difference in fire growth was observed. The requirements in NFPA 1124, Chapter 7, were shown by the Southwest Research tests to be effective, and this document should be heralded by NFPA as evidence of a significant improvement in fire safety that has been achieved in NFPA 1124-2013.

The future of the important Chapters in NFPA 1124 dealing with retail sales of consumer fireworks and the storage of consumer fireworks is very much in doubt, and is the issue that we are here to discuss today. It makes no sense to me what-so-ever for the NFPA to threaten to revoke the Consumer Fireworks sales and storage chapters in NFPA 1124 due to a perceived lack of sufficient test data to determine appropriate sprinkler systems for these activities. The standard industrial sprinklers used in the SWRI tests worked, when used in combination with the other protective measure in Chapter 7.

The fireworks industry has shown its commitment to testing, and is planning to run commodity classification testing on an appropriate collection of consumer fireworks. This testing would be of significant technical value in further determining appropriate sprinkler protection systems for consumer fireworks. Given the current state of the American economy and the devastating impact that this year's droughts across the country had on fireworks sales, funding for large-scale sprinkler testing will be difficult to obtain in the near future.

The Technical Committee on Pyrotechnics has worked diligently to meet the nine conditions imposed on it by the NFPA regarding documentation validating the content in NFPA 1124. Sprinklers remain the sole point of concern, but the SWRI tests showed that standard industrial sprinklers have a positive effect on fire growth and spread. We urge you to reconsider the conditions you have imposed on NFPA 1124, and urge you not to withdraw the chapters dealing with the storage and retail sale on consumer fireworks. This document contains the only detailed guidance on this commodity provided by any of
the current fire and building codes. Removing the chapters over a concern about one
point - sprinklers - does not seem like an appropriate action to take, and the timetable
for further testing to help determine appropriate sprinkler systems is not feasible in light
of the current state of the economy in general and the economy of the consumer
fireworks industry in particular.

The current version of NFPA 1124-2013 is an excellent document, and the chapters on
consumer fireworks should be retained for reasons of life safety while the sprinkler issue
continues to be studied - a project the fireworks industry is committed to pursue. The
proposed time table for removing the current consumer fireworks chapters, however, just
does not make sense for any logical reason.

Respectfully submitted,

John A. Conkling, Ph.D.
Member, Technical Committee on Pyrotechnics (since 1981)
Executive Director (retired), American Pyrotechnics Association
Ms. Linda Fuller, Manager  
Codes and Standards Administration  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169

RE: Council Decision D#112-4  
NFPA 1124

Dear Ms. Fuller:

We are the representatives of various insurance companies which write both property and liability insurance for members of the American Pyrotechnics Association.

They have requested that we contact you regarding the above decision.

Our Insurers have written this class of business for over 30 years. They have developed extensive knowledge of the exposures involved based on their history of location inspections, loss investigations, etc.

Although, of course, more detailed knowledge is always welcome, the underwriters involved are satisfied that the NFPA standards currently in force are adequate to enable them to continue offering insurance coverage for these risks.

They do not believe that the completion of the proposed tests will result in any significant benefits for members of the fireworks industry as respects either insurance coverage or rates.

Yours sincerely,

A.J. Stringer

AJS/rr
Item 12-10-13
**New Project Initiation Form**

(To be completed by proponent of new project/document)

*Additional pages may be attached if necessary.*

a. **Explain the Scope of the new project/document:**
   
The project shall include the development of documents on installation, signage, use, training, inspection, maintenance, and testing of automatic external defibrillators (AED).

b. **Provide an explanation and any evidence of the need for the new project/document:**
   
   There are currently no NFPA documents addressing the safe installation, signage, use, training, inspection, maintenance, and testing of automatic external defibrillators (AED). There was a recent fatality (Washington, DC, Pentagon Metro Station, April 2012) where an AED was employed which had a dead battery. If there was an NFPA document developed that addresses the inspection, maintenance and testing of these devices, this type of tragedy might be avoided in the future. Additionally, a document addressing safety issues such as placement, installation, signage, and training will provide a baseline for safety of these devices in the field, and will help prevent fatalities in the future. Although there are several manufacturers and the design of the devices varies, there are enough issues that are similar that documents to standardize practice and address safety issues can be developed in the NFPA standards development process.

c. **Identify intended users of the new project/document:**
   
The intended users of the new document on AED installation, signage, use, training, inspection, maintenance, and testing will be used by building and business owners, enforcers and other authorities having jurisdiction, installer/maintainers, emergency responders, manufacturers of the devices and related equipment, research/testing laboratories, insurance, consumers, and special experts.

d. **Identify individuals, groups and organizations that should review and provide input on the need for the proposed new project/document; and provide contact information for these groups:**
   
   Fire service, ambulance service, building inspectors, fire inspectors, building owners, business owners, FEMA, OSHA, GSA, HHS, TSA, airport operators, all military branches, fitness organizations, schools, universities, educational organizations, AED manufacturers, AED installer/maintainers, independent testing laboratories, insurers, faith based organizations, industrial plants, manufacturing plants, merchant marine organizations, offshore platforms, mines, building code organizations, petro-chemical industry, health care facilities, assisted living facilities, nursing homes, and child care facilities.

e. **Identify individuals, groups and organizations that will be or could be affected, either directly or indirectly, by the proposed new project/document, and what benefit they will receive by having this new document available:**
   
   Same groups and organizations that will be or could be affected, either directly or indirectly, by the proposed new project/document are the same as identified in item “d” above.

   The benefit that they will receive is that the current practices that vary widely will be standardized and the level of safety will be improved by the development of a document within the NFPA standards development process. Lives will be saved by having these devices properly installed and maintained with a document providing standardized signage, instructions, training, and use.

f. **Identify other related documents and projects on the subject both within NFPA and external to NFPA:**
   

g. **Identify the technical expertise and interest necessary to develop the project/document, and if the committee membership currently contains this expertise and interest:**

Persons with technical expertise and interest are currently employed at organizations representing manufacturers or AED, AED installer/maintainers, fire service, ambulance service, building inspectors, fire inspectors, building owners, business owners, federal, local, and state agencies, airport operators, military, physical fitness, schools, universities, independent testing laboratories, insurers, faith based, industrial plants, manufacturing plants, merchant marine, offshore platforms, mines, building codes, petro-chemical industry, health care, assisted living, nursing homes, and child care.

h. **Provide an estimate on the amount of time needed to develop the new project/document:**

A draft document could be developed within a year followed by the normal NFPA proposal/comment/appeal period.

i. **Comment on the availability of data and other information that exists or would be needed to substantiate the technical requirements and other provisions of the proposed new project/document:**

Data and information contained in the manufacturers’ literature would be needed to substantiate the technical requirements and other provisions of the proposed new document. Additionally, a review of battery technologies, literature from battery manufacturers, and data and literature from the Fire Protection Research Foundation would be needed to substantiate the technical requirements.

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**Please send your request to:**
NFPA
Codes and Standards Administration
1 Batterymarch Park
Quincy, MA 02169

**Signature:**

**Name:** Mark T. Conroy

(please print)

**Affiliation:** Brooks Equipment Company

**Rev. 10/09**
**Phillips**

- **Battery**: Replace four years after the installation date. Once you install your battery, it should last for four years. We recommend that you take a Sharpie marker and write "Installation date: [your date]" on your battery. (Please note, the battery comes with an "Install By" date pre-printed on it. However, the four-year battery life actually starts once it has been installed, not with the "Install By" date.)
- **Pads**: Replace on the two-year expiration date, as well as after each use. Your AED pads have a two-year life span. The pads come pre-printed with an expiration date.

**Medtronic**

When establishing your local operator maintenance schedule, consider how often the AED is used and how familiar the operators are with AED operation. For example:
- If the AED is used on a weekly basis, daily inspections may be appropriate.
- If the AED is used on a monthly basis, weekly inspections may be appropriate.
- If the AED is used very infrequently, such as once a year, monthly inspections may be appropriate.

Even when properly maintained, SLA (sealed lead acid) battery packs should be replaced every two years or after 200 charge cycles, whichever comes first.

Non-rechargeable lithium sulfur dioxide (LiSO₂) battery pack and non-rechargeable lithium manganese dioxide (LiMnO₂) battery pack:
To properly maintain non-rechargeable lithium battery packs:
- Do not use beyond the expiration date marked on the battery label.

**Heartsine**

Replace battery pack based on expiration date on battery pack.

**LifePak**

Check the “Use By” date on the electrode package.
Consumables pads also have “Use By” date.

**General:**

Periodic test – remove battery and re-install it so that the AED performs a self-check.
Periodic inspection of signage.
September 28, 2012

To:
Mr. James Pauley, Chair
NFPA Standards Council

From:
Chair Greg Noll
NFPA Technical Committee on Hazardous Materials Response Personnel (HCZ-AAA)

Re: Release of NFPA 475 *Recommended Practices for Organizing and Managing a Hazardous Materials/WMD Emergency Response Program*

Mr. Pauley:

The Technical Committee on Hazardous Materials Response Personnel has been preparing a preliminary draft of the document. Recently, the TC was balloted to release the document to the Standards Council. The ballot results are available.

Your approval to release the draft will give opportunity for public input.

Thank you in advance for the Standards Council’s consideration.

Respectfully,

Tom McGowan
Staff Liaison
MEMORANDUM

TO: NFPA Technical Committee on Hazardous Materials Response Personnel
FROM: Stacey Van Zandt
DATE: September 28, 2012
SUBJECT: NFPA 475 Draft Release TC Final Ballot Results

The Final Results of the NFPA 475 (Recommended Practices for Organizing and Managing a Hazardous Materials/WMD Emergency Response Program) Draft Release Letter Ballot are as follows:

32 Members Eligible to Vote
2 Not Returned (Raksnis and Sprifke)
30 Affirmative on All (Uzeloc – affirmative with comment)
0 Negative
0 Abstentions

An affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:

\[ 32 \text{ eligible} \div 2 = 16 + 1 = (17) \]

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.
Technical Committee on Hazardous Materials Response Personnel

Recommended Practices for Organizing and Managing a Hazardous Materials/WMD Emergency Response Program

Approve the preliminary draft of NFPA 475.

X AFFIRMATIVE  _____ NEGATIVE*  _____ ABSTAINING*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a negative or abstaining vote.

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My only comment would be that in order to align with other TC standards in this group there should be Canadian regulatory material included in that section of the draft as well.

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Signature

Ken Uzeloe
Name (Please Print)

September 24, 2012
Date

Please return your ballots not later than Thursday, September 27, 2012.

RETURN TO:
Stacey Van Zandt, Project Administrator
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
svanzandt@nfpa.org  or  FAX: (617-984-7056)
Recommended Practices for Organizing and Managing a Hazardous Materials/WMD Emergency Response Program

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex C. Editorial changes to extracted material consist of revising references to an appropriate division in this document or the inclusion of the document number with the division number when the reference is to the original document. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex C.

Chapter 1 - Administration

1.1 Scope. This recommended practice applies to all entities having responsibility for responding to hazardous materials/WMD incidents and establishes guidelines for the organization and management of the program based on the AHJ’s expected function and assessed level of risk. Preparedness and response functions are specifically covered in this recommended practice.

1.2 Purpose. The purpose of this document is to recommend the minimum program elements necessary for the organization and management of a hazardous material/WMD emergency response program and to specify guidelines for planning and responding to hazardous material/WMD incidents. These recommended practices are not intended to restrict the AHJ from exceeding these requisite elements.

1.3 Application. The recommendations contained in this document apply to those organizations that respond to hazardous materials/WMD incidents in accordance with the AHJ’s functional responsibilities and an acceptable level of response.

Chapter - 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.
2.2 NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

2.3 Other Publications.

2.3.1 U.S. Government Publications.
Title 18, U.S. Code, Section 2332a, “Use of Weapons of Mass Destruction.”

2.3.2 Other Publications.

2.4 References for Extracts in Mandatory Sections. (Reserved)

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* 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.

3.2.4 Shall. Indicates a mandatory requirement.

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

3.2.6 **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* **Allied Professional.** That person who possesses the knowledge, skills, and technical competence to provide assistance in the selection, implementation, and evaluation of mission-specific tasks at a hazardous materials weapons of mass destruction (WMD) incident. [472, 2013]

3.3.2 **Analyze.** The process of identifying a hazardous materials/weapons of mass destruction (WMD) problem and determining likely behavior and harm within the training and capabilities of the emergency responder. [472, 2013]

3.3.3 **Area of Specialization.**

3.3.3.1 **Individual Area of Specialization.** The qualifications or functions of a specific job(s) associated with chemicals and/or containers used within an organization. [472, 2013]

3.3.3.2 **Organization's Area of Specialization.** Any chemicals or containers used by the specialist employee's employer. [472, 2013]

3.3.4 **Awareness Level Personnel.** (29 CFR 1910.120: First Responder at the Awareness Level) Personnel who, in the course of their normal duties, could encounter an emergency involving hazardous materials/weapons of mass destruction (WMD) and who are expected to recognize the presence of the hazardous materials/weapons of mass destruction (WMD), protect themselves, call for trained personnel, and secure the scene. 

*(See Annex H).* [472, 2013]

3.3.5 **CANUTEC.** The Canadian Transport Emergency Center, operated by Transport Canada, which provides emergency response information and assistance on a 24-hour basis for responders to hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.3.6 **CHEMTREC.** The Chemical Transportation Emergency Response Center, a public service of the American Chemistry Council, which provides emergency response information and assistance on a 24-hour basis for responders to hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.3.7 **Competence.** Possessing knowledge, skills, and judgment needed to perform indicated objectives. [472, 2013]

3.3.8* **Confined Space.** An area large enough and so configured that a member can bodily enter and perform assigned work but which has limited or restricted means for entry and exit and is not designed for continuous human occupancy. [472, 2013]

3.3.9 **Confinement.** Those procedures taken to keep a material, once released, in a defined or local area. [472, 2013]

3.3.10 **Container.** A receptacle used for storing or transporting material of any kind.
3.3.11 Containment. The actions taken to keep a material in its container (e.g., stop a release of the material or reduce the amount being released). [472, 2013]

3.3.12 Contaminant. A hazardous material, or the hazardous component of a weapon of mass destruction (WMD), that physically remains on or in people, animals, the environment, or equipment, thereby creating a continuing risk of direct injury or a risk of exposure. [472, 2013]

3.3.13 Contamination. The process of transferring a hazardous material, or the hazardous component of a weapon of mass destruction (WMD), from its source to people, animals, the environment, or equipment, that can act as a carrier. [472, 2013]

3.3.13.1 Cross Contamination. The process by which a contaminant is carried out of the hot zone and contaminates people, animals, the environment, or equipment. [472, 2013]

3.3.14 Control. The procedures, techniques, and methods used in the mitigation of hazardous material/weapons of mass destruction (WMD) incidents, including containment, extinguishment, and confinement. [472, 2013]

3.3.15* Control Zones. The areas at hazardous materials/weapons of mass destruction incidents within an established/a controlled perimeter that are designated based upon safety and the degree of hazard. [472, 2013]

3.3.15.1 Cold Zone. The control zone of hazardous materials/weapons of mass destruction incidents that contains the incident command post and such other support functions as are deemed necessary to control the incident. [472, 2013]

3.3.15.2 Decontamination Corridor. The area usually located within the warm zone where decontamination is performed. [472, 2013]

3.3.15.3 Hot Zone. The control zone immediately surrounding hazardous materials/weapons of mass destruction (WMD) incidents, which extends far enough to prevent adverse effects of hazards to personnel outside the zone. [472, 2013]

3.3.15.4* Warm Zone. The control zone at hazardous materials/weapons of mass destruction (WMD) incidents where personnel and equipment decontamination and hot zone support takes place. [472, 2013]

3.3.16 Coordination. The process used to get people, who could represent different agencies, to work together integrally and harmoniously in a common action or effort. [472, 2013]

3.3.17* Decontamination. The physical and/or chemical process of reducing and preventing the spread of contaminants from people, animals, the environment, or equipment involved at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.3.17.1* Emergency Decontamination. The physical process of immediately reducing contamination of individuals in potentially life-threatening situations with or without the formal establishment of a decontamination corridor. [472, 2013]

3.3.17.2* Gross Decontamination. The phase of the decontamination process during which the amount of surface contaminants is significantly reduced. [472, 2013]

3.3.17.3* Mass Decontamination. The physical process of reducing or removing surface contaminants from large numbers of victims in potentially life-threatening situations in
the fastest time possible. [472, 2013]

3.3.17* Technical Decontamination. The planned and systematic process of reducing contamination to a level that is as low as reasonably achievable. [472, 2013]

3.3.18 Degradation. (1) A chemical action involving the molecular breakdown of a protective clothing material or equipment due to contact with a chemical. (2) The molecular breakdown of the spilled or released material to render it less hazardous during control operations. [472, 2013]

3.3.19* Demonstrate. To show by actual performance. [472, 2013]

3.3.20 Describe. To explain verbally or in writing using standard terms recognized by the hazardous materials/weapons of mass destruction (WMD) response community. [472, 2013]

3.3.21 Dispersal Device. Any weapon or combination of mechanical, electrical or pressurized components that is designed, intended or used to cause death or serious bodily injury through the release, dissemination or impact of toxic or poisonous chemicals or their precursors, biological agent, toxin or vector or radioactive material. [472, 2013]


3.3.23 Endangered Area. The actual or potential area of exposure associated with the release of a hazardous material/weapon of mass destruction (WMD). [472, 2013]

3.3.24 Evaluate. The process of assessing or judging the effectiveness of a response operation or course of action within the training and capabilities of the emergency responder. [472, 2013]

3.3.25 Example. An illustration of a problem serving to show the application of a rule, principle, or method (e.g., past incidents, simulated incidents, parameters, pictures, and diagrams). [472, 2013]

3.3.26* Exposure. The process by which people, animals, the environment, and equipment are subjected to or come in contact with a hazardous material/weapon of mass destruction (WMD). [472, 2013]

3.3.27* Fissile Material. Material whose atoms are capable of nuclear fission (capable of being split). [472, 2013]

3.3.28 Hazard/Hazardous. Capable of posing an unreasonable risk to health, safety, or the environment; capable of causing harm. [472, 2013]

3.3.29* Hazardous Material. A substance (either matter — solid, liquid, or gas — or energy) that when released is capable of creating harm to people, the environment, and property, including weapons of mass destruction (WMD) as defined in 18 U.S. Code, Section 2332a, as well as any other criminal use of hazardous materials, such as illicit labs, environmental crimes, or industrial sabotage. [472, 2013]

3.3.30* Hazardous Materials Branch/Group. The function within an overall incident management system that deals with the mitigation and control of the hazardous materials/weapons of mass destruction (WMD) portion of an incident. [472, 2013]

3.3.31* Hazardous Materials Officer. (NIMS: Hazardous Materials Branch
Director/Group Supervisor.) The person who is responsible for directing and coordinating all operations involving hazardous materials/weapons of mass destruction (WMD) as assigned by the incident commander. [472, 2013]

3.3.32* Hazardous Materials Response Team (HMRT). An organized group of trained response personnel operating under an emergency response plan and applicable standard operating procedures who perform hazardous material technician level skills at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.3.33* Hazardous Materials Safety Officer. (NIMS: Assistant Safety Officer — Hazardous Material.) The person who works within an incident management system (IMS) (specifically, the hazardous materials branch/group) to ensure that recognized hazardous materials/WMD safe practices are followed at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.3.34* Hazardous Materials Technician. Person who responds to hazardous materials/weapons of mass destruction (WMD) incidents using a risk-based response process by which they analyze a problem involving hazardous materials/weapons of mass destruction (WMD), select applicable decontamination procedures, and control a release using specialized protective clothing and control equipment. [472, 2013]

3.3.34.1* Hazardous Materials Technician with a Cargo Tank Specialty. Person who provides technical support pertaining to cargo tanks, provides oversight for product removal and movement of damaged cargo tanks, and acts as a liaison between the hazardous materials technician and other outside resources. [472, 2013]

3.3.34.2 Hazardous Materials Technician with a Marine Tank and Non-tank Vessel Specialty. Person who provides technical support pertaining to marine tank and non-tank vessels, provides oversight for product removal and movement of damaged marine tank and non-tank vessels, and acts as a liaison between the hazardous materials technician and other outside resources. [472, 2013]

3.3.34.3* Hazardous Materials Technician with an Intermodal Tank Specialty. Person who provides technical support pertaining to intermodal tanks, provides oversight for product removal and movement of damaged intermodal tanks, and acts as a liaison between the hazardous materials technician and other outside resources. [472, 2013]

3.3.34.4* Hazardous Materials Technician with a Tank Car Specialty. Person who provides technical support pertaining to tank cars, provides oversight for product removal and movement of damaged tank cars, and acts as a liaison between the hazardous materials technician and other outside resources. [472, 2013]

3.3.34.5 Hazardous Materials Technician with a Flammable Liquids Bulk Storage Specialty. Person who, in incidents involving bulk flammable liquid storage tanks and related facilities, provides support to the hazardous materials technician and other personnel, provides strategic and tactical recommendations to the on-scene incident commander, provides oversight for fire control and product removal operations, and acts as a liaison between technicians, response personnel, and outside resources. [472, 2013]

3.3.34.6 Hazardous Materials Technician with a Flammable Gases Bulk Storage Specialty. Person who, in incidents involving flammable gas bulk storage tanks, provide support to the hazardous materials technician and other personnel, provide strategic and tactical recommendations to the on-scene incident commander, provide oversight for fire
control and product removal operations, and act as a liaison between technicians, firefighting personnel, and other resources. [472, 2013]

3.3.34.7 Hazardous Materials Technician with a Radioactive Materials Specialty. Person who provides support to the hazardous materials technician and other personnel, uses radiation detection instruments, manages the control of radiation exposure, conducts hazards assessment, and acts as a liaison between hazardous materials technicians at incidents involving radioactive materials. [472, 2013]

3.3.35 Identify. To select or indicate verbally or in writing using standard terms to establish the fact of an item being the same as the one described. [472, 2013]

3.3.36 Incident. An emergency involving the release or potential release of hazardous materials/weapons of mass destruction (WMD). [472, 2013]

3.3.37* Incident Commander (IC). The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources. [472, 2013]

3.3.38 Incident Command System. A management system designed to enable effective and efficient on-scene incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure. [472, 2013]

3.3.39* Incident Management System (IMS). A plan that defines the roles and responsibilities to be assumed by personnel and the operating procedures to be used in the management and direction of emergency operations to include the incident command system, multi-agency coordination system, training, and management of resources. [472, 2013]

3.3.40 Match. To provide with a counterpart. [472, 2013]

3.3.41* Material Safety Data Sheet (MSDS). A form, provided by manufacturers and compounders (blenders) of chemicals, containing information about chemical composition, physical and chemical properties, health and safety hazards, emergency response, and waste disposal of the material. [472, 2013]

3.3.42 Monitoring Equipment. Instruments and devices used to identify and quantify contaminants. [472, 2013]

3.3.43 Objective. A goal that is achieved through the attainment of a skill, knowledge, or both, that can be observed or measured. [472, 2013]

3.3.44* Packaging. Any container that holds a material (hazardous or nonhazardous). [472, 2013]

3.3.44.1* Bulk Packaging. Any packaging, including transport vehicles, having a liquid capacity of more than 119 gal (450 L), a solids capacity of more than 882 lb (400 kg), or a compressed gas water capacity of more than 1001 lb (454 kg). [472, 2013]

3.3.44.2 Nonbulk Packaging. Any packaging having a liquid capacity of 119 gal (450 L) or less, a solids capacity of 882 lb (400 kg) or less, or a compressed gas water capacity of 1001 lb (454 kg) or less. [472, 2013]

3.3.44.3* Radioactive Materials Packaging. Any packaging for radioactive materials including excepted packaging, industrial packaging, Type A, Type B, and Type C packaging. [472, 2013]
3.3.45 **Penetration.** The movement of a material through a suit's closures, such as zippers, buttonholes, seams, flaps, or other design features of chemical-protective clothing, and through punctures, cuts, and tears. [472, 2013]

3.3.46 **Permeation.** A chemical action involving the movement of chemicals, on a molecular level, through intact material. [472, 2013]

3.3.47** Personal Protective Equipment.** The equipment provided to shield or isolate a person from the chemical, physical, and thermal hazards that can be encountered at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.3.48 **Plan.** [472, 2013]

3.3.48.1** Emergency Response Plan.** A plan developed by the authority having jurisdiction, with the cooperation of all participating agencies and organizations, that details specific actions to be performed by all personnel who are expected to respond during an emergency. [472, 2013]

3.3.48.2** Incident Action Plan.** An oral or written plan approved by the incident commander containing general objectives reflecting the overall strategy for managing an incident. [472, 2013]

3.3.48.3** Site Safety and Control Plan.** A site safety and control plan should be completed and approved by the hazardous materials officer, the hazardous materials safety officer, and the incident commander for inclusion in the incident action plan. The plan must be briefed to personnel operating within the hot zone by the hazardous materials safety officer or the hazardous materials officer prior to entry mission initiation. The initial site safety and control plan for the first operational period can be written or oral. The plan should be documented as soon as resources allow. [472, 2013]

3.3.49** Planned Response.** The incident action plan, with the site safety and control plan, consistent with the emergency response plan and/or standard operating procedures for a specific hazardous material/weapon of mass destruction (WMD) incident. [472, 2013]

3.3.50 **Predict.** The process of estimating or forecasting the future behavior of a hazardous materials/weapons of mass destruction (WMD) container and/or its contents within the training and capabilities of the emergency responder. [472, 2013]

3.3.51** Protective Clothing.** Equipment designed to protect the wearer from heat and/or from hazardous materials, or from the hazardous component of a weapon of mass destruction contacting the skin or eyes. [472, 2013]

3.3.51.1** Chemical-Protective Clothing.** Items made from chemical-resistive materials, such as clothing, hood, boots, and gloves, that are designed and configured to protect the wearer's torso, head, arms, legs, hands, and feet from hazardous materials. [472, 2013]

3.3.51.2** High Temperature–Protective Clothing.** Protective clothing designed to protect the wearer for short-term high temperature exposures. [472, 2013]

3.3.51.3** Liquid Splash–Protective Clothing.** The garment portion of a chemical-protective clothing ensemble that is designed and configured to protect the wearer against chemical liquid splashes but not against chemical vapors or gases. [472, 2013]

3.3.51.4** Structural Fire-Fighting Protective Clothing.** The fire resistant protective clothing normally worn by fire fighters during structural fire-fighting operations, which
includes a helmet, coat, pants, boots, gloves, PASS device, and a fire resistant hood to cover parts of the head and neck not protected by the helmet and respirator facepiece. [472, 2013]

3.3.51.5* Vapor-Protective Clothing. The garment portion of a chemical-protective clothing ensemble that is designed and configured to protect the wearer against chemical vapors or gases. [472, 2013]

3.3.52 Qualified. Having knowledge of the installation, construction, or operation of apparatus and the hazards involved. [472, 2013]

3.3.53* Respiratory Protection. Equipment designed to protect the wearer from the inhalation of contaminants. [472, 2013]

3.3.54* Response. That portion of incident management in which personnel are involved in controlling hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.3.55 Risk-Based Response Process. Systematic process by which responders analyze a problem involving hazardous materials/weapons of mass destruction (WMD), assess the hazards, evaluate the potential consequences, and determine appropriate response actions based upon facts, science, and the circumstances of the incident. [472, 2013]

3.3.56 Safely. To perform the assigned tasks without injury to self or others, to the environment, or to property. [472, 2013]

3.3.57 Scenario. A sequence or synopsis of actual or imagined events used in the field or classroom to provide information necessary to meet student competencies; can be based upon threat assessment. [472, 2013]

3.3.58 SETIQ. The Emergency Transportation System for the Chemical Industry in Mexico. [472, 2013]

3.3.59 Specialist Employees. [472, 2013]

3.3.59.1* Specialist Employee A. That person who is specifically trained to handle incidents involving chemicals or containers for chemicals used in the organization's area of specialization. [472, 2013]

3.3.59.2* Specialist Employee B. That person who, in the course of his or her regular job duties, works with or is trained in the hazards of specific chemicals or containers within the individual's area of specialization. [472, 2013]

3.3.59.3* Specialist Employee C. That person who responds to emergencies involving chemicals and/or containers within the organization's area of specialization. [472, 2013]

3.3.60 Stabilization. The point in an incident when the adverse behavior of the hazardous material, or the hazardous component of a weapon of mass destruction (WMD), is controlled. [472, 2013]

3.3.61* Termination. That portion of incident management after the cessation of tactical operations in which personnel are involved in documenting safety procedures, site operations, hazards faced, and lessons learned from the incident. [472, 2013]

3.3.62* UN/NA Identification Number. The four-digit number assigned to a hazardous material/weapon of mass destruction (WMD), which is used to identify and cross-reference products in the transportation mode. [472, 2013]
3.3.63* Weapon of Mass Destruction (WMD). (1) Any destructive device, such as any explosive, incendiary, or poison gas bomb, grenade, rocket having a propellant charge of more than four ounces, missile having an explosive or incendiary charge of more than one quarter ounce (7 grams), mine, or device similar to the above; (2) any weapon involving toxic or poisonous chemicals; (3) any weapon involving a disease organism; or (4) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life. [472, 2013]

3.3.63.1* Radiological Weapons of Mass Destruction [472, 2013]

3.3.63.1.1* Radiation Exposure Device (RED) — an RED, used interchangeably with the term “radiological exposure device” or “radiation emitting device”, consists of radioactive material, either as a sealed source or as material within some type of container, or a radiation-generating device, such as an X-ray device, that directly exposes people to ionizing radiation. [472, 2013]

3.3.63.1.2* Radiation Dispersal Device (RDD) — an RDD, also as referred to as a “dirty bomb”, is a device designed to spread radioactive material through a detonation of conventional explosives or other (non-nuclear) means. [472, 2013]

3.3.63.1.3* Improvised Nuclear Device (IND) — an IND is an illicit nuclear weapon that is bought, stolen, or otherwise obtained from a nuclear State (that is, a national government with nuclear weapons), or a weapon fabricated from fissile material that is capable of producing a nuclear explosion. [472, 2013]

3.4 Operations Level Responders Definitions. [472, 2013]

3.4.1 Agent-Specific Competencies. The knowledge, skills, and judgment needed by operations level responders who have completed the operations level competencies and who are designated by the authority having jurisdiction to respond to releases or potential releases of a specific group of WMD agents. [472, 2013]

3.4.2 Core Competencies. The knowledge, skills, and judgment needed by operations level responders who respond to releases or potential releases of hazardous materials/weapons of mass destruction (WMD). [472, 2013]

3.4.3 Mission-Specific Competencies. The knowledge, skills, and judgment needed by operations level responders who have completed the operations level competencies and who are designated by the authority having jurisdiction to perform mission specific tasks, such as decontamination, victim/hostage rescue and recovery, evidence preservation, and sampling.

3.4.4* Operations Level Responders. Persons who respond to hazardous materials/weapons of mass destruction (WMD) incidents for the purpose of implementing or supporting actions to protect nearby persons, the environment, or property from the effects of the release. [472, 2013]

3.4.5 Operations Level Responders Assigned to Perform Air Monitoring and Sampling. Persons, competent at the operations level, who are assigned to implement air monitoring and sampling operations at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.4.6 Operations Level Responders Assigned to Perform Evidence Preservation and Sampling. Persons, competent at the operations level, who are assigned to preserve
forensic evidence, take samples, and/or seize evidence at hazardous materials/weapons of mass destruction (WMD) incidents involving potential violations of criminal statutes or governmental regulations. [472, 2013]

3.4.7 Operations Level Responders Assigned to Disablement/Disruption of Improvised Explosives Devices (IED), Improvised WMD Dispersal Devices, and Operations at Improvised Explosive Laboratories. Persons, competent at the operations level, who are assigned to interrupt the functioning of improvised explosive devices (IED) and improvised WMD dispersal devices and to conduct operations at improvised explosive laboratories. [472, 2013]

3.4.8 Operations Level Responders Assigned to Perform Mass Decontamination During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. Persons, competent at the operations level, who are assigned to implement mass decontamination operations at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.4.9 Operations Level Responders Assigned to Perform Product Control. Persons, competent at the operations level, who are assigned to implement product control measures at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.4.10 Operations Level Responders Assigned to Perform Technical Decontamination During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. Persons, competent at the operations level, who are assigned to implement technical decontamination operations at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.4.11 Operations Level Responders Assigned to Perform Victim Rescue/Recovery During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. Persons, competent at the operations level, who are assigned to rescue and/or recover exposed and contaminated victims at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.4.12 Operations Level Responders Assigned to Respond to Illicit Laboratory Incidents. Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving potential violations of criminal statutes specific to the illegal manufacture of methamphetamines, other drugs, or weapons of mass destruction (WMD), are assigned to secure the scene, identify the laboratory/process, and preserve evidence. [472, 2013]

3.4.13 Operations Level Responders Assigned Responsibilities for Biological Response. Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving biological materials, are assigned to support the hazardous materials technician and other personnel, provide strategic and tactical recommendations to the on-scene incident commander, serve in a technical specialist capacity to provide technical oversight for operations, and act as a liaison between the hazardous materials technician, response personnel, and other outside resources regarding biological issues. [472, 2013]

3.4.14 Operations Level Responders Assigned Responsibilities for Chemical Response. Persons, competent at the operations level, who, at hazardous
materials/weapons of mass destruction (WMD) incidents involving chemical materials, are assigned to support the hazardous materials technician and other personnel, provide strategic and tactical recommendations to the on-scene incident commander, serve in a technical specialist capacity to provide technical oversight for operations, and act as a liaison between the hazardous material technician, response personnel, and other outside resources regarding chemical issues. [472, 2013]

3.4.15 Operations Level Responders Assigned Responsibilities for Radioactive Material Response. Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving radioactive materials, are assigned to support the hazardous materials technician and other personnel, provide strategic and tactical recommendations to the on-scene incident commander, serve in a technical specialist capacity to provide technical oversight for operations, and act as a liaison between the hazardous material technician, response personnel, and other outside resources regarding radioactive material issues. [472, 2013]

3.4.16 Operations Level Responders Assigned to Use Personal Protective Equipment During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. Persons, competent at the operations level, who are assigned to use of personal protective equipment at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

Chapter 4 - Regulations

4.1 General.
The laws, regulations, standards, and guidance documents or portions thereof listed in this chapter are referenced within this recommended practice and should be considered part of the recommendations of this document.

4.2 Laws.
4.2.1 General
Over the years, U.S. Congress has passed major pieces of legislation concerning hazardous materials and public safety. This has resulted in seven major federal agency regulations that contain no fewer than six different legal definitions of hazardous material. Each state will have its own laws regulating hazardous materials which must be taken into consideration when responding to an incident. In addition, there are over 70 different voluntary consensus standards. Of all areas concerning HazMat Response Teams (HMRT), this area is one of the most confusing and at the same time, an area that must be completely understood when supporting operations of a HMRT. Below are some of the more important laws impacting hazardous materials emergency planning and response that will be of particular interest to HMRTs. The brief summaries are designed to highlight only the provisions that have the potential to impact HMRTs.

4.2.2 Environmental Protection Agency (EPA)
4.2.2.1 The Resource Conservation and Recovery Act (RCRA)
Passed by Congress in 1976, this law established uniform a national policy for hazardous and solid waste disposal. It is intended to provide general oversight to state programs, which may be more stringent but not less stringent. It contains four major programs
4.2.2.1 Solid Waste. Subtitle D of the act encourages state to develop and implement solid waste management plans.

4.2.2.2 Medical Waste. Subtitle J address medical waste pertaining to generation, treatment, destruction, and disposal.

4.2.2.3 Hazardous Waste. Subtitle C establishes a program to manage hazardous waste from “cradle-to-grave”. The objective of the program is to ensure that hazardous waste is handled in a manner that protects human health and the environment. The regulation covers the generation, transportation, treatment, storage, or disposal of hazardous wastes.

4.2.2.4 Underground Storage Tanks. Subtitle I regulates petroleum products and hazardous substances stored in underground tanks. The objective of this section is to prevent leakage to groundwater from tanks and to clean up past releases. It also contains standards on new tanks and regulation for leak detection and prevention.

4.2.2.2 The Clean Air Act (CAA)

Passed by Congress in 1970 and last amended in 1990, covers a wide range of activities from manufacturing and processing, transportation, and management of hazardous chemicals.

4.2.2.2.1 Section 112(r) of the CAA, the Chemical Accident Prevention Provisions require facilities that produce, handle, process, distribute, or store certain chemicals to develop a Risk Management Program, prepare a Risk Management Plan (RMP), and submit the RMP to EPA.

4.2.2.3 Superfund Amendments and Reauthorization Act (SARA)

Known as “Superfund”, this law, passed in 1980, addresses hazardous substance releases into the environment and cleanup of inactive hazardous waste disposal sites. It also requires those individuals responsible for the release of hazardous materials (commonly referred to as the responsible party) above a specified “reportable quantity” to notify the National Response Center. SARA has had perhaps the greatest impact on hazardous materials emergency planning and response operations. SARA amended CERCLA and provided a national baseline with regard to hazardous materials planning, preparedness, training, and response.

4.2.2.3.1 Title I of this act required OSHA to develop health and safety standards covering numerous worker groups who handle or respond to chemical emergencies and led to the development of OSHA 1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER).”

4.2.2.3.2 Title III is perhaps the most familiar to the emergency response community. It is also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). Title III led to the establishment of the State Emergency Response Commissions (SERC) and the Local Emergency Planning Committees (LEPC). Passed in 1986, it includes four major sections pertaining to public safety.

4.2.2.3.2.1 Sections 301-303: Emergency Planning - These sections are to ensure that state and local communities are prepared to respond to potential chemical accidents. As a first step, each state had to establish a State Emergency Response Commission (SERC). In turn, the SERC designated local emergency planning districts. For each district, the SERC appoints, supervises and coordinates the activities of a Local Emergency Planning
Committee (LEPC). The LEPC must, in turn, develop an emergency response plan for its district and review it annually.

4.2.2.3.2 Section 304: Emergency Release Notification - This section applies to any facility which stores, produces or uses a "hazardous chemical" (any chemical which is a physical hazard or a health hazard) and releases a reportable quantity (RQ) of a substance contained in either of the following two tables published by the EPA in the Code of Federal Regulations:

- list of extremely hazardous substances; and
- list of CERLA hazardous substances.

4.2.2.3.3 Sections 311-312: Community right-to-know - The purpose of these requirements is to increase community awareness of chemical hazards and to facilitate emergency planning.

4.2.2.3.4 Section 313: Toxic chemical release inventory - The data gathered will assist in research and development of regulations, guidelines, and standards. Under this section, The EPA is required to establish the Toxic Release Inventory, an inventory of routine toxic chemical emissions from certain facilities. The original data requirements for the TRI, specified in SARA Title III, have been greatly expanded by the Pollution Prevention Act of 1990. The TRI must now also include information on source reduction, recycling and treatment.

4.2.2.4 Federal Water Pollution Control Act (FWPCA)

The FWPCA was passed in 1972 and amended in 1977 to become the Clean Water Act. This act requires the EPA and U.S. Coast Guard to regulate the spills of oil and/or other hazardous substances that threaten coastal waters and inland waterways.

4.2.2.5 Clean Water Act (CWA)

The CWA aims to protect the health of our nation's waters by establishing water quality goals as well as the plans and permits needed to achieve these goals. The CWA aims to protect the waters of the United States by preventing, reducing, and eliminating pollution. The term waters of the United States include navigable water, ground water, surface water, and underground waters. Title III of the CWA establishes response requirements for discharges of oil and hazardous substances from ships and on- or off-shore facilities.

4.2.2.6 Oil Pollution Act (OPA)

This act was signed into law in 1990 to cover both facilities and carriers of oil and related liquid product, including deepwater marine terminals, marine vessels, pipelines, and railcars. Requirements include the development of emergency response plans, regular training and exercise sessions, and verification of spill resources and contractor capabilities. The OPA addresses development of a national planning and response system on four levels – national, area, local, and facility. In the event of an oil spill, the facility response plan (FRP) is immediately activated with other plans be activated as needed.
Owners or operators of a regulated facility must have a Spill Prevention, Control, and Countermeasures (SPCC) program.

4.2.2.7 Spill Prevention, Control, and Countermeasure Plan (SPCC)
This regulation applies to facilities engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing, or consuming oil and oil product, which due to location could reasonably be expected to discharge oil in quantities that may be harmful into or upon navigable waterways or adjoining shoreline, or upon the water on the contiguous zone.

4.2.2.8 National Contingency Plan
The National Contingency Plan (NCP) is the federal government's blueprint for responding to both oil spills and hazardous substance releases. The NCP is required by section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and by section 311(d) of the Clean Water Act (CWA), as amended by the Oil Pollution Act of 1990 (OPA). The NCP has been revised over the years to include a framework for responding to oil discharges and hazardous substance spills to water as well as releases at hazardous waste sites requiring emergency removal actions.

4.2.3 Department of Homeland Security
4.2.3.1 The Stafford Act
Central legislation governing the Federal response to disasters within the United States with the Federal Emergency Management Agency designated as the primary Federal agency responsible for responding to disasters.

4.3 Regulatory Agencies
4.3.1 U.S. Occupational Safety and Health Administration (OSHA)

4.3.1.1 29 CFR 1910.120 and 1926.65 covers emergency response operations for release of, or substantial threats of release of, hazardous substances without regard to the location of the hazard. Paragraph (q) of the Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) provides inspection procedures for 29 CFR 1910.120 and 1926.65, relative to emergency response to hazardous substance release.

4.3.1.2 Subpart H--Hazardous Materials 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
4.3.1.3 Subpart I--Personal Protective Equipment 29 CFR 1910.134 Respiratory Protection


4.3.2 The U.S. Environmental Protection Agency (EPA)

Title 40--Protection of the Environment, Chapter I--Environmental Protection Agency, Subchapter J--Superfund, Emergency Planning, And Community Right-To-Know Programs.

4.3.2.1 Part 311 "Worker Safety." 29 CFR Part 1910 is incorporated by reference.

4.3.2.2 SARA Title III and Emergency Planning and Community Right-to-Know Act (EPCRA). Created a method and standard practice for a local community to understand and be aware of the requirements businesses have that handle chemicals to report storage type, quantity, and storage methods to the fire department and the local emergency planning committee.

4.2.2.2.1 Local Emergency Planning Committees (LEPCs). LEPCs gather and disseminate information about hazardous materials to the public.

4.2.2.2.2 State Emergency Response Commission (SERC). Each State has a SERC. The SERC is the liaison between local and State levels of authority.

4.3.3 U.S. Department of Transportation (DOT).

49 CFR, a comprehensive set of transportation regulations enforces and publicizes laws and regulations that govern the transportation of goods by highway, rail, air, and, in some cases, marine transport. When spills occur while the material is on the vehicle or otherwise "in transportation," OSHA's HAZWOPER standard (29 CFR 1910.120(q)) covers the emergency response personnel who respond to the incident.

4.3.3.1 Subchapter B (Hazardous Materials and Oil Transportation):

Part 130 (Oil Spill Prevention and Response Plans) - prescribes prevention, containment and response planning requirements applicable to transportation of oil by motor vehicles and rolling stock.

4.3.3.2 Subchapter C (Hazardous Materials Regulations)

Part 172 - lists and classifies those materials which the Department has designated as hazardous materials for purposes of transportation and prescribes the requirements for shipping papers, package marking, labeling, and transport vehicle placarding applicable to the shipment and transportation of those hazardous materials.

Part 174 (Carriage by Rail) - prescribes requirements to be observed with respect to the transportation of hazardous materials in or on rail cars.

Part 175 (Carriage by Aircraft) - prescribes requirements that apply to the transportation of hazardous materials in commerce aboard (including attached to or suspended from) aircraft.
Part 176 (Carriage by Vessel) - prescribes to be observed with respect to the transportation of hazardous materials by vessel.
Part 177 (Carriage by Public Highway) - prescribes requirements that are applicable to the acceptance and transportation of hazardous materials by private, common, or contract carriers by motor vehicle.

4.3.3.3 Subchapter D (Pipeline Safety)
Part 193 (Liquefied Natural Gas Facilities: Federal Safety Standards) - prescribes safety standards for LNG facilities used in the transportation of gas by pipeline that is subject to the pipeline safety laws.
Part 194 (Response Plans for Onshore Oil Pipelines) - contains requirements for oil spill response plans to reduce the environmental impact of oil discharged from onshore oil pipelines.
Part 195 (Transportation of Hazardous Liquids by Pipelines) - prescribes safety standards and reporting requirements for pipeline facilities used in the transportation of hazardous liquids or carbon dioxide.

4.3.4 U.S. Department of Energy (DOE)
Title 10 Chapter 10 1021 Subpart C Implementing Procedures of the Department of Energy outline the manner which nuclear materials will be assed and handled.

4.4 Standards - General
The documents or portions thereof listed in this chapter are referenced within this recommended practice and should be considered part of the recommendations of this document.

4.4.1 NFPA Standards. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101. Note – The following is only a partial list of the NFPA standards. Review the complete list of the NFPA standards at the following link to determine if any others apply to your operations (http://www.nfpa.org).

4.4.1.2 NFPA Standards for Hazardous Materials
NFPA 472, Standard for Professional Competence of Responders to Hazardous Materials Incidents, 2008 edition – provides a framework by which an organization can meet the requirements of the OSHA HAZWHOPER regulation. By meeting this standard, you meet or exceed compliance with OSHA 1910.120.

NFPA 473, Standard for Competencies for EMS Personnel Responding to Hazardous Materials Incidents, 2008 edition - identifies the levels of competence required of emergency medical services (EMS) personnel who respond to incidents involving hazardous materials or weapons of mass destruction (WMD).

NFPA 600, Standard on Industrial Fire Brigades - contains minimum requirements for organizing, operating, training, and equipping industrial fire brigades. It also contains minimum requirements for the occupational safety and health of industrial fire brigade members while performing firefighting and related activities.

NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, 2007 edition – contains minimum requirements for a fire service-related safety and health program. Items covered include: PPE; staffing; medical requirements; and physical requirements.

NFPA 1521, Standard for Fire Department Safety Officer, 2008 edition – contains minimum requirements for the assignment, duties, and responsibilities of a health and safety officer (HSO) and an incident safety officer (ISO) for a fire department.

NFPA 1582, Standard on Comprehensive Occupational Medical Program for Fire Departments – provides guidance on annual physicals for firefighters and members of Hazardous Materials Response teams.

NFPA 1584, Standard on the Rehabilitation Process for Members during Emergency Operations and Training Exercises - establishes the minimum criteria for developing and implementing a rehabilitation process for fire department members at incident scene operations and training exercises.

Fire Brigade

4.4.1.3 NFPA Standards for PPE


4.4.1.4 NFPA Standards on Rescue Operations


NFPA 1951, Standard on Protective Ensembles for Technical Rescue Incidents, 2013 edition - specify the minimum design, performance, testing, and certification requirements for utility technical rescue, rescue and recovery technical rescue, and chemicals, biological agents, and radiological particulate [also known as chemical,
biological, radiological, and nuclear (CBRN) technical rescue] protective ensembles for use by emergency services personnel during technical rescue incidents.

4.4.2 UL Standards. Underwriters Laboratory, 2600 N.W. Lake Road, Camas, WA 98607-8542
UL Classified PPE has been tested to levels of safety determined by NFPA standards for: firefighters; hazardous materials response teams; and other emergency responders.

4.4.3 ASTM Standards. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. The following is only a partial list of the ASTM standards. Review the complete list of the ASTM standards at the following link to determine if any others apply to your operations (www.astm.org).
ASTM F 716, Method of Testing Sorbent Performance of Absorbents, 1993 - covers the development of laboratory test data which describe the performance of absorbent materials used to remove oils and other compatible fluids from water. This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.
ASTM F 726, Method of Testing Sorbent Performance of Adsorbents, 1999 - describes the performance of adsorbents in removing nonemulsified oils and other floating, immiscible liquids from the surface of water.
ASTM E2458, Procedures for Sample Collection, XXXX – bulk and onsite sampling.
ASTM E2601-O8, Standard Practice for Radiological Emergency Response - provides decision-making considerations for response to incidents that involve radioactive materials. It provides information and guidance for what to include in response planning, and what activities to conduct during a response.
ASTM E2770-10, Standard Guide for Operational Guidelines for Initial Response to a Suspected Biothreat Agent - provides considerations for decision-makers when responding to incidents that may involve biothreats.

4.4.4 ANSI Standards. American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036. The following is only a partial list of the ANSI standards. Review the complete list of the ANSI standards at the following link to determine if any others apply to your operations (www.ansi.org).
ANSI Z88.2, AMERICAN NATIONAL STANDARD PRACTICES FOR RESPIRATORY PROTECTION, 2013 edition - sets forth accepted practices for respirator users; provides
information and guidance on the proper selection, use, and care of respirators; and contains requirements for establishing and regulating respirator programs.

ANSI Z88.10, *Fit Test Method*, 2012 edition – provides guidance on how to conduct fit testing of tight fitting respirators and appropriate methods to be used.

4.5 Guidance Documents

4.5.1 OSHA

4.5.1.1 Best Practices - The most efficient and effective way to accomplish a task or function. Standards of Care are established from best practices.

4.5.1.2 Standard Operating Procedures or Standard Operating Guide - Documents that define and codify your best practices. SOPs take the guesswork out of the job because they allow everyone to understand what their job entails.

4.5.2 FEMA

4.5.2.1 The National Response Framework (NRF) – it is a comprehensive how-to guide which spells out how the nation should conduct an all-hazard response. It is intended to capture all levels of government and all incident levels. Local plans feed into State plans, which feed into the NRF.

4.5.2.1 National Preparedness Guidelines - coordinated capabilities to prevent, protect against, respond to, and recover from all hazards in a way that balances risk with resources and need.

4.5.2.2 Target Capabilities List (TCL) - supports an all-hazards approach to building capabilities and is a tool for planning and responding (https://www.rkb.us/hspd8.cfm). The TCL describes the capabilities related to the four homeland security mission areas: Prevent, Protect, Respond and Recover. It defines and provides the basis for assessing preparedness. It also establishes national guidance for preparing the Nation for major all-hazards events, such as those defined by the National Planning Scenarios. The current version of the TCL contains 37 core capabilities.

4.5.2.3 Resource Typing - is "the categorization and description of resources that are commonly exchanged in disasters via mutual aid, by capacity and/or capability," for the purpose of facilitating ordering and tracking.

4.5.3 Presidential Directives

4.5.3.1 Presidential Policy Directive 8 (PPD 8: National Preparedness) - This directive is aimed at strengthening the security and resilience of the United States through systematic preparation for the threats that pose the greatest risk to the security of the Nation, including acts of terrorism, cyber attacks, pandemics, and catastrophic natural disasters. Our national preparedness is the shared responsibility of all levels of government, the private and nonprofit sectors, and individual citizens. Everyone can contribute to safeguarding the Nation from harm. As such, while this directive is intended
to galvanize action by the Federal Government, it is also aimed at facilitating an integrated, all-of-Nation, capabilities-based approach to preparedness.

4.5.3.2 National Security Presidential Directive 33 (NSPD 33: Biodefense for the 21st Century) - includes response planning, mass casualty care, risk communication, medical countermeasures, and decontamination. New initiatives will strengthen our ability to provide mass casualty care and to decontaminate the site of an attack.

4.5.4 Other Resources
4.5.4.1 U.S. Chemical Safety Board www.csb.gov
4.5.4.2 National Transportation Safety Board www.ntsb.gov
4.5.4.3 Lessons Learned Information Sharing www.llis.dhs.gov
4.5.4.4 FEMA's National Training and Education Division www.firstrespondertraining.gov
4.5.4.5 The National Fire Fighter Near-Miss Reporting System www.firefighternearmiss.com
4.5.4.6 FEMA's National Training and Education Division www.firstrespondertraining.gov
4.5.4.7 The National Fire Fighter Near-Miss Reporting System www.firefighternearmiss.com
4.5.4.8 Responder Knowledge Base https://www.rkb.us/

Chapter 5: - Risk Analysis

5.0 Risk Analysis

5.1 Introduction:

5.1.1 Purpose: The purpose of this chapter is to provide information and guidance for hazardous materials/weapons of mass destruction response team (HMRT) program managers in understanding how a risk analysis can be used to identify the presence of hazards and risks within a jurisdiction, the estimated impact of a potential hazardous materials release, the probability of an incident occurring, and the types, kinds, and causes of hazardous materials releases.

5.1.2 Scope:

5.2 Hazard Identification and Risk Assessment (HIRA): HIRA is a process for conducting a risk assessment, identifying vulnerabilities, and estimating the potential for a release of hazardous materials within a given area or jurisdiction. Hazardous materials have a potential to effect life, environment, or property. The purpose of the HIRA process is to reduce the likelihood of an accidental or intentional release.
(a) HIRA analytical methods will vary from jurisdiction to jurisdiction, and the assessment will be specific to each hazard.

(b) Identifying locations that may present a hazard that would affect the stability of life, the environment and/or property should be accomplished using various systems that have been well established. SARA Title III and the Emergency Preparedness and Community Right to Know Act (EPCRA) along with the Environmental Protection Agency’s Risk Management Plans (RMP) can be used to identify facilities within a given area that manufacture or store Extremely Hazardous Substances (EHS). Code of Federal Regulation (CFR) Title 49 Subchapter B, Subchapter C, and Subchapter D can also help identify substances that are considered regulated materials during transportation. With this information a Hazardous Materials Response Team (HMRT) can plan, prepare for, and prioritize those facilities with the greatest potential for harm.

(c) Identification of hazardous locations, the hazards present, and the facility’s internal emergency response capabilities will greatly influence the jurisdiction’s decision of whether or not a HMRT is needed and what type of the equipment will be needed to mitigate a hazardous materials incident.

(d) Historical information regarding chemicals and releases from other similar facilities can be a valuable tool when assessing the risks of a given facility and the response resources needed by the jurisdiction.

5.3 Hazard Identification: Identifying the areas within a jurisdiction that may be affected by hazardous material/weapons of mass destruction (HazMat/WMD) event is crucial to planning a well-organized and effective response. The severity of the event, probability, frequency, causation factors, and other locations affected should be considered when identifying potential locations.

5.4 Types of Events: Events that can cause a release or a potential for release can be categorized as natural or manmade. Manmade events may include intentional or deliberate acts.

(a) Special attention should be given to facilities that may have a profound economic impact on the community should a major release or loss occur. The majority of the population within any given area may be either directly or indirectly employed by a facility that manufactures, stores, or ships certain regulated materials. Some may be employed by the stricken facility itself while others may work for companies that support or depend on those facilities.
(b) If commercial and economic interdependencies exist at the time of a catastrophic event the impact will most likely affect not only the nearby community but also the economy and/or life safety of the entire region.

(c) Specialized response resources may be limited within a given jurisdiction. Scares resources need to be identified and mutual aid agreements or memorandums of understanding need to be developed for additional resource prior to an Incident. A list of outside resources and how they can be obtained should be maintained by the jurisdiction to expedite procurement when needed.

(d) Once facilities have been identified a risk assessment should be performed using the information obtained from EPCRA, RMP, and CFR Title 49.

(e) Vulnerable populations that may be impacted include residences, hospitals, nursing homes, businesses, or other occupancies.

(f) Environmental concerns may include waterways, estuaries, parks, floodplains, wetlands, or bordering facilities.

(g) Other areas of concern may include critical infrastructure such as roadways, power plants, and water supplies.

5.4.1 Naturally Occurring Hazardous Materials Incidents: Naturally occurring events have the potential to cause hazardous materials releases at fixed facilities or during the transportation of hazardous materials. Unforeseen hazards from naturally occurring events may hamper response efforts. The responding jurisdiction may be faced with difficult decisions such as determining alternate routes for access and egress, availability of specialized equipment needed to support the response, and specialized resources to overcome obstacles encountered. Naturally occurring events that could affect a response include:

(a) Floods

(b) Hurricanes

(c) Earthquakes

(d) Tornadoes

(e) Wildfires

(f) Landslides
(g) Winter Storms
(h) Drought
(i) Lightning

5.4.2 Manmade Hazardous Material Incidents: Manmade events have the potential to cause hazardous material releases at fixed facilities or during the transportation of hazardous materials. During day-to-day operations, personnel at fixed facilities may cause accidental releases by their actions or the lack thereof. Manmade releases which are more common than natural occurring events can be classified into two categories, accidental or intentional. The cause of the release can change the response. Intentional releases constitute a crime and will require investigative assistance from law enforcement agencies. Although the protection of life and the environment are paramount, steps should be taken to preserve any evidence. Causes of manmade hazardous materials releases may include:

(a) Poor maintenance of equipment, faulty engineering and design, human error, or mechanical failure.

(b) Transportation accidents.

(c) Terrorist activities.

(d) Fire or explosion.

(e) Sabotage or intentional releases.

5.5 Severity: The severity and magnitude of a hazardous materials incident is dependent upon the type of facility involved or mode of transportation, the amount released, and the hazards of the material involved. The community’s resources and ability to respond can also affect the severity. Factors that may contribute to the severity of the incident may include:

(a) Type of container (atmospheric pressure or high pressure)

(b) Type of breach (puncture, tear, detonation, or deflagration)

(c) Rate of release (spill, leak, vent, engulfment)

(d) Matter released (matter or energy)

(e) State of matter (solid, liquid, or gas).
(f) Type of dispersion (driving force, path or movement, dispersion pattern, and distance traveled)

(g) Type of impingement (transient, lingering, or permanent)

(h) Type of harm (thermal, radiation, asphyxiating, etiologic, or mechanical)

5.6 Probability: Probability is the process of determining how likely it is that a hazardous materials incident may occur. Probability can reasonably be determined by subjectively examining historical data that might indicate the frequency of incidents and what type of hazardous materials have been involved in accidents in the past. National databases can be consulted to determine the most common types of materials involved in other incidents. This data can then be compared to the hazards identified within your community to determine if you have a high or low probability of an incident occurring. Probability can also be determined objectively through the use of mathematics and models that measure the ratio of the favorable cases to the whole number of cases possible.

5.7 Frequency: Frequency is the process of determining how often hazardous material incidents occur in your community, the state, or the region. Frequency may be determined by asking the following questions:

(a) Has a hazardous materials incident ever occurred in your jurisdiction?

(b) Has similar types of incidents ever occurred within your jurisdiction?

(c) What was the magnitude of the incidents that occurred?

(d) How did the event impact the community in terms of loss of life, injuries, property damage, environmental impact, and disruption of infrastructure or the economy?

5.8 Causation Factors: Causation factors examine the probable cause of known incidents that have occurred. Issues that should be examined include:

(a) Were the events from natural causes such as flood, lightening, strike, tornado, hurricane, earthquake, etc.?

(b) Was the event manmade such as accidental, sabotage, vandalism, or a terrorist incident?

5.9 Locations: Determining the locations of potential incidents is the process of identifying specific locations where hazardous materials are stored, manufactured, used,
or transported. This may also include locations where hazardous waste is disposed of or processed. When evaluating incident locations the following factors should be considered:

(a) What will the primary impact to the community be if a credible worst-case scenario were to happen? Can the hazardous material go beyond the fence line of the facility and impact people, property, or the environment?

(b) Will a major incident at a fixed facility have a significant impact on the local economy? Is the facility a primary employer in the community? Are there inter-dependencies with other facilities?

(c) Is the location of a potential incident a critical infrastructure node? If a major incident were to occur at this location, would it have a significant impact on transportation, communications, or energy supplies?

(d) Does the location have significance to national security? Will an incident have a negative impact on national defense or intelligence missions?

(e) Would a major incident at the location likely require additional Regional, State, or Federal resources to mitigate?

(f) Is the facility a one of a kind resource that cannot be quickly replaced if destroyed?

5.10 Risk Assessment: Risk assessment is a process used to determine the probability of a hazardous materials incident within your jurisdiction along with the associated impact. Risk assessment considers various factors including severity, frequency, causes, and the location of the threat. Assessing the risk includes examining the local response history and comparing it to regional, State and national historical data. In addition to the issues already covered the following factors should be examined:

(a) HMRT should examine previous events that have occurred in their local area. DOT, OSHA, and NIOSH accident data involving the most common hazardous materials can be valuable in conducting local risk assessments. When a catastrophic event occurs in some other area and the AHJ has a comparable facility in their area, the local HMRT should ensure that their response plans and training programs include information about that type of facility.

(b) The HMRT should maintain a list of the Tier 2 facilities, including those facilities that have Extremely Hazardous Substances (EHS) and the ones that are covered by EPA RMP regulations. At a minimum, HMRT response plans should be developed and reviewed with both facility and the nearby community. The review should identify vulnerable populations such as
schools, day cares, retirement centers, assisted living/nursing homes, hospitals, and other facilities that cannot be quickly evacuated and may have to shelter in place. HMRT plans should include atmospheric air monitoring and protection strategies for those vulnerable populations. Outreach efforts between the facility and the vulnerable populations should be conducted on a regular basis so that all parties are aware of emergency response plans prior to a release.

(c) Fuel stations, liquefied gas facilities (LPG/LNG), and their respective storage present a likely risk in many communities. The number, frequency, and method of delivery make incidents at these locations a likely scenario. Conducting a commodity flow study that identifies the delivery routes can assist in the development of pre-incident plans.

(d) The transportation system should be analyzed for potential threats. The railroad that operates in the AHJ can be contacted for information concerning the number and frequency of hazardous cargo shipments. The Port Authority can be contacted to determine the number and frequency of maritime shipments. The DOT PHMSA pipeline mapping system can be researched to determine what pipelines are located in the AHJ’s area of responsibility. A challenging threat area includes highway transportation. One method of determining the potential threat is to conduct a community flow study where HMRT personnel track the number of truck shipments in their area along with the type and quantity of materials being shipped. Peak truck traffic can vary greatly so a community flow study should encompass a variety of times and should be done over a period of days to reveal trends. If a weigh station is present law enforcement agencies who conduct truck inspections can help identify cargos by examining the shipping papers.

(e) The impact of natural events and their interaction with at-risk facilities should be considered. When natural events occur elsewhere the HMRT should identify comparable facilities within their region and plan for the possibility of a similar event. Examining historical weather data can determine the frequency of unusual weather related events.

(f) Emergency response plans should include expected accidental releases including the frequency and impact. Events can be categorized as frequent or infrequent and have a low or high impact. The impact to the local community should be considered as well as the potential impact to adjacent facilities. Fixed facilities should have safety systems in place with redundant backups to prevent accidental releases.

(g) Intentional releases are criminal in nature and could be an attempted terrorist attack. Although both acts are criminal, it is the purpose and intent of the release that makes the difference. Releases at fixed facilities should be considered criminal acts until proven otherwise. While it can be difficult to
determine whether a release is accidental or intentional, the HMRT team along with trained investigators should try to determine the root cause. In cases where terrorism is suspected the appropriate law enforcement officials should be notified.

(h) Explosions also require an investigation including the root cause. The bomb squad can be used to determine the cause of an explosion. The HMRT should be used to determine if there are flammable gases or other hazardous materials present.

5.11 Threat: The threat becomes the analysis of the potential hazards as identified by the community risk assessment. Factoring in the facilities, the materials and the community provides a total hazard assessment. This analysis includes the hazard identification combined with an assessment of the risk based on the community and available resources.

(a) The components of the threat include the facility, the hazardous materials present, the location of the facility, and the jurisdiction’s response capabilities. The facility should have engineering controls in place to minimize the potential for a release and should have plans in place to control a release if one occurs. The HMRT should have an emergency response plan in place. Plans should include both realistic worst-case scenarios with a special emphasis on those high frequency type events.

a) The amount of material and the concentration is another aspect of the threat. The Threshold Planning Quantities (TPQs) have been established under the Emergency Planning and Community Right to Know Act (EPCRA). For instance the TPQ for ammonia is 500 pounds. Ammonia however, can be found in an anhydrous or aqueous (mixed with water) state. The potential impact from a release of anhydrous and aqueous ammonia can be very different. If a fixed facility stores more than 500 pounds of ammonia it is considered an EHS facility. Some materials that are not considered EHSs may create situations where there is substantial risk to the facility and the community. Gasoline for instance, if allowed to enter a storm drain system can migrate and spread flammability and contamination risk a considerable distance.

b) The ability of a fixed facility to prevent, detect, and mitigate a potential release is an important part of a threat assessment. HMRT’s capability to detect, control, and mitigate a potential release is a vital part of the threat assessment process. In the event of a terrorist attack there is potential for the terrorist to try and exploit weaknesses in the system for maximum impact. Having a well prepared facility focused on security and a properly trained and equipped HMRT is critical for the safety of the community.
5.12 Vulnerability: Assessing the vulnerability combines the potential for an event to happen, an estimation of the probability of an event, and the potential impact to life and property should an event occur. The vulnerability of a jurisdiction should be assessed from both the accidental and intentional release perspective.

5.12.1 Potential: The potential for an event to happen is an important part of the planning process. In some cases, releases may be fairly common and will most likely result in a low impact to the community and facility. The challenge is being prepared for low frequency events that have a potential for high impact effects. A high impact event typically extends beyond the facility and may result in road closures or a neighborhood being evacuated or sheltered in place. Other situations may impact businesses, community buildings, or areas that inconvenience the community. Releases from pipelines may disrupt gas, power, water, sewer systems and can have a community-wide effect.

5.12.2 Probability: Probability estimates the potential for an event to take place and should include the previous history based on the process and facility. To estimate the probability the following questions should be asked:

(a) Has an event ever occurred with this type of process or storage system anywhere in the world?

(b) Has the company ever experienced an event with this process or storage system?

(c) Has the facility ever experienced an event with this process or storage system?

(d) If there is an affirmative answer to any of the previous questions? If so, the frequency should be determined. Is this a 20+ year event, a less than 20 year event, an annual event, or do they occur weekly or daily?

(e) What were the consequences and circumstances of the event?

(f) What additional preventative steps were taken by the facilities after each of the events?

5.12.3 Once potential events have been determined they should be ranked as to risk level. Having the resources in place to handle potential events should be a high priority. If the AHJ does not have the required resources and capabilities then planning should take place to determine the best way to obtain those resources when needed. A cost benefit analysis should be conducted by the AHJ to decide whether or not to invest in the necessary training and/or equipment or simply rely on mutual aid. Cooperative planning between facilities can help with equipment acquisitions and response training.
5.12.4 In each potential scenario the HMRT should develop rescue plans based on the potential for human impact. The HMRT should focus their planning efforts on two fronts. The first should include those high frequency/low impact events and the second should address the low frequency/high impact events.

5.12.5 Specific HMRT activities will vary depending on the material released and any potential for off-site consequences. Other factors may include the ability of the stricken facility to self-evacuate and the amount of protection offered by the facility’s buildings. It may be that the facility’s structures have been designed to protect the occupants offering an internal shelter in place as a viable option.

5.12.6 Certainly the preference would be that the AHJ would prohibit a facility from being located next to a vulnerable population. Another preference would be that occupancies located adjacent to a facility be constructed and designed to offer protection for vulnerable populations during shelter in place scenarios.

5.12.7 As a release occurs, HMRT members should be assigned to conduct atmospheric air monitoring and sampling in and around the stricken facility. Establishing a central point of contact where information can be disseminated to the community and the facility involved is beneficial. The sooner scene data is obtained and disseminated the quicker the public’s fears can be addressed.

5.12.8 In each potential scenario the HMRT should estimate the economic impact to the community, region, state, and in some cases the nation. Land, equipment, infrastructure, and key resources may have to be repaired, decontaminated, or replaced.

5.12.9 The HMRT should survey and preplan fixed facilities where hazardous materials could be released. HMRT should determine if property beyond the facility will be impacted and then plan accordingly. Planning for transportation incidents can present a challenge. However, surveying areas where incidents are likely to occur and developing plans for safe access and protection of nearby vulnerable populations can be beneficial.

5.12.10 Vulnerable areas may include waterways, sewer systems, environmentally sensitive areas, roads, bridges, water treatment facilities and other sensitive areas.

5.12.11 Researching the chemical and physical properties of the materials that could be involved and pre-planning for the use of specialized equipment should help HMRT prepare for the possible contamination or damage of that equipment. When such equipment will be out of service for decontamination, repair, or replacement the HMRT should plan for its quick replacement or have other contingency plans in place.

5.12.12 The HMRT should identify those fixed facilities that might cause off-site impact and develop pre-incident plans with the assistance from the facility to minimize those effects.
5.12.13 Potential scenarios that might lead to a catastrophic release and impact to a major highway or transportation corridor should be discussed with the local emergency management agency, transportation agency, local elected officials, and other stakeholders.

5.12.14 The HMRT should develop a relationship with other local, regional, and state emergency response agencies so assistance can be quickly obtained when catastrophic events result in major impact to the community.

5.13 Risk Characterization: Risk characterization combines the results of the hazard identification and risk assessment to define the probability and severity of adverse social, economic, environmental, infrastructure, and/or health risk to the community. When characterizing risks the following types of impacts should be considered:

(a) Social Impact – How can the identified risk impact the life safety and security of the community?

(b) Economic Impact – How can the identified risk affect the local, regional, or national economy?

(c) Environmental Impact – How can the identified risk affect the environmental quality? Is the facility located next to a critical aquifer, navigable waterway, or sensitive environmental area?

(d) Infrastructure Impact – How can the identified risk impact local or regional energy supplies, communications, or national security?

(e) Public Health Impact – How can the identified risk impact public health? Will potential incidents have an acute or chronic effect? Are special/functional needs populations potentially at risk?

5.14 Cascading Events: Cascading events are incidents that compound the stresses placed on the response system as a whole. For instance, a single manmade event occurring simultaneously along with a natural disaster can compound the intensity by virtue of the sheer magnitude. Likewise, a natural disaster such as an earthquake can cause multiple incidents at multiple locations which can spiral out of control and have secondary or tertiary impacts to life safety, public health, or the environment. When evaluating cascading event potential, each event location should be viewed as an individual event within the context of a larger disaster complex.

5.15 Geographic Based Threat Assessment: Geographic threat assessment utilizes Geographic Information Systems (GIS) allowing the user to better visualize, question, analyze, interpret, and understand inter-dependencies, patterns, and trends. GIS provides layers of information that can be used to map locations and assess potential impact. This allows planners to identify the relationships between the hazards, predict outcomes, visualize scenarios, and plan strategies.
5.16 **Computer Based Assessment**: Computer based assessments use a variety of computer-based modeling to determine the potential impact of a hazardous materials release. Computer models are designed to evaluate specific issues such as hazardous substances releases, migrating toxic gas plumes, oil spill migration, blast effects, and weather. When computer data is combined with Geographic Information Systems data the consolidation of information can give planners a clearer picture of the potential vulnerabilities within the community, region, or state.

5.17 **Strategic Plan**: A strategic plan is the final work product that incorporates all of the hazard and risk assessment work products into a cogent document for elected officials and public safety agencies. When done properly, a strategic plan provides clear direction for decision makers. The plan summarizes the hazardous materials problems within the community, prioritizes the most significant issues that need to be addressed, and allocates resources required to reduce risks to the community at large. A key component of the Strategic Plan is the identification of the different levels of emergency services needed to safely mitigate a hazardous materials incident. The key elements of a Strategic Plan should include:

(a) **Purpose** – States the purpose and goals of the plan.

(b) **Scope** – Identifies the Authority Having Jurisdiction and their geographic boundaries.

(c) **Situation** – Describes the hazardous materials problems within the defined jurisdiction.

(d) **Concept of Operations** – Describes the general concept of operation for addressing the hazardous materials problem and the desired outcomes that will lower risks to the community.

(e) **Administration and logistics** – Describes who has ownership of the plan and who is responsible for providing funding and tracking costs.

(f) **Plan maintenance** – Describes who is responsible for managing change and ensuring action items are closed out.

(g) **Emergency Support Functions** – Defines what Emergency Support Functions (ESF) are needed to implement parts of the plan and the names the specific agencies that are required to staff those respective functions. For example, during an Evacuation, ESF-1 (Transportation) and ESF-6 (Sheltering) will be activated. Each ESF within the plan is responsible for determining how they will support the Strategic Plan as it is implemented.

(h) **References** – A list of applicable laws, regulations, or plans that provide authority or direction for the plan.
Chapter 6 - Community and Organizational Influences

6.1 Introduction

6.1.1 Purpose: The purpose of this chapter is to provide information and guidance for hazardous materials/weapons of mass destruction response team (HMRT) program managers in understanding and managing the internal, external and planning influences which may affect HMRTs. HMRT program managers must assess conditions specific to their jurisdiction and remain aware of how these influences and how they affect the management and operation of HMRTs.

6.1.2 Scope:

6.1.3 Internal Influences – Internal influences are intra-organizational (i.e. response agency), local, and or regional jurisdictional conditions or circumstances which may influence, control and/or affect how HMRTs prepare for and respond to hazardous materials and weapon of mass destruction (WMD) incidents.

6.1.3.1 Internal organizational influences are issues, conditions, and or constraints which affect how a jurisdiction prepares for, responds to, and manages a hazardous materials/weapon of mass destruction (WMD) incident.

(a) Organizational influences may include political, financial, resource allocation and response capability considerations.

(b) The level of response capability in a given community may range from a well-trained and equipped hazardous materials response team to no local hazmat response capability at all.

(c) HMRT program managers must assess and adapt to various opportunities, conditions, and constraints associated with internal organizational influences.

6.1.3.2 The local authority having jurisdiction (AHJ) can and often does influence how HMRTs respond to and manage hazardous materials/WMD incidents.

(a) Decisions on HMRT preparation and response are influenced by community hazard identification, vulnerability analysis, risk assessment, and response capabilities, as well as economic and political considerations.
(b) HMRT program managers should gain an understanding of local AHJ influences and develop team capabilities based on these conditions and constraints.

6.1.3.3 Internal economic considerations may include internal funding sources, financial liabilities, local or regional tax bases which fund the HMRT, organizational budgeting priorities, and financial resource allocation decisions.

a) HMRT program managers must constantly be prepared to justify program costs and budget requests. Internal competition for funding is often fierce and low frequency, high-risk response resources (e.g. HMRTs) can be forgotten if the HMRT does not have a champion during budget discussions.

b) Internal budget allocations and priorities often change with each budget cycle. HMRT program managers frequently find that they must re-justify HMRT needs with each new cycle. Ongoing cost-benefit analysis and performance tracking are important components of program management.

6.1.3.4 Internal political influences may include local and regional business considerations (e.g. industries which contribute to the tax base and are of value to the community), labor agreements within response agencies, citizen groups and activists (e.g. environmentalists), inter-jurisdictional mutual aid agreements, political edicts and directives, and local regulatory requirements. (Reference Chapter 12 – Community Outreach and Marketing for related information).

(a) Preparation for and response to hazmat incidents can become highly political. Frequently, industrial plants and chemical facilities that present the greatest perceived risk to a community are also large employers which generate significant tax revenues for the same community.

(b) HMRT program managers must develop an awareness of the political sensitivities associated with hazmat facilities and understand the ramifications of incidents at such facilities. Program managers must avoid being drawn into a battle between environmental or community activists and industry.

6.1.3.5 Internal environmental influences may include local and regional land use and zoning, prevailing weather conditions, and atmospheric and topographical conditions which can affect the preparation for and response to hazardous materials/WMD incidents.
Planning and zoning regulations may cluster high risk industrial occupancies and hazmat transportation modes (e.g. pipelines) near each other. HMRT program managers should ensure that such areas are subject to pre-incident planning to ensure familiarity with the occupancies and related hazards and risks.

(b) HMRT program managers should develop atmospheric air monitoring capabilities utilizing advanced technology and computer software programs to evaluate the effects of environmental conditions during responses to Hazmat and weapons of mass destruction incidents.

6.1.3.6 Cultural influences may include inter or intra-jurisdictional response priorities, organizational history, and perceived community need which influence an organization’s preparation and response to hazardous materials/WMD incidents. (Reference Chapter 12 – Community Outreach and Marketing for related information)

6.1.4 External Influences – External influences are inter and or extra-organizational relations, conditions, and/or circumstances which may influence, control or affect how HMRTs prepare for and respond to hazardous materials and weapons of mass destruction (WMD) incidents.

6.1.4.1 External economic influences include the overall economic condition of the country, funding streams from external sources (e.g. grant programs, government programs, donations, etc.), and the ability to recover costs associated with response to Hazmat incidents.

(a) HMRT program managers must monitor and take advantage of federally funded training programs. There are numerous programs which provide funded training for Hazmat response personnel.

(b) HMRTs can benefit from and share in cost recovery from expenditures at Hazmat incidents. Program managers should become aware of the administrative and financial processes associated with cost recovery and ensure that the HMRT is properly reimbursed as permitted by established cost recovery practices in their communities.

6.1.4.2 External political influences include adjacent jurisdictions or agency mandates; federal, state, and local Hazmat laws, regulations, and consensus standards that affect the chemical and related industries; interstate commerce; and the management of HMRTs (Reference Chapter XX - Laws and Regulations). Laws, Regulations and Standards may include:
(a) Hazardous materials laws such as the Resource Conservation and Recovery Act of 1976 (RCRA); the Comprehensive Environmental Response; Compensation and Liability Act of 1980 (CERCLA); the Superfund Amendments and Reauthorization Act of 1986 (SARA); and the Oil Pollution Act of 1990.

(b) Hazardous materials regulations such as Hazardous Waste Operations and Emergency Response (29 CFR 1910.120); Community Emergency Planning Regulations (40 CFR 300-400); Hazard Communication Regulation (29 CFR 1910.1200); Hazardous Materials Transportation Regulations (49 CFR 100-199); and the National Contingency Plan (40 CFR 300).

(c) Voluntary consensus standards that affect HMRTs include NFPA 472 – Standard for Professional Competence ofResponders to Hazardous Materials and Weapons of Mass Destruction Incidents; NFPA 473 - Standard for Professional Competence of EMS Personnel Responding to Hazardous Materials and Weapons of Mass Destruction Incidents; and various other industry specific standards (e.g. American Petroleum Institute).

(d) Laws, regulations and consensus standards all directly affect the operation of a HMRT. Program managers must be familiar with and guided by the requirements set forth in these documents.

6.1.4.3 Existing external services, agencies and organizations can influence the operation of HMRTs and may include:

(a) Relations with private industry, including funding, training support, team participation and expert consultation resources.

(b) Interaction with local emergency planning committees (LEPCs) can provide funding and training support and interaction.

(c) Development of relationships with state and federal agencies including state emergency management agencies, the FBI Hazmat Response Team (HMRT), the Coast Guard, the EPA, and like agencies with common Hazmat response and mitigation missions.

(d) Cooperative relationships with external services, agencies and organizations can have a mutually beneficial effect on HMRT operations and should be cultivated and maintained by the program manager.

6.1.5 HMRT Planning Considerations – Planning and preparedness for hazardous materials and weapons of mass destruction incidents is a primary
component of a Hazmat response system. HMRT program managers must be aware of, utilize, and integrate a number of planning considerations including:

6.1.5.1 Community hazards analysis which identifies the specific hazardous materials and associated risks present in a community, and;

6.1.5.2 Community emergency or contingency planning which outlines a comprehensive and integrated approach to the defined local Hazmat problem, and;

6.1.5.3 Local and state emergency operations plan(s) which address roles and responsibilities for preparation, response and mitigation of hazardous materials and weapons of mass destruction incidents within a locality or region, and;

6.1.5.4 Local planning and zoning standards, and industrial regulations which may dictate where hazardous materials are located in a community, the containers or vessels which store hazardous materials, the amount which may be stored at a given site, and the reporting requirements for chemical releases, and;

6.1.5.5 Jurisdictional charters, directives, interagency agreements, etc. which support the response and mitigation considerations of the various plans in place within a community.

Chapter 7 – Training

7.1 Introduction

7.1.1 Purpose: The purpose of this chapter is to provide information and guidance for hazardous materials/weapons of mass destruction response team (HMRT) program managers in understanding the importance of initial and ongoing training to develop the personal competence of HMRT response personnel as required by established regulations and the recommendations set forth in NFPA Standards.

7.1.2 Scope: The development of a comprehensive training program is an essential component of a hazardous materials program. The training program should serve as a source of initial and ongoing team training, but should also accommodate the evaluation of personnel competence as required by both OSHA regulations and NFPA standards. The training program should produce products that provide accurate, timely, and engaging training that are both challenging and worthwhile for the members of the Hazmat team.

7.1.2.1 Failure to provide sufficient training for Hazmat team personnel may have disastrous consequences including mission failure, violation of OSHA regulations, and injury or death to team members or the public. The training program must not be viewed as a burden or afterthought, nor should an assignment to the training program be viewed as a reprimand. In contrast, progressive Hazmat team leaders place their best and
brightest team members in the training program in order to ensure quality of instruction and improve team efficiency.

7.1.2.2 The goal of any Hazmat training program should be to encourage the transfer of knowledge to the team members, modify the behavior of the team to ensure their health & safety, and prepare the team to manage incidents in an efficient manner. Field work should reflect the outcomes that are described, discussed and demonstrated during a training event. A professionally prepared training program will deliver measurable performance outcomes as they relate to the tasks required during operational missions.

7.2 Training Delivery Methodologies and Models:

7.2.1 Competency Based Training: OSHA federal regulations and NFPA both reference the term “competency” throughout their respective documents. Hazmat team leaders must embrace the intent of the term as is relates to the evaluation of Hazmat team personnel. OSHA 29CFR 1910.120 states under each of the response levels in Paragraph (q) (6) that the responder must demonstrate competency in each of the skill areas referenced. NFPA 472 defines competence as “Possessing knowledge, skills, and judgment needed to perform indicated objectives”.

Hazmat team leaders should choose a methodology to measure the competency of their team. Attendance at classroom training sessions, watching videos, or the donning of chemical protective clothing do not become measures of competency until the learner’s knowledge, skill, or judgment is evaluated and documented. The evaluation of learning may be accomplished by various methods. A following popular method for evaluating learning has been published by Dr. Donald Kirkpatrick:

(a) Level 1 Evaluation – This evaluation level measures the reaction of the learner to the training delivered. This reaction is typically measured by the completion of an evaluation form by the learner. These forms provide the training program manager with a snapshot of the training’s effectiveness from the perspective of the learner and should include questions on the content, delivery, and relevance of the training material. Evaluation sheets on their own do not prove competence but they do assist with validation of the training delivery.

(b) Level 2 Evaluation – This evaluation level measures the learning of the learner. The learning is typically measured by a metric based, quantifiable evaluation tool such as written tests, skills testing, or observation of performance. There are many techniques available to enhance the measurement of learning, such as pre-testing prior to the training delivery and then measuring the improvement in knowledge with post-test evaluations.

(c) Level 3 Evaluation - This evaluation level measures the changes in behavior from the learner. The evaluation of behavior change is typically performed over time to ensure that the knowledge, skills, and judgment of the learner is retained and used as a matter of routine. The evaluation of behavior change can be accomplished through techniques such as re-
testing the learner after a period of time or direct observation of the learner’s performance.

It should be noted that Kirkpatrick’s evaluation model includes a fourth level evaluation based upon a measurement of the ratio of the cost of the training project in comparison to the return of investment to the organization. While a valid business model and a financial consideration for Hazmat team leaders, the measurement of return of investment does not impact the measurement of competency for Hazmat team personnel and will not be discussed further.

7.3 Selection and Competence of Instructors: Hazmat team leaders should carefully select the instructors who will deliver training to the members of the hazardous materials program. OSHA gives general guidance for the competence of instructors in 29CFR 1910.120 (q) (8), stating that instructors delivering instruction on Hazmat topics should have:

(a) Satisfactorily completed a course in the delivery of training (educational methodology), or;
(b) Have the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills, and;
(c) Have a good command of the subject matter to be delivered.

The completion of an educational methodology course, although optional under OSHA, is an important benchmark in the overall validation of a training program. Completion of an educational methodology course will allow training program personnel to develop programs of instruction that follow a methodical validated process that is more likely to withstand scrutiny if the quality of the team’s instructional program is ever called into question.

Hazmat team members who are chosen to be Hazmat instructors should thoroughly prepare for the training programs they will deliver. As OSHA recommends, instructors should have a good command of the subject matter and should be able to deliver the material with confidence. Hazmat team members should be encouraged to deliver team training. Course preparation transfers a great deal of knowledge to the instructor as well. Hazmat team training should be lively and engaging. One of the pioneers of adult learning, Malcolm Knowles theorized that adults only learn when certain criteria are met:

(a) Adult learners want to make decisions regarding their learning (self-direction).
(b) Adult learners’ life experiences provide a foundation for their learning.
(c) Adult learners must be ready to learn (desire to learn).
(d) Adult learners want to learn things they can apply to their life (application of learning).
(e) Adult learners are more internally, rather than externally; motivated to learn.
Adult learners must understand the reason they are learning (*need to know*).

Instructors should facilitate learning based on the above principles rather than simply lecturing to their learner. The key to a successful transfer of knowledge is by achieved by providing an environment that encourages the participants to learn.

**7.4 Training Program Development:** The development of training programs should be based upon an analysis of the needs of the organization. Hazmat team leaders should ensure that training programs meet both the regulatory requirements and operational needs of the team. A decision must be made whether to use external, internal, electronic, or a combination of these programs for the delivery of training.

**7.4.1 External Training Programs:** External training programs are programs that are developed, and typically delivered by agencies or individuals from outside of the AHJ.

**7.4.1.1 External Training Program Advantages:** External training programs offer several advantages for Hazmat teams. The curriculum development process is typically borne by the external provider and external instructors may provide a fresh insight and perspective to course topics. External instruction is often preferred when introducing new equipment or procedures. External training programs where the team members physically travel at a remote location adds additional advantages. The remote location may include training equipment not available in the home jurisdiction. A physical separation from the normal workplace also reduces distractions associated with normal work activities such as administrative tasks and on-call duties.

**7.4.1.2 External Training Program Disadvantages:** External training has several disadvantages that must be considered. Costs incurred by bringing in outside instructors, outside course development, locating training with sufficient expertise, personnel travel, course fees, and backfilling personnel to replace trainees all have to be factored in. The costs and reliance on external training are significant and Hazmat team leaders should consider internal training programs as an alternative.

**7.4.2 Internal Training Programs:** Internal training programs are programs that are developed and delivered by individuals within the AHJ, or “packaged” instructional curricula that can be delivered by individuals within the AHJ.

**7.4.2.1 Internal Training Program Advantages:** Internal training programs offer several advantages including efficient use of training funds, training products that are uniquely tailored for the AHJ, administrative control over course content, convenient access to the training program by team members, and repeatability of course deliveries for multiple shifts of personnel.

**7.4.2.2 Internal Training Program Disadvantages:** The primary disadvantages of internal training programs revolve around quality. The quality of the curriculum development, course materials, training equipment, facilities, instructors, and evaluation of learning are the responsibility of the Hazmat team leader and must be closely monitored. Leaders must realize that the delivery of training in the classroom is the only a small component of the curriculum process. The analysis, design, development, and evaluation of training will require a great deal of time and effort compared to the actual delivery of the training itself. Other disadvantages of internal training include complacency, apathy, and internalization when the same instructor is used over and over.
Encouraging team members to take over training duties can enhance instruction and increase the knowledge of the guest instructor as they prepare to deliver the course.

7.4.3 Electronic Learning Programs: E-Learning (Electronic Learning) can provide a low cost alternative for external training deliveries. When properly designed, these programs can evaluate competency and the transfer of learning. E-Learning can provide either individual or group instruction on topics that would otherwise be difficult to provide. Delivery times are often more convenient for the learner. E-Learning deliveries include Computer Based Training, Web Based Training, and Simulation Training. It is recommended that E-Learning techniques be followed by practical application exercises to reinforce the transfer of knowledge to the learner.

7.4.3.1 Computer Based Training (CBT): Computer Based Training (CBT) is an E-Learning method which is comprised of a software program loaded onto a standalone computer or Local Area Net (LAN) and runs independent of the internet. These software programs are either purchased or obtained at little or no cost and can be taken by team members at their convenience. The AHJ must provide a computer station and allow sufficient time for the learner to complete the training. It is recommended that the CBT program be reviewed in advance by the training officer to ensure the content meets several factors including technical accuracy, applicability to the AHJ’s mission, and an evaluation of competency following the training.

7.4.3.2 Web Based Training (WBT): Web Based Training (WBT) is an E-Learning method which is comprised of a program accessed through a remote internet server. The entire content of the program may reside on a third-party system with access by the AHJ through an internet site. These programs are either purchased or obtained at little or no cost and can be taken by team members at their convenience. The AHJ must provide a computer station in order to complete the WBT and that station must have an internet connection with sufficient speed to participate in the training without delays. The AHJ must allow sufficient time for learner to complete the training. It is recommended that the WBT program be reviewed in advance by the training officer to ensure the content meets several factors including technical accuracy, applicability to the AHJ’s mission, and an evaluation of competency following the training.

7.4.3.2 Simulation Training: Simulation training is an E-Learning method which is comprised of a program that is either loaded on a standalone computer, or LAN, or is accessed through the internet. Simulation training is unique in that the simulation program places the learner in situations where operational decisions dictate the outcome of scripted scenarios. Satisfactory responses are generally rewarded with favorable scenario outcomes and unsatisfactory responses are generally rewarded with deterioration of the scenario. The AHJ must provide a computer station to participate in the training and if the course is web-based that computer must have an internet connection with sufficient speed to take the training without delays. The AHJ must allow sufficient time for learners to complete the training. It is recommended that the Simulation program be reviewed in advance by the training officer to ensure the content meets several factors including technical accuracy, applicability to the AHJ’s mission, and an evaluation of competency following the training.

7.5 Curriculum Development: Proper development of training curricula is the cornerstone of a successful training program. Putting a PowerPoint together and showing
it to the team may satisfy the training requirement, however there can be little expectation of the quality and retention of that training. The field of adult education or “andragogy” focuses on the concept that all training developed for adults should emphasize the transfer of knowledge to the learner and that adult education is a professional process. The development of training curricula should follow a consistent process that will meet the instructional needs of the AHJ and withstand scrutiny for the validity of the training for regulatory and accreditation purposes. Often, a group of training specialists can work together as a curriculum development team to improve the process. There are numerous instructional design models available, and no one method is necessarily better than the other. A common example widely used in adult learning is the “ADDIE” model. The ADDIE acronym stands for Analysis, Design, Development, Implementation, and Evaluation.

The ADDIE model has been adopted and further enhanced by the Federal Emergency Management Agency’s Responder Training Development Center by adding a ”Planning” phase turning “ADDIE” into “PADDIE”. The use of the curriculum development tool on the Responder Training Development Center’s website will assist course developers through the instructional design process and ensure that the course development is in line with DHS standards.

7.5.1 Planning: The Planning phase looks at the project from a strategic level, assessing the AHJ needs, the training scope, developmental resource needs and program scheduling and budgets. Team leaders must weigh the benefits of internal course development against available financial, staffing, and logistical resources.

7.5.2 Analysis: Every training project should contain an analysis of factors that will impact course development. Analysis should concentrate on identifying existing gaps in the Hazmat team’s capabilities, the current relevant and available instruction, and the knowledge, skills and abilities of the learner who will be attending the training. Examples of the analysis process should include tools such as:

(a) Audience Analysis: An analysis of which personnel within the organization that should attend the training and any challenges exist getting those personnel to the training event.

(b) Job Task Analysis (sometimes referred to as a Work Analysis): An analysis of the learner’s job tasks and how the training delivered will apply to the learner’s job.

(c) Learner Analysis (sometimes referred to as a Learner Gap Analysis): An analysis of the learner’s current knowledge, skills, and abilities as they relate to the subject to be delivered.

Performance of an analysis can be accomplished using a variety of tools including surveys, interviews, group sessions, and other similar techniques. It is often beneficial to include agency stakeholders (supervisors, administrators, external peers, etc.) when performing Audience and Job Task Analysis. When performing the Learner Analysis, the curriculum designer should ensure that a statistically significant number of potential learners are included in the discussion.
7.5.3 Design: Once the analysis tools have been completed the design of the training product can begin. During the design phase decisions are made regarding the components of the training and the best methods for delivery in order to bridge the gaps discovered during the analysis phase. Often, the design phase is captured in a “Design Document”. Design Document elements include items such as:

(a) The goal of the training

(b) The objectives or desired accomplishments of the training

(c) The performance targets of the training

(d) Results of all analysis tools

(e) Statutory and regulatory requirements

(f) Training course prerequisites

(g) A list of deliverable course materials (visuals, handouts, evaluation tools)

(h) Instructional strategies and models (classroom, practical sessions, group sessions, etc.)

(i) Evaluation strategies

(j) Plan for implementation of the training

The design phase is complete when the curriculum development team has a grasp on how the training product will look, who will attend, what is needed to deliver the training, how it will be delivered, and how the transfer of knowledge to the learner will be measured.

7.5.4 Development: Once the design phase has been completed the development of the training product can begin. During the development phase course materials are researched and written, visual aids are created, practical skill sessions are developed, training aids and props are built, evaluation tools are written and validated, student and instructor handbooks are designed, and any courses destined for computer or web based delivery are loaded into an electronic format.

A “plan of instruction” or “lesson plan” should be developed that will act as the playbook for the delivery of the course, to include the goal and objectives for the course, course material requirements, and guidance for the instructor to maintain flow. The lesson plan should be written so that any instructor knowledgeable in the topic can pick it up and deliver the course. As the development phase proceeds, the curriculum development team should continually refer back to the design document to ensure that the vision phase transitions from the development phase.
7.5.5 Implementation: Once the course materials have been developed the implementation phase begins. The curriculum development team may decide to deliver an initial course offering called a “pilot” before a select audience for the purpose of evaluating the course. Delivering a pilot course is a good opportunity to “proofread” the course material, look at visual aids, conduct practical sessions, develop evaluation tools, and check the overall flow of the material.

The delivery of the training course should be coordinated so that all team members are allowed to attend and participate in all classroom and practical sessions. The instructional team must ensure that all tools and materials identified during the design and development phases are available for implementation. The learner should be given course materials such as student manuals and reference sheets to assist them in reviewing the material after delivery. The instructors should continually assess the ratio of learners to instructors to maintain control of the learning environment.

7.5.6 Evaluation: Once the training program has been implemented the evaluation phase can begin. As discussed earlier, leaders of Hazmat team should determine the appropriate methodology to measure competency. During the design phase the curriculum development team should have identified the level of evaluation needed to assess the transfer of knowledge to the learner.

7.6 Training Delivery Models: During the design phase the curriculum development team must determine the best model of delivery for the learner. Although each type of training delivery has its own unique advantages, successful training programs often use a blended format comprised of several different models to offer a variety to the learner. The most common types of training delivery models are as follows:

(a) Instructor-led classroom lecture: This model is suited for large group delivery of technical material. However it is not very useful for evaluating competency.

(b) Instructor-facilitated discussion: This model is suited for large group delivery of material when there is a desire for immediate feedback from the learner. However it is not very efficient for evaluating competency.

(c) Instructor-led demonstration: This model is suited for large group demonstrations of visual concepts such as chemical & physical property demonstrations. However it is not very useful for evaluating competency.

(d) Self-paced learning: This model is suited for research type work by the learner. Using the Emergency Response Guidebook and NIOSH Pocket Guide to Chemical Hazards are examples of this method. This model can be used for competency skills evaluation.
(e) Small group lecture: This model is suited for delivery of technical information where a more intimate instructor-learner ratio is desired. However it is not very efficient for evaluating competency.

(f) Small group demonstration: This model is suited for demonstration of equipment that requires close proximity of the learner to the instructor. This model can be used for evaluation if properly planned by the instructor team.

(g) Practical skill sessions: This model is suited for hands-on experience by the learner and can be used for evaluation if properly planned by the instructor team.

(h) E-Learning (Web-based or computer-based): This model is suited for individual delivery of written material and can be used for evaluation of written competency.

(i) Simulation: This model is suited for either individual or group training and involves the use of electronic aids to present the learner with unique problem solving and critical thinking exercises.

(j) Scenario-based practical sessions: This model is suited for maximum transfer of learning to the learner and can be used for evaluating competency.

(k) Table-top exercises: This model is suited for transfer of learning on administrative tasks such as the incident command system or strategic management training and can be used for evaluation of competency if properly planned by the instructor team.

(l) Full scale exercises: This model is suited for maximum transfer of learning and can be used for evaluating competency. Real-time, unannounced exercises are beneficial for maximum evaluation.

(m) One-on-one evaluation: This model is best suited for evaluating individual skill competencies.

7.7 Physical Training Facilities: Well-designed training facilities can dramatically enhance the transfer of knowledge to the learner. Conversely poorly designed training facilities can dramatically detract from the transfer of knowledge. Hazmat team leaders should work within their AHJ’s budget to develop training facilities that provide plenty of space to learn the tradecraft.
7.7.1 Classrooms: Classrooms should be designed with the needs of the learner in mind. The following is a list of desirable features in a modern classroom. Hazmat team leaders should consider the following features during new construction or refurbishment of training facilities.

(a) The classroom should ideally have a minimum number of windows to maximize the visibility of presentations and to minimize distractions for the learner.

(b) The classroom should have a projector capable of projecting a bright image even in ambient light conditions. Ideally it should be suspended from the ceiling or set up for rear projection.

(c) The classroom lighting should allow for ample lighting at the learner’s desks.

(d) The classroom should have ample desk space for each learner.

(e) The classroom should be sufficient in size to allow for flexibility and multiple seating configurations.

(f) The classroom should have isolated environmental controls for learner comfort.

(g) Each learner should have a clear view of the screen.

(h) The classroom should have an audio system capable of playing sound from video presentations and amplifying the instructor’s voice.

(i) The classroom should have a computer for PowerPoint presentations and/or a connection for laptop computers.

(j) The classroom should be capable of playing multi-media presentations.

(k) Consideration should be given to adding an instructor preparation room allowing instructors to discuss the course away from the learner.

7.7.2 Training Props: Meeting the NFPA 472 hazardous materials competencies requires a demonstration of skills as they relate to many subject areas including personal protective equipment, product control, decontamination, and detection & monitoring. Hazmat team leaders must ensure that training programs have access to sufficient equipment and training props for team training and evaluation. Training props can be expensive and in many cases too large for existing training facilities. Hazmat team leaders should consider development of regional training centers for larger props such as rail tank cars and tank trucks so the expenses for those props can be shared.
Training equipment to be considered for acquisition by training programs may include:
(a) Self-contained Breathing Apparatus and spare cylinders
(b) Air Purifying Respirators
(c) Powered Air Purifying Respirators
(d) Fully Encapsulating Chemical Garments
(e) Encapsulating Chemical Splash Garments
(f) Chemical Splash Garments
(g) Chemical Resistant Boots
(h) Chemical Resistant Gloves
(i) Multiple Gas Chemical Monitors
(j) Single Gas Chemical Monitors
(k) Alpha, Beta, Gamma, Neutron Radiation Detectors
(l) Reagent papers
(m) Advanced Detection Equipment per the AHJ
(n) Product Control kits per the AHJ

Training props might include:
(a) Chlorine 100lb and 150lb cylinders
(b) Chlorine Ton Container ends
(c) Chlorine DOT-105 Tank Car Dome
(d) Propane tank burn prop
(e) MC306/DOT406 Highway Cargo Tank Truck
(f) MC307/DOT407 Chemical Cargo Tank Truck
(g) MC312/DOT 412 Corrosive Tank Truck
(h) MC331 Pressure Highway Cargo Tank Truck
(i) MC338 Cryogenic Tank Truck
(j) DOT111 (low pressure) Railroad Tank Car
(k) DOT105 or DOT112 (high pressure) Railroad Tank Car
(l) Drum Leak Simulators
(m) Pipe leak “trees”

Electronic simulation devices:
(a) Air Monitoring & Detection Simulators
(b) Incident Command Simulators
(c) Virtual Reality Simulators

7.8 Levels of Hazardous Materials Training: A critical component of Hazmat team management is determining the level of training needed for your team. That decision should be based on an assessment of the expected tasks to be performed by the team, the time available for initial and recertification training, and the financial commitment from the AHJ.

There are three distinct sources for determining the desired Hazmat training level, the Occupational Safety & Health Administration (OSHA), the Environmental Protection
Agency (EPA), and the National Fire Protection Association (NFPA). OSHA 29 Code of Federal Regulations (CFR) 1910.120 “Hazardous Waste Operations and Emergency Response” is a regulation that is enforceable by OSHA investigators. Violations of the regulation can result in fines levied against the AHJ and/or individuals within the AHJ. EPA 40 CFR 311 “Worker Protection” is essentially a mirror of OSHA 29 CFR 1910.120, and applies to all employees within States that do not have a State-specific OSHA plan. 40 CFR 311.2 specifically defines an employee as either a compensated or non-compensated worker controlled by a State or local government, which includes most volunteer public safety agencies. As 40 CFR 311 is essentially the same document as OSHA, all further reference will be to 29 CFR 1910.120 and inferred to include 40 CFR 311.

NFPA 472 “Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents” is a voluntary consensus standard defining minimum competencies for personnel who respond to Hazmat incidents. There is no enforcement body for NFPA 472. However, the Standard (2008 edition) has been adopted by the Department of Homeland Security as a minimum requirement for all HazMat responders. Essentially, OSHA 29CFR 1910.120 is the law and NFPA 472 is a standard for the Hazmat emergency response community. Hazmat teams that train to the competencies set forth in NFPA 472 will far exceed OSHA 29CFR 1910.120.

7.8.1 Hazmat Responder Training Levels per OSHA 1910.120: OSHA 29CFR 1910.120 defines the levels of training for Hazmat emergency responders in paragraph (q)(6). Promulgated in 1990, the regulation recognizes five (5) levels of training: First Responder Awareness Level, First Responder Operations Level, Hazardous Materials Technician, Hazardous Materials Specialist, and On-scene Incident Commander.

Key points with the OSHA levels of training include:

(a) The language is very clear. If you are part of the response then you must train your personnel to First Responder Operations Level as a minimum.

(b) If the mission of the team is to take offensive actions to perform product control you must train your personnel to Hazardous Materials Technician as a minimum.

(c) OSHA requires that all responders be trained prior to responding to an incident and requires that the AHJ certify that the responder has shown competency in each area.

7.8.1.1 First Responder Awareness Level (OSHA 29CFR1910.120 (q) (6)): First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond notifying the authorities of the release. First responders at the awareness level shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

(a) An understanding of what hazardous substances are and the risks associated with them in an incident.
(b) An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.

(c) The ability to recognize the presence of hazardous substances in an emergency.

(d) The ability to identify the hazardous substances, if possible.

(e) An understanding of the role of the first responder awareness individual in the employer's emergency response plan including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook.

(f) The ability to realize the need for additional resources, and to make appropriate notifications to the communication center.

7.8.1.2 First Responder Operations Level (OSHA 29CFR1910.120 (q) (6)): First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operational level shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level and the employer shall so certify:

(a) Knowledge of the basic hazard and risk assessment techniques.

(b) Know how to select and use proper personal protective equipment provided to the first responder operational level.

(c) An understanding of basic hazardous materials terms.

(d) Know how to perform basic control, containment and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.

(e) Know how to implement basic decontamination procedures.

(f) An understanding of the relevant standard operating procedures and termination procedures.

7.8.1.3 Hazardous Materials Technician (OSHA 29CFR1910.120 (q) (6)): Hazardous materials technicians are individuals who respond to releases or potential releases for the
purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch or otherwise stop the release of a hazardous substance. Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

(a) Know how to implement the employer's emergency response plan.

(b) Know the classification, identification and verification of known and unknown materials by using field survey instruments and equipment.

(c) Be able to function within an assigned role in the Incident Command System.

(d) Know how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician.

(e) Understand hazard and risk assessment techniques.

(f) Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit.

(g) Understand and implement decontamination procedures.

(h) Understand termination procedures.

(i) Understand basic chemical and toxicological terminology and behavior.

7.8.1.4 Hazardous Materials Specialist (OSHA 29CFR1910.120 (q) (6)): Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician, however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with Federal, state, local and other government authorities in regards to site activities. Hazardous materials specialists shall have received at least 24 hours of training equal to the technician level and in addition have competency in the following areas and the employer shall so certify:

(a) Know how to implement the local emergency response plan.

(b) Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.

(c) Know the state emergency response plan.
(d) Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist.

(e) Understand in-depth hazard and risk techniques.

(f) Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available.

(g) Be able to determine and implement decontamination procedures.

(h) Have the ability to develop a site safety and control plan.

(i) Understand chemical, radiological and toxicological terminology and behavior.

7.8.1.5 On-Scene Incident Commander (OSHA 29CFR1910.120 (q) (6)): Incident commanders, who will assume control of the incident scene beyond the first responder awareness level, shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

(a) Know and be able to implement the employer's incident command system.

(b) Know how to implement the employer's emergency response plan.

(c) Know and understand the hazards and risks associated with employees working in chemical protective clothing.

(d) Know how to implement the local emergency response plan.

(e) Know of the state emergency response plan and of the Federal Regional Response Team.

(f) Know and understand the importance of decontamination procedures.

7.8.2 Hazmat Responder Training Levels per NFPA 472: NFPA 472 defines the levels of training for emergency responders in essentially two categories, Operations Level Responders and Hazardous Materials Technicians. NFPA does not recognize the Awareness Level training for responders. However it does define an Awareness Level of training for non-response personnel. There are several specialty areas for Hazardous Materials Technicians including Hazardous Materials Officer, Hazardous Materials Safety Officer, Tank Cars, Cargo Tanks, Intermodal Tanks, and Marine Tank and Non-Tank Vessels. NFPA 472 does not recognize a Hazardous Materials Specialist level of training like OSHA 29 CFR 1910.120.
Additionally, NFPA 472 further divides the Operations Level Responder training level into Core Competencies which all responders must achieve and Mission Specific Competencies for unique skill competency requirements. It is important to note that the Mission Specific Competencies are not designed to be a “checkbox” requirement rather the Operations Level Responder only needs to show competency for the Mission Specific Competencies chosen by the AHJ for their expected job tasks.

**7.8.2.1 Awareness Level Personnel (NFPA 472):** Personnel who, in the course of their normal duties, could encounter an emergency involving hazardous materials/Weapons of Mass Destruction (WMD) and who are expected to recognize the presence of the hazardous materials/Weapons of Mass Destruction (WMD), protect themselves, call for trained personnel, and secure the scene.

**7.8.2.2 Operations Level Responders (NFPA 472):** Persons who respond to hazardous materials/Weapons of Mass Destruction (WMD) incidents for the purpose of implementing or supporting actions to protect nearby persons, the environment, or property from the effects of the release.

**7.8.2.3 Operations Level Mission-Specific Competencies (NFPA 472):** The knowledge, skills, and judgment needed by operations level responders who have completed the operations level competencies and who are designated by the authority having jurisdiction to perform mission specific tasks, such as decontamination, victim/hostage rescue and recovery, evidence preservation, and sampling.

**7.8.2.4 Hazardous Materials Technician (NFPA 472):** Person who responds to hazardous materials/Weapons of Mass Destruction (WMD) incidents using a risk-based response process by which they analyze a problem involving hazardous materials/Weapons of Mass Destruction (WMD), select applicable decontamination procedures, and control a release using specialized protective clothing and control equipment.

**7.8.2.5 Hazardous Materials Officer (NFPA 472):** The hazardous materials officer (NIMS: Hazardous Materials Branch Director/Group Supervisor) shall be that person who is responsible for directing and coordinating all operations involving hazardous materials/WMD as assigned by the incident commander.

**7.8.2.6 Hazardous Materials Safety Officer (NFPA 472):** The hazardous materials safety officer (NIMS: Assistant Safety Officer — Hazardous Material) shall be that person who works within an incident management system (IMS) (specifically, the hazardous material branch/group) to ensure that recognized hazardous materials/WMD safe practices are followed at hazardous materials/ WMD incidents.

**7.8.3 Establishing Your Hazmat Team Training Level:** One of the most critical decisions a Hazmat team leader can make is to determine the level of training needed for their team. An objective assessment must be made based on the mission, staffing levels, financial support, and training availability of team members. Team leaders must realize the tremendous commitment necessary to train and maintain competency for a fully capable Technician Level Team.

The following is a decision matrix designed to assist team leaders in the determination of training levels. It is based upon the expected job tasks for team personnel. This is only a guide. Team leaders must assess their own unique situation to determine levels of training.
<table>
<thead>
<tr>
<th>Mission Expectation</th>
<th>Level of Training</th>
</tr>
</thead>
</table>
| **Administrative worker**, could encounter hazardous materials incidents in workplace | OSHA First Responder Awareness Level  
NFPA Awareness Level Personnel |
| **Responder**, could be sent to hazardous materials incidents, not intended to don Personal Protective Equipment | OSHA First Responder Operations Level  
NFPA Operations Level Responder - Core |
| **Responder**, could be sent to hazardous materials incidents, intended to perform rescue of victims from hazardous environments | OSHA First Responder Operations Level  
NFPA Operations Level Responder - Core  
NFPA Mission Specific Competencies for Personal Protective Equipment & Victim Recovery |
| **Responder**, will be sent to hazardous materials incidents, intended to perform decontamination and/or defensive product control | OSHA First Responder Operations Level  
NFPA Operations Level Responder - Core  
NFPA Mission Specific Competencies (MSC) for Personal Protective Equipment, and MSC for Mass Decontamination, Technical Decontamination, and Product Control as needed |
| **Responder**, will be sent to hazardous materials incidents, intended to enter the exclusion zone to assess the situation and assist in determining a plan of action. | OSHA First Responder Operations Level  
NFPA Operations Level Responder - Core  
NFPA MSC for Personal Protective Equipment, Evidence Preservation & Sampling, Illicit Labs, air monitoring & sampling |
| **Emergency Medical Technician**, will be sent to hazardous materials incidents, intended to receive only decontaminated patients. | OSHA First Responder Operations Level  
NFPA Operations Level - Core |
| **Emergency Medical Technician**, will be sent to hazardous materials incidents, intended to perform decontamination and/or patient care for contaminated patients | OSHA First Responder Operations Level  
NFPA Operations Level - Core  
NFPA MSC for Personal Protective Equipment, Technical & Mass Decontamination  
NFPA 473 for BLS/ALS providers as appropriate |
| **Emergency Medical Technician - Advanced Provider**, will be sent to hazardous materials incidents, intended for assignment to the hazardous materials team for overall team medical care | OSHA Hazardous Materials Technician  
NFPA Operations Level - Core  
NFPA MSC for Personal Protective Equipment, Technical Decontamination, Air Monitoring & Sampling  
NFPA 473 BLS/ALS Provider Recommended - NFPA Hazardous Materials Technician |
| **Bomb Technician**, will be sent to hazardous materials incidents, intended to assess and render-safe suspected explosive | OSHA Hazardous Materials Technician**  
NFPA Operations Level Responder - Core  
NFPA MSC for Personal Protective |
<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law Enforcement</td>
<td>Will be sent to hazardous materials incidents, intended to conduct activities outside of exclusion zone (i.e. Traffic Control)</td>
<td>OSHA First Responder Operations Level NFPA Operations Level Responder - Core NFPA MSC for Personal Protective Equipment, Evidence Preservation &amp; Sampling, Illicit Labs.</td>
</tr>
<tr>
<td>Law Enforcement</td>
<td>Will be sent to hazardous materials incidents, intended to assess and collect items of evidence from within the exclusion zone.</td>
<td>OSHA First Responder Operations Level NFPA Operations Level Responder - Core NFPA MSC for Personal Protective Equipment, Evidence Preservation &amp; Sampling, Illicit Labs.</td>
</tr>
<tr>
<td>Law Enforcement Tactical</td>
<td>Will be sent to hazardous materials incidents, intended to make tactical law enforcement entry into exclusion zone</td>
<td>OSHA First Responder Operations Level NFPA Operations Level Responder - Core NFPA MSC for Personal Protective Equipment, Illicit Labs, Air Monitoring &amp; Sampling</td>
</tr>
<tr>
<td>Hazardous Materials Technician</td>
<td>Will be sent to hazardous materials incidents, intended to make an entry into the exclusion zone to perform offensive actions for product control.</td>
<td>OSHA Hazardous Materials Technician NFPA Hazardous Materials Technician</td>
</tr>
</tbody>
</table>

** Certification as an OSHA Hazardous Materials Technician is a requirement prior to responders attending the FBI/DOD Hazardous Devices School.

7.8.3.1 Awareness Level Training: Awareness level training is clearly defined and includes those personnel who may encounter hazardous materials. There is no interpretation from OSHA nor is there guidance within NFPA 472 that states Awareness Level training is appropriate for anyone who is expected to physically respond to hazardous materials incidents. If your personnel answer a phone or radio and are being sent to a hazardous materials incident, they need to be trained above the Awareness Level. Awareness Trained personnel may include:

(a) Administrative Staff

(b) Custodial Staff

(c) Maintenance Staff

(d) Agency Officials (Mayor’s office, etc.)

(e) News Media

Neither OSHA nor NFPA place a time factor on Awareness Level training. The expectation is that upon the completion of training, the learner will have an understanding of the hazards associated with hazardous materials and know how to contact the
appropriate response agency to deal with the situation. The word “understand” is vague; therefore the Hazmat team leader should design an evaluation process that metrically captures the transfer of knowledge to the learner. The time required for instruction will vary based upon the learner gap analysis and the number of learners in the class. As Awareness Level personnel are not part of the response and do not don personal protective clothing nor enter the exclusion zone, there is very little equipment needed for this training. Awareness Level training equipment may include:

(a) Classroom

(b) Data Projector

(c) DOT Emergency Response Guidebooks

(d) Pens/Pencils

(e) Notebook Paper

7.8.3.2 Operations Level Responder Training: Operations Level training is clearly defined and includes those personnel who respond to hazardous materials incidents. If your personnel answer a phone or radio and are being sent to a hazardous materials incident, they need to be trained at or above the Operations Level. Personnel trained to the Operations Level are able to perform defensive actions at a Hazmat incident. NFPA 472 further states that Operations Level personnel are those who respond to hazardous materials/weapons of mass destruction (WMD) incidents for the purpose of protecting nearby persons, the environment, or property from the effects of the release. NFPA 472 divides Operations Level personnel in two categories:

(a) Core Competencies for Operations Level Responders (Chapter 5) applies to all Operations Level Responders.

(b) Competencies for Operations Level Responders Assigned Mission Specific Competencies (Chapter 6) applies to Operations Level Responders who will be wearing PPE, performing decontamination, or performing other mission specific tasks at incidents.

Personnel who should be trained to the Operations Level Responder - Core competencies include:

(a) Firefighters assigned to suppression or rescue duties.

(b) Industrial brigade personnel assigned to suppression or rescue duties.

(c) Law Enforcement Officers assigned to Patrol duties.

(d) Emergency Medical Service personnel.
(e) Health Department response personnel.

(f) Public Works Department response personnel.

(g) Emergency Management Agency response personnel.

(h) Other response personnel.

OSHA 29CFR 1910.120 places a minimum time requirement on First Responder Operations Level training. OSHA requires that First Responder Operations personnel complete at least eight (8) hours of training or have enough experience to demonstrate competency in the following areas, in addition to those listed for the awareness level:

(a) Knowledge of the basic hazard and risk assessment techniques.

(b) Know how to select and use proper personal protective equipment provided to the first responder operational level.

(c) An understanding of basic hazardous materials terms.

(d) Know how to perform basic control, containment and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.

(e) Know how to implement basic decontamination procedures.

(f) An understanding of the relevant standard operating procedures and termination procedures.

As with OSHA First Responder Awareness Level, the word “understand” is vague and the Hazmat team leader should design an evaluation process that metrically captures the transfer of knowledge to the learner. NFPA 472 Operations Level Responder - Core competencies go into much more detail and specify the competencies that are required for all personnel who respond to hazardous materials incidents. Operations Level training that meets the competencies of NFPA 472, Chapter 5 will by default meet OSHA First Responder Operations Level as defined in 1910.120 (q)(6)(ii). To meet the NFPA 472 Operations Level Responder - Core competencies, an additional amount of training time beyond the eight (8) hours referenced in OSHA 29CFR1910.120 will be required. Operations Level Responder training equipment may include:

(a) Classroom

(b) Data Projector

(c) DOT Emergency Response Guidebooks
7.8.3.3 Operations Level Responder Mission Specific Training: In NFPA 472, the Operations Level Mission Specific Training competencies (MSC) are designed to provide the operations level responder who is assigned mission-specific responsibilities the knowledge and skills to perform those assigned responsibilities safely and effectively. Personnel that require MSC training must achieve all the competencies listed in Chapter 4 (Awareness) and Chapter 5 (Operations - Core) prior to being trained in the MSCs. OSHA does not have an equivalency to the NFPA 472 Mission Specific Competencies, rather they are covered in the language within 29CFR 1910.120 (q)(6)(ii) First Responder Operations Level. Any personnel expected to perform defensive actions in the hot zone and/or any action in the warm zone must receive Operations Level Responder - Core training and any requisite Mission Specific Competencies (MSCs). The AHJ will determine the appropriate MSC based upon the mission of the Hazmat responder.

(a) Mission-Specific Competencies - Personal Protective Equipment: The operations level responder assigned to use personal protective equipment shall be that person, competent at the operations level, who is assigned to use personal protective equipment at hazardous materials/WMD incidents. This MSC is required for any responder requiring the competencies found in any of the MSCs, as all MSC levels require the use of personal protective equipment.

(b) Mission-Specific Competencies - Mass Decontamination: The operations level responder assigned to perform mass decontamination at hazardous materials/WMD incidents shall be that person, competent at the operations level, who is assigned to implement mass decontamination operations at hazardous materials/WMD incidents. Mass decontamination is defined by NFPA 472 as the physical process of reducing or removing surface contaminants from large numbers of victims in potentially life-threatening situations in the fastest time possible.

(c) Mission-Specific Competencies - Technical Decontamination: The operations level responder assigned to perform technical decontamination at hazardous materials/WMD incidents shall be that person, competent at the operations level, who is assigned to implement technical
decontamination operations at hazardous materials/WMD incidents. Technical decontamination can be described as the performance of contamination removal to a level that is as low as reasonably achievable on responders that are wearing personal protective clothing.

(d) **Mission-Specific Competencies - Evidence Preservation and Sampling:** The operations level responder assigned to perform evidence preservation and public safety sampling shall be that person, competent at the operations level, who is assigned to preserve forensic evidence, take samples, and/or seize evidence at hazardous materials/WMD incidents involving potential violations of criminal statutes or governmental regulations. The collection of evidence is performed either by a law enforcement responder, or under the guidance of law enforcement. Public safety samples may be collected by any responder with the authority granted by the AHJ to assess incidents for potential threats to public safety.

(e) **Mission-Specific Competencies - Product Control:** The operations level responder assigned to perform product control shall be that person, competent at the operations level, who is assigned to implement product control measures at hazardous materials/WMD incidents. This MSC is designed only to cover defensive actions, such as damming/diking and the application of Class B foams. Advanced product control such as application of patching kits falls under the skill requirements of Hazardous Materials Technicians.

(f) **Mission-Specific Competencies - Air Monitoring and Sampling:** The operations level responder assigned to perform air monitoring and sampling shall be that person, competent at the operations level who is assigned to implement air monitoring and sampling operations at hazardous materials/WMD incidents. This MSC is designed to apply to the use of air monitoring and detection devices that do not require direct contact with hazardous substances.

(g) **Mission-Specific Competencies - Victim Rescue and Recovery:** The operations level responder assigned to perform victim rescue and recovery shall be that person, competent at the operations level, who is assigned to rescue and recover exposed and contaminated victims at hazardous materials/WMD incidents. This MSC includes fire service and emergency medical service personnel that are assigned to hazmat rescue/extraction duties.
(h) **Mission-Specific Competencies - Response to Illicit Laboratory Incidents:** The operations level responder assigned to respond to illicit laboratory incidents shall be that person, competent at the operations level, who, at hazardous materials/WMD incidents involving potential violations of criminal statutes specific to the illegal manufacture of methamphetamines, other drugs, or WMD, is assigned to secure the scene, identify the laboratory or process, and preserve evidence at hazardous materials/WMD incidents involving potential violations of criminal statutes specific to the illegal manufacture of methamphetamines, other drugs, or WMD.

(i) **Mission Specific Competencies - Improvised WMD Dispersal Device Disablement/Disruption and Operations at Improvised Explosive Laboratories:** The operations level responder assigned to interrupt the functioning of an improvised WMD dispersal device or conduct mitigation procedures on energetic materials shall be that person, competent at the operations level who is assigned to perform disablement and/or disruption procedures on an improvised explosive device (IED) or WMD dispersal device. This MSC is designed for the responder who is already certified as a Hazardous Devices Technician through the Federal Bureau of Investigation’s Hazardous Devices School or Department of Defense.

**Mission Specific Competency Application Matrix:** The following matrix is designed to assist the hazmat team leader and training program personnel with the appropriate MSCs for team members. The matrix is a guide; the AHJ must make the determination on MSCs appropriate for the team.
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</thead>
<tbody>
<tr>
<td>Responder expected to perform defensive product control</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Responder assigned to perform decontamination</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Responder assigned to perform rapid rescue</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Responder providing Staffing or Support to Hazmat Team</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>LE Officer involved in investigation where HM present (including labs)</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>Hazardous Devices Tech</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>LE tactical team operator</td>
<td>X</td>
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<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>Public Health investigating Public Health emergency</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Environmental H&amp;S professional</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Providing Air monitoring support</td>
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<tr>
<td>Private or Industrial personnel providing product control</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Private or Industrial personnel providing product transfer</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td></td>
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<tr>
<td>EMS performing decontamination and treatment</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Advanced EMS Provider assigned to hazmat team</td>
<td>X</td>
<td>X</td>
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</table>

The Mission Specific Competencies set forth in NFPA 472 resemble an “Operations +” concept which is designed for Operations Level personnel who have a mission to enter the warm or hot zone to perform specific tasks. OSHA 29CFR 1910.120 regulations place a minimum time requirement on First Responder Operations Level training. OSHA requires that First Responder Operations personnel receive at least eight (8) hours of training, or have enough experience to demonstrate competency in the following areas, in addition to those listed for the awareness level:

(a) Knowledge of the basic hazard and risk assessment techniques.

(b) Know how to select and use proper personal protective equipment provided to the first responder operational level.

(c) An understanding of basic hazardous materials terms.

(d) Know how to perform basic control, containment and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.
(e) Know how to implement basic decontamination procedures.

(f) An understanding of the relevant standard operating procedures and termination procedures.

As with OSHA Awareness, the word “understand” is vague; therefore the Hazmat team leader should design an evaluation process that metrically captures the transfer of knowledge to the learner. The time required for instruction will vary based upon the learner gap analysis and the number of learners in the class.

NFPA 472 Operations Level Responder Mission Specific competency training will require an additional training time beyond the eight (8) hours referenced in OSHA 29CFR1910.120.

Operations Level Mission Specific Competency Training equipment may include:

(a) Classroom
(b) Data Projector
(c) DOT Emergency Response Guidebooks
(d) NIOSH Pocket Guide to Chemical Hazards
(e) Other Reference Materials as required by the AHJ
(f) Pens/Pencils
(g) Notebook Paper
(h) Self-contained Breathing Apparatus and spare cylinders
(i) Air Purifying Respirators
(j) Powered Air Purifying Respirators
(k) Fully Encapsulating Chemical Garments
(l) Encapsulating Chemical Splash Garments
(m) Chemical Splash Garments
(n) Chemical Resistant Boots
(o) Chemical Resistant Gloves
(p) Multiple Gas Chemical Monitors
(q) Single Gas Chemical Monitors
(r) Alpha, Beta, Gamma, Neutron Radiation Detectors
(s) Reagent papers
(t) Advanced Detection equipment per the AHJ
(u) Product Control kits per the AHJ

Electronic simulation devices may include:

(a) Air Monitoring & Detection simulators
(b) Incident Simulators
(c) Virtual reality simulators
7.8.3.4 Technician Level Responder Training: Any personnel expected to perform offensive actions at a hazardous materials incident will require Hazardous Materials Technician Level training. Such persons may include:

(a) Members of a hazardous materials team tasked to perform product control (per OSHA 1910.120 (q)(6)(iii) and NFPA 472 Chapter 7)

(b) Responders who perform advanced risk assessment and presumptive identification on hazardous materials within hazardous environments (per OSHA 1910.120 (q)(6)(iii))

(c) Members of a bomb squad tasked to perform render-safe actions that may affect container integrity or change the stability of hazardous materials. (per OSHA 1910.120 (q)(6)(iii))

(d) Members of railroad, trucking, or other related industries performing product control at emergency incidents. (per OSHA 1910.120 (q)(6)(iii) and NFPA 472 Chapter 7)

(e) Members of railroad, trucking, or other related industries performing product transfer at emergency incidents. (per OSHA 1910.120 (q)(6)(iii))

(f) Members of a fire brigade tasked to perform product control. (per OSHA 1910.120 (q)(6)(iii) and NFPA 472 Chapter 7)

OSHA 29CFR 1910.120 places a minimum time requirement on Technician Level training, by requiring OSHA Hazmat Technicians to complete at least twenty-four (24) hours at a level equal to OSHA First Responder Operations Level, and have competency in the following areas:

(a) Know how to implement the employer's emergency response plan.

(b) Know the classification, identification and verification of known and unknown materials by using field survey instruments and equipment.

(c) Be able to function within an assigned role in the Incident Command System.

(d) Know how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician.

(e) Understand hazard and risk assessment techniques.

(f) Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit.
(g) Understand and implement decontamination procedures.

(h) Understand termination procedures.

(i) Understand basic chemical and toxicological terminology and behavior.

Additionally, OSHA 29CFR1910.120, Appendix E, states the Hazardous Materials Technician should have “Awareness and knowledge of the competencies for the Hazardous Materials Technician covered in the National Fire Protection Association's Standard No. 472, Professional Competence of Responders to Hazardous Materials Incidents (sic)”. In order to meet all of the competencies required by OSHA 29CFR 1910.120 and all of the competencies set forth in NFPA 472 for “Hazardous Materials Technician” a considerably more than 24-hours of training will be needed especially since NFPA 472 requires the Hazardous Materials Technician to also be trained to all of the competencies in Chapters 4 (Awareness), 5 (Operations), and 7 (Technician). The length of a Hazardous Materials Technician training course is not defined by NFPA. NFPA simple states that the training needs to be sufficient in length for the learner to show competence.

Technician Level Courses are heavily dependent on training props and equipment. The AHJ must consider all available regional resources when preparing for a Technician level course. Technician Training equipment may include:

(a) Classroom
(b) Data Projector
(c) DOT Emergency Response Guidebooks
(d) NIOSH Pocket Guide to Chemical Hazards
(e) Other Reference Materials as required by the AHJ
(f) Pens/Pencils
(g) Notebook Paper
(h) Self-contained Breathing Apparatus and spare cylinders
(i) Air Purifying Respirators
(j) Powered Air Purifying Respirators
(k) Fully Encapsulating Chemical Garments
(l) Encapsulating Chemical Splash Garments
(m) Chemical Splash Garments
(n) Chemical Resistant Boots
(o) Chemical Resistant Gloves
(p) Multiple Gas Chemical Monitors
(q) Single Gas Chemical Monitors
(r) Alpha, Beta, Gamma, Neutron Radiation Detectors
(s) Reagent papers
(t) Advanced Detection equipment per the AHJ
(u) Product Control kits per the AHJ
Training props may include:
(a) Chlorine 100lb and 150lb cylinders
(b) Chlorine Ton Container ends
(c) Chlorine DOT-105 Dome
(d) Propane tank burn prop
(e) MC306/DOT406 Highway Cargo Tanker
(f) MC307/DOT407 Chemical Cargo Tanker
(g) MC112 Acid Tanker
(h) MC331 Pressure Highway Tanker
(i) MC338 Cryogenic Tanker
(j) DOT111 (low pressure) rail tank car
(k) DOT105 or DOT112 (high pressure) rail tank car
(l) Leak drums
(m) Pipe leak “trees”

Electronic simulation devices may include:
(a) Air Monitoring & Detection simulators
(b) Incident Simulators
(c) Virtual reality simulators

7.9 Specialty Positions and Training

NFPA 472 defines several specialty positions that are options for personnel assigned to hazardous materials teams. Each of these positions carries an additional mandate for training and the demonstration of competency. The AHJ must assess the need within the organization for these specialty positions, and identify the best method for demonstrations of competency.

7.9.1 Incident Commanders

NFPA 472 Chapter 8 defines the position of Incident Commander as the person responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources as designated by the authority having jurisdiction. OSHA states that Incident Commanders must have 24 hours of training equal to the first responder operations level, and have additional competency in the areas of incident command systems, emergency response plans, hazards and risks of working in chemical protective clothing, and knowledge of decontamination procedures.

NFPA 472 goes on in Chapter 8 to state that Incident Commanders should be competent in the core areas of Operations Level Responder, and be able to analyze, plan, implement, evaluate, and terminate responses to hazmat incidents.

Incident Commanders should consider receiving Incident Command System (ICS) training to the level of ICS-300, Intermediate ICS for Expanding Incidents. ICS-300 covers the advanced use of Unified Command, as well as the use of Incident Action Plans for incidents covering more than one operational period, as is likely during major hazmat incidents.

7.9.2 Specialist Employees

NFPA Chapter 9 defines the role of Specialist Employees, typically those personnel who have subject matter expertise within an organization. NFPA 472 defines
three levels of Specialist Employee. In many cases, demonstration of competency for these personnel may be simply documentation of their expertise in their specific area of specialty.

7.9.2.1 Specialist Employee A

Defined as the person who is specifically trained to handle incidents involving chemicals or containers for chemicals used in the organization's area of specialization, and who is able to analyze an incident involving chemicals within his or her organization's area of specialization. The specialist employee A can then plan a response to that incident, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response.

There is a requirement in NFPA 472 for Specialist Employee A personnel to meet the requirements under Awareness (Chapter 4), Specialty Employee (Chapter 9) and relevant areas of Hazardous Materials Technician (Chapter 7) as they apply to the employee’s area of specialty.

7.9.2.2 Specialist Employee B

Defined as the person who is trained in the hazards of specific chemicals or containers in the individual's area of specialization, and who can be called on to respond to incidents involving these chemicals or containers. The specialist employee B can be used to gather and record information, provide technical advice, and provide technical assistance (including work in the hot zone) at the incident, consistent with the emergency response plan and/or standard operating procedures.

There is a requirement in NFPA 472 for Specialist Employee B personnel to meet the requirements under Awareness (Chapter 4) and relevant areas of Specialty Employee (Chapter 9) as they apply to the employee’s area of specialty.

7.9.2.3 Specialist Employee C

Defined as the person who responds to emergencies involving hazardous materials/WMD and/or containers in the organization's area of specialization, and can be called on to gather and record information, provide technical advice, and arrange for technical assistance. The specialist employee C does not enter the hot or warm zone at an emergency.

There is a requirement in NFPA 472 for Specialist Employee C personnel to meet the requirements under Awareness (Chapter 4) and relevant areas of Specialty Employee (Chapter 9) as they apply to the employee’s area of specialty.

7.9.3 Hazardous Materials Officers

NFPA 472 defines the competencies of a Hazardous Materials Officer in Chapter 10. A Hazardous Materials Officer is the person who is responsible for directing and coordinating all operations involving hazardous materials/WMD as assigned by the incident commander. Hazardous Materials Officers must show competency for all skills defined in NFPA Awareness Level, Operations Level Responder, Hazardous Materials Technician, and Chapter 10 for Hazardous Materials Officers.

Hazardous Materials Officers lead Hazmat Technicians, and thus are expected to possess fluent knowledge of the process for analyzing, planning, implementation, evaluation, and termination of hazardous materials incidents. There are many components of NFPA 472 which require employees to perform their tasks only while in the presence of a Hazardous Materials Officer, therefore the competencies listed within NFPA 472 are written at a level above those for a Hazardous Materials Technician.
7.9.4 Hazardous Materials Safety Officers

NFPA 472 defines the competencies of a Hazardous Materials Safety Officer in Chapter 11. A Hazmat Safety Officer is the person who works within an incident management system (IMS) (specifically, the hazardous material branch/group) to ensure that recognized hazardous materials/WMD safe practices are followed at hazardous materials/ WMD incidents.

Hazmat Safety Officers within an organization must possess a working knowledge of all team capabilities and weaknesses, therefore are required to show competency for all skills defined in NFPA Awareness Level, Operations Level Responder, Hazardous Materials Technician, and Chapter 11 for Hazardous Materials Safety Officers.

7.9.5 Hazardous Materials Technicians with a Tank Car Specialty
7.9.6 Hazardous Materials Technicians with a Cargo Tank Specialty
7.9.7 Hazardous Materials Technicians with an Intermodal Tank Specialty
7.9.8 Hazardous Materials Technicians with a Marine Tank and Non-Tank Specialty
7.9.9 Hazardous Materials Technicians with a Flammable Liquids Bulk Storage Specialty
7.9.10 Hazardous Materials Technicians with a Flammable Gas Bulk Storage Specialty
7.9.11 Hazardous Materials Technicians with a Radioactive Material Specialty

7.10 Annual Competencies and Refresher Training

The hazmat team leader must ensure that team members retain knowledge and show competency on an annual basis. A properly designed training program will make this requirement an easier process and ensure that team competency does not singularly revolve around an annual requirement.

7.10.1 OSHA Requirements for Refresher Training

In 29 CFR 1910.120 (q)(8) OSHA states that employees must receive training that is of sufficient content and length to maintain competency, or must demonstrate competency in their area of certification at least annually. Agencies must resist the temptation to quantify annual refresher training based solely on the number of hours a learner sits in class, rather develop a process to measure competency based on the job task analysis for the employees.

At the conclusion of annual refresher training, each learner must be evaluated on their abilities to perform the tasks assigned by the AHJ. The evaluation process should follow the processes outlined earlier in this chapter for evaluation of response personnel. It is the responsibility of the AHJ to document and maintain records of annual training Information/material based on established standard operating procedures/guidelines.

If training drills, workshops, and exercises are developed with a mechanism to measure competency, the process of validating competency for OSHA refresher requirements becomes easier.

7.10.2 NFPA Requirements for Refresher Training

NFPA 472 does not specifically state a requirement for annual refresher training. NFPA 472 defines competence as possessing knowledge, skills, and judgment needed to perform indicated objectives. The AHJ should develop a process to ensure that all team members maintain a steady level of competency on a continual basis.
7.11 Exercises. The Hazmat team leader should utilize exercises to evaluate the competency of the team, response partners, and to validate the community emergency response plans, policies, and procedures. There are numerous resources available to the Hazmat team leader when selecting and implementing exercises. A very robust exercise and evaluation program is the DHS/FEMA Homeland Security Exercise and Evaluation Program (HSEEP) ([https://hseep.dhs.gov/pages/1001_HSEEP7.aspx](https://hseep.dhs.gov/pages/1001_HSEEP7.aspx)). HSEEP provides several products that can assist with Hazmat team exercise development and the evaluation of exercise play. HSEEP products include:

(a) HSEEP Volume I – HSEEP Overview and Exercise Program Management

(b) HSEEP Volume II – Exercise Planning and Conduct

(c) HSEEP Volume III – Exercise Evaluation and Improvement Planning

(d) HSEEP Volume V – Prevention Exercises

(e) HSEEP Toolkit

Online Independent Study courses are also available from the FEMA/Emergency Management Institute ([http://training.fema.gov/EMI](http://training.fema.gov/EMI)). These can also help with exercise planning.

(a) IS-120 – An Introduction to Exercises

(b) IS-130 – Exercise Evaluation and Improvement Planning

(c) IS-139 – Exercise Design

The HSEEP program lists several types of exercise tools that may be used to assist with the evaluation of Hazmat team and its individual team member competence.

(a) Discussion Based Exercises
   1) Seminars
   2) Workshops
   3) Table Top Exercises
   4) Games

(b) Operations Based Exercises
   1) Drills
   2) Functional Exercises
   3) Full Scale Exercises

7.11.1 Discussion Based Exercises: Discussion-based exercises are normally used as a starting point in the building-block approach of escalating exercise complexity.
Discussion-based exercises include seminars, workshops, tabletop exercises (TTXs), and games. These types of exercises typically highlight existing plans, policies, interagency/inter-jurisdictional agreements, and procedures. Discussion-based exercises are valuable tools for familiarizing agencies and personnel with current or expected capabilities. Discussion-based exercises typically focus on strategic, policy-oriented issues. Facilitators and/or presenters usually lead the discussion, keeping participants on track toward meeting the exercise objectives.

7.11.1.1 Seminars: Seminars are informal discussions, unconstrained by real-time portrayal of events and led by a presenter. They are generally used to orient participants to, or provide an overview of, authorities, strategies, plans, policies, procedures, protocols, response resources, and/or concepts and ideas. Seminars provide a good starting point for teams that are just developing or making major changes to their plans and procedures.

7.11.1.2 Workshops: After seminars, workshops represent the second tier of exercises in the HSEEP building-block approach. They differ from seminars in two important respects; participant interaction is increased, and the focus is on achieving or building a product (such as a draft plan or policy). Workshops are often used in conjunction with exercise development to determine objectives, develop scenarios, and define evaluation criteria. A workshop may also be used to produce new standard operating procedures (SOPs), emergency operations plans (EOPs), multiyear plans, or improvement plans. To be effective, workshops must be highly focused on a specific issue and the desired outcome or goal must be clearly defined.

7.11.1.3 Table Top Exercises: TTXs involve key personnel discussing hypothetical scenarios in an informal setting. This type of exercise can be used to assess plans, policies, and procedures or to assess the systems needed to guide the prevention of, response to, and recovery from a defined incident. TTXs typically are aimed at facilitating understanding of concepts, identifying strengths and shortfalls, and achieving changes in the approach to a particular situation. Participants are encouraged to discuss issues in depth and develop decisions through slow-paced problem solving, rather than the rapid, spontaneous decision making that occurs under actual or simulated emergency conditions. The effectiveness of a TTX is derived from the energetic involvement of participants and their assessment of recommended revisions to current policies, procedures, and plans.

TTX methods are divided into two categories; basic and advanced. In a basic TTX, the situation established by the scenario materials remains constant. It describes an event or emergency incident (i.e., scenario) and brings discussion participants up to the simulated present time. Players apply their knowledge and skills to a list of problems presented by the leader/moderator; problems are discussed as a group; and the leader generally agrees on and summarizes the resolutions.

In an advanced TTX, play revolves around delivery of pre-scripted messages to players that alter the original scenario. The exercise controller/moderator usually introduces problems one at a time in the form of a written message, simulated telephone call, videotape, or other means. Participants discuss the issues raised by the simulated problem, applying appropriate plans and procedures.

7.11.1.4 Games: A game is a simulation of operations that often involves two or more teams and uses rules, data, and procedures to depict an actual or assumed real-life
situation. The goal of a game is to explore decision-making processes and the consequences of those decisions. A game does not require use of actual resources, and the sequence of events affects, and is in turn affected by, decisions made by players. With the evolving complexity and sophistication of current simulations, opportunities to provide enhanced realism for game participants have increased. Computer-generated scenarios and simulations can provide a more realistic and time-sensitive method of introducing situations for analysis. Planner decisions can be input into realistic models to show the effects of decisions made during a game. Internet-based, multi-player games offer many additional benefits, such as saving money by reducing travel time, offering more frequent training opportunities, and taking less time away from primary functions. They also provide a collaborative environment that reflects realistic occurrences.

7.11.2 Operations Based Exercises: Operations-based exercises represent the next level of the exercise cycle. They are used to validate the plans, policies, agreements, and procedures solidified in discussion-based exercises. Operations-based exercises include drills, functional exercises (FEs), and full-scale exercises (FSEs). They can clarify roles and responsibilities, identify gaps in resources needed to implement plans and procedures, and improve individual and team performance. Operations-based exercises are characterized by actual reaction to simulated intelligence; response to emergency conditions; mobilization of apparatus, resources, and/or networks; and commitment of personnel, usually over an extended period of time.

7.11.2.1 Drills: A drill is a coordinated, supervised activity usually employed to validate a single, specific operation or function in a single agency or organizational entity. Drills are commonly used to provide training on new equipment, develop or validate new policies or procedures, or practice and maintain current skills. Typical attributes of drills include:

(a) a narrow focus, measured against established standards;

(b) immediate feedback;

(c) a realistic environment; and

(d) performance in isolation.

7.11.2.2 Functional Exercises: A Functional Exercise (FE) is designed to validate and evaluate individual capabilities, multiple functions, activities within a function, or interdependent groups of functions. Events are projected through an exercise scenario with event updates that drive activity at the management level. An FE simulates the reality of operations in a functional area by presenting complex and realistic problems that require rapid and effective responses by trained personnel in a highly stressful, time-constrained environment.

Response-and recovery-focused FEs generally concentrate on exercising the plans, policies, procedures, and staffs of the direction and control branches of Incident Command (IC), Unified Command (UC), and/or multi-agency coordination centers (e.g., EOCs). Movement of personnel and equipment is simulated. Prevention-focused FEs usually concentrate on exercising the plans, policies, procedures, agreements, networks, and staffs of fusion centers or law enforcement centers.
agencies with counterterrorism missions. Adversary actions are largely simulated and
delivered in the form of shared intelligence; however, some of these actions may be
carried out by simulated adversaries, or Red Teams, in a separate but coordinated
category of exercise play. See HSEEP Volume V: Prevention Exercises for more
information on prevention-focused exercises.

7.11.2.3 Full Scale Exercises: The FSE is the most complex type of exercise. FSEs are
multi-agency, multi-jurisdictional, multi-organizational exercises that validate many
facets of preparedness. They focus on implementing and analyzing the plans, policies,
procedures, and cooperative agreements developed in discussion-based exercises and
honored in previous, smaller, operations-based exercises. In FSEs, the reality of operations
in multiple functional areas presents complex and realistic problems that require critical
thinking, rapid problem solving, and effective responses by trained personnel. During
FSEs, events are projected through a scripted exercise scenario with built-in flexibility to
allow updates to drive activity. FSEs are conducted in real time, creating a stressful, time-
constrained environment that closely mirrors real events. The level of support needed to
conduct an FSE is greater than that needed during other types of exercises.
Response-focused FSEs include many first responders operating under the principles of
the National Incident Management System (NIMS) to effectively and efficiently respond
to an incident. Personnel and resources are mobilized and deployed to the scene where
they conduct their activities as if a real incident had occurred (with minor exceptions). An
FSE also may include functional play from participants not located at the exercise
incident response site, such as multi-agency coordination centers (MACCs), EOCs, or
hospitals.

7.12 External Influences on Training Programs: There are several external influences
the Hazmat team leader must consider when establishing a training program. Issues
involving regulatory compliance, budgetary constraints, advances in technology, and the
expectations of external stakeholders all play a role in the training program’s scope and
success.

7.12.1 Regulatory Compliance: As presented earlier in this chapter the field of
hazardous materials response is regulated by OSHA, and in many states Hazmat training
is further defined by state policy or law. The Hazmat team leader must understand that
regulations and laws must be met and are considered the minimum for Hazmat response
personnel. A Hazmat team training program must include thorough documentation of all
training activities that show compliance.

7.12.2 Budgetary Constraints: Funding for Hazmat teams can be a challenge. During
times of budgetary constraints Hazmat training may be considered extraneous to other
“essential” AHJ funding mandates. Hazmat team leaders must be sensitive to external
budgetary issues and remain cognizant of the minimum training required for the Hazmat
team.

During extreme budget crisis, Hazmat team leaders may have to find alternative ways to
provide training for the team. If training funds are strained the team leader should
consider all internal and in-service training possibilities. At no time should a team leader
allow the team to function without current certifications.

7.12.3 Technology Advances: Hazmat team leaders should maintain awareness of
advances in technology that could affect team operations. Improvements in computers,
computer networks, software, computer-based and web-based training programs,
detection & monitoring equipment, personal protective equipment, and product control devices can all add to the efficiency of the team. Team leaders should identify personnel within their organization that have a propensity and interest in technological advances and allow them to assist in this area.

7.12.3 Stakeholder Expectations: Team leaders must remember that there are numerous external stakeholders that influence team operations. Members of the public have expectations that their personal safety will be protected during hazardous materials releases. Other public safety agencies rely on the AHJ’s expertise and response capabilities and look to the Hazmat team for guidance and assistance during incidents. Private sector entities such as healthcare and industry have expectations for guidance and assistance during events that might affect their property. Agency representatives, elected officials, and administrators all have an expectation that the Hazmat team will be ready for whatever situation that might arise.

References
Chapter 8 - Resource Management

8.1 Introduction

8.1.1 Purpose: The purpose of this chapter is to provide information and guidance for hazardous materials / weapons of mass destruction response team (HMRT) program managers in understanding the aspects of managing various resources for hazardous materials / weapons of mass destruction response teams.

8.1.2 Scope: The acquisition and management of the various resources associated with hazardous materials response teams (HMRT) is a critical factor in the effective management of an overall hazardous materials response team program. Effective resource management ensures that hazardous materials response teams have the personnel, equipment, and supplies necessary to safely and effectively mitigate hazardous materials/weapons of mass destruction incidents. HMRT program managers should develop comprehensive resource management plans and procedures to ensure that teams are properly resourced to meet program objectives.

8.1.3 References

8.1.3.1 DHS NIMS Guide NG0001 National NIMS Resource Typing Criteria
8.1.3.2 DHS NIMS Guide NG0002 National Credentialing Definition and Criteria
8.1.3.3 DHS Resource Typing Document FEMA508-1-FEMA 508-4 Typed Resource Definitions – Fire and Hazardous Materials Resources
8.1.3.4 NFPA 1561 Standard on Emergency Services Incident Management System (2008)

8.2 Personnel: The recruitment and maintenance of personnel are critical aspects of the management of a hazardous materials response team (HMRT). The success of meeting the mission of a HMRT is dependent on the proper recruitment, effective retention, and appropriate maintenance of team members. HMRT program managers should ensure that proper personnel management procedures are developed and maintained as a component of team operating practices.

8.2.1 Recruitment: Recruitment of team members is determined by the mission requirements of the HMRT and available personnel resources. Response to hazardous materials/weapons of mass destruction incidents is considered a
specialized discipline and may only be of interest to certain people. HMRT program managers should define personnel needs and assign resources to personnel recruit and retention activities as needed.

8.2.2 Types of HMRTs: HMRTs can vary in size and complexity based on a team’s mission and objectives. Teams may be single or multi-jurisdictional, public or private industry, and or variations on all of the above. How a HMRT is configured should be driven by the overall team mission but is also influenced by the source(s) and availability of personnel, geography, political realities, obtainable resources, funding and other intrinsic influences.

(a) Dedicated teams: Due to the professional competencies and job performance requirements of personnel needed to safely and effectively manage hazardous materials/weapons of mass destruction incidents, the training requirements needed to achieve and maintain these competencies, and the specialized equipment and practices used in responding to such incidents, most HMRTs maintain a team of dedicated personnel. Dedicated teams are configured in various ways to include:

i. Single jurisdiction / single agency or organization: HMRT team members are recruited and maintained solely from personnel within the specific agency, jurisdiction, or organization that is maintaining the HMRT.

ii. Private / Industrial Sector: HMRT team members are employees of a private business or industry that elects to maintain hazardous materials response capabilities for business operations and continuity purposes, and or to respond off site to incidents that involve the company’s products or services.

iii. Multi-jurisdictional / multi-agency: HMRT team members are recruited and maintained from a pool of personnel from two or more agencies, jurisdictions, and or organizations which cover a single or multi-jurisdictional geographic area. Often referred to as regional teams, these types of HMRTs often pool personnel, equipment, funding, and other necessary resources into a single team to mitigate hazardous materials/weapons of mass destruction incidents over a multi-jurisdictional geographic area.

i. Combination Teams: HMRTs may recruit and maintain members from both public agencies and private industry forming a combination team.
8.2.3 Core capabilities (team): Based on the assigned mission of the HMRT, a specific set of core team capabilities should be developed based on available personnel, resources, and funding support.

(a) Various internal and external influences shape the mission of a HMRT. HMRT program managers should assess these influences to determine the mission and scope of team operations, and develop a plan for staffing the HMRT based on these factors.

(b) Community support is an important influence on a HMRT’s overall mission and by relation, affects personnel recruitment and retention decisions when managing HMRTs.

(c) Funding has both direct and indirect effects on team personnel decisions. Personnel who are reimbursed for team activities may be one of the largest line items in a HMRT budget. Careful planning is required in order to match available funding to personnel resources, and the overall HMRT mission.

8.2.4 Core capabilities (members): 29 CFR 1910.120 - Hazardous Waste Operations and Emergency Response is a federal regulation that dictates personnel management and training requirements for HMRT personnel. Under this regulation, HMRT program managers have legal requirements for the training and maintenance of capabilities of their team members.


(a) HMRTs may recruit and maintain subject matter experts (SME) to assist them with specialized aspects of team responses and training. The SME may or may not be a fully trained and qualified team member and may only be used for specific purposes. One common example is the use of a chemist to assist with research and planning during responses.

(b) By definition and practice, personnel are considered to be HMRT resources. In 2005, the United States Department of Homeland Security government developed and published a *National Mutual Aid and Resource*
Management Initiative, which was designed to support the National Incident Management System (NIMS) by establishing a comprehensive, integrated national mutual aid, and resource management system that provides the basis to type, order, and track all Federal, State, and local response assets. Within these guidance documents resource typing for hazmat entry team personnel is defined within DHS Resource Typing Document FEMA508-1-FEMA 508-4 Typed Resource Definitions – Fire and Hazardous Materials Resources.

(c) Personnel credentialing is defined within DHS NIMS Guide NG0002 National Credentialing Definition and Criteria which provides credentialing requirements for personnel ordered as single resources or personnel assigned to teams, and crew assigned to equipment, listed within the “Tier One” NIMS national resource typing definitions. Credentialing of personnel is a voluntary process and only relates to deployable resources for interstate mutual aid responses. It is recommended that HMRT program managers be familiar with NIMS credentialing requirements.

(d) Various federal regulations, guidance documents, voluntary standards, and recommended practices provide criteria for the recruitment, development, and training of HMRT personnel. Team personnel should be assigned specific roles and responsibilities based on their training specialties, experience, and capabilities. HMRT program managers should be familiar with these documents and use them in making personnel management decisions.

8.2.5 Deployment: As influenced by a HMRT’s mission, responsibilities, geographic cover area, regulations, and other various factors, HMRT program managers must anticipate and properly prepare for team deployments. HMRT deployments vary in length and complexity, and require that HMRT program managers perform appropriate pre-deployment planning.

(a) Dependant on the type and size of the HMRT, deployments present the HMRT program manager with staffing needs and challenges. 29 CFR 1910.120 - Occupational Health and Safety Administration (OSHA) Hazardous Waste Operations and Emergency Response requires that personnel with specific training and competencies be present during emergency responses. HMRT program managers are responsible to ensure that properly trained and qualified personnel are present in the correct numbers to meet this federal regulation.

(b) Based on the type of HMRT, staffing capabilities, compliance with regulatory requirements, budget considerations, and other factors, HMRT program managers should develop deployment models to ensure that the proper personnel resources are deployed during
responses to emergency incidents. These models should be published in HMRT procedural documents, and team members should be familiar with their personal responsibilities within the HMRT models.

(c) Dependant on the type and size of hazardous materials/weapons of mass destruction incidents, HMRT program managers must be prepared to sustain incident operations over long periods. Incidents which are to be sustained for greater than one operational period will likely require relief of on scene personnel, and should be anticipated by the HMRT program manager.

i. The first choice of most HMRT program managers is to relieve team personnel with other team members. Personnel rotations should be anticipated for in advance and HMRT program managers should have systems in place for the recall of off-duty personnel.

ii. Mutual aid resources are another source of relief for on scene personnel. HMRT program managers should be familiar with existing mutual aid systems and available resources prior to calling for these resources to sustain operations at an existing emergency incident. Some mutual aid relationships may require advance agreements outlining the provision of and sharing of services prior to deploying to incidents.

iii. Local and regional resources may be another source of personnel to sustain or enhance incident operations. These may include other emergency services agencies, private hazardous materials teams, military units proficient in hazardous materials response, and other like resources. HMRT program managers should be familiar with these types of resources prior to requiring assistance from such services.

iv. The Emergency Management Assistance Compact (EMAC) was established by Congress in 1996 and serves as a national state-to-state mutual aid system. HMRTs are subject to EMAC requests and may be requested to deploy to large scale, events of national significance. HMRT program managers should be familiar with the EMAC system and seek guidance from their superiors as to whether their team is to deployed within this compact.
(d) Demobilization: HMRT program managers should develop and maintain demobilization plans as part of their team practices and documentation.

i. Record keeping is an important part of HMRT deployments. Based on the type, length, and complexity of the incident, team members may have to produce documentation after the incident including but not limited to incident action plans (IAP), entry and medical records, payroll records, maintenance records, etc. HMRT program managers should develop recordkeeping requirements and systems prior to team deployments and maintain a system for the collection and review of such documentation following deployments.

ii. HMRT program managers should develop a process conducting a post incident analysis following deployment to emergency incidents. A post incident analysis provides HMRTs with the ability to review their incident operations and provide for the ability to improve future team operations.

8.2.6 Compensation and benefits  (reference Finance chapter): When applicable, the management of HMRT personnel must include provisions for compensating team members and providing for their assigned benefits. HMRT program managers should develop information on the compensation and benefit requirements of team members, and budget accordingly. Budgeting for compensation should include anticipating the deployment of team members and incurring associated overtime costs.

(a) HMRT members may work under collective bargaining agreements that specifically outline compensation and benefit requirements, inclusive of overtime provisions and working conditions. HMRT program managers with personnel working within collective bargaining agreements should be familiar with the provisions contained in these agreements and their associated responsibilities in managing these personnel.

(b) Some team members may be subject to non-monetary compensation for team activities. These may include compensation (comp) time and or the ability to work variable hours to meet team needs in lieu of working their normal assigned work schedule.

(c) Many HMRT members are covered under workers compensation regulations. If a team member suffers a duty related injury, the HMRT program manager or their designee may be responsible for
filing initial reporting documentation and managing the workers compensation case to a conclusion.

8.2.7 Member maintenance: Responses to hazardous materials and or weapons of mass destruction incidents must include provisions to ensure the well-being of responders before, during and after their designated actions are executed. Member maintenance incorporates a number of subcategories that in aggregate are designed to address not only the legal requirements set forth in applicable standards, but beyond the letter of the law are designed to ensure the well being of team members. Incorporated in this topic are OSHA’s HAZWOPER Standard, 29CFR1910.120, OSHA's respirator protection standard, 29CFR1910.134, OSHA's access to employee exposure and medical records standard, 29CFR1910.1020, as well as an employer’s internal standards regarding the subject.

(a) Respiratory Protection Program. 29CFR 1910.134 (c) requires that an employer develop and implement a written respiratory protection program when workplace conditions require the use of a respirator to protect the health of the employee; HAZMAT teams fall under this requirement. The respiratory protection program must be administered by an appropriately trained/experienced individual and must address respirator selection, annual fit testing procedures, breathing air quality, procedures for use, care and cleaning of respirators, training of employees, evaluation of program effectiveness, and medical evaluations to determine the employees’ ability to don the respirator required.

It should be noted that the requirements for use of a respirator (1910.134), (i.e. the annual respirator evaluation) do not require the employee to perform an annual medical examination. However, OSHA places the responsibility on the employer and the examining health care professional to determine the frequency and content of medical evaluations for each employee. Type and content of medical evaluations will depend on the strenuousness of the work being performed, the type and frequency of respirator use, the physical and medical condition of the employee (as determined by the evaluating physician) as well as any physical and medical issues reported by the employee.

(b) Medical surveillance: 29CFR1910.120(a)(1)(i) through (a)(1)(iv) (where no exceptions exist) define the operational arenas in which employees fall under the routine medical surveillance program. Section(q)(9) of the standard incorporates HAZMAT team members and mandates the minimum requirements for an organization’s/employer’s medical surveillance program. It should be noted that the type of medical surveillance is based on roles filled during a response. Not all personnel have to have the same type of medical surveillance. However, this is a nonissue when all members of the team are trained to the same
level (use of level A for example.). Medical surveillance is an ANNUAL requirement, unless the attending physician believes a longer interval is acceptable. In NO case can the period between physicals exceed two years.

OSHA requires anyone who leaves the HAZMAT team (for any reason) to have a physical examination upon departure, unless an annual (or biennial) physical was conducted within 6 months of exiting, in which case it can be used to fulfill the requirement.

Medical examinations, including what may be in existence in an employee’s file (which should be regularly updated) must be conducted with detailed emphasis related to the handling of hazardous materials and their accompanying health hazards, as well as fitness for duty, including the ability to wear personal protective equipment that may be required.

(c) **Recording keeping** is addressed in 1910.120(f)(8) and retention periods are specified in 29CFR1910.1020(d)(1)(i) and (d)(1)(ii) require that medical records and exposure records, respectively be retained for 30 years beyond termination of employment (with some minor exceptions).

The record must include at a minimum:
1. Name and social security number of the employee
2. Physicians written opinions, recommended limitations and results of examinations and tests.
3. Any employee medical complaints related to exposure to hazardous substances.
4. A copy of the information provided to the examining physician by the employee.
5. Place holder for example record.

(d) **Personnel exposures:** In the case of exposure, or injury resulting from response, employers must immediately upon notification by an employee that they are presenting with signs or symptoms of exposure (suggesting a possible overexposure to hazardous substances, or exposure above permissible limits), provide the employee access to additional medical surveillance.

(e) **Treatment:** Employees who undergo treatment for an exposure or injury receive said treatment at no cost to them, with no loss of pay. Treatment shall be performed by or under the supervision of a licensed physician at a reasonable time and place. 1910.120(f)(5)

(e) **Follow-up:** Follow up medical surveillance and/or treatment must be provided as determined to be necessary by the examining physician. Additional medical surveillance may also be required under 29CFR 1910
Subpart Z (Substance Specific Standards) depending on the nature and extent of the exposure.

8.3 Supply Management: Response to hazardous materials and or weapons of mass destruction incidents normally requires the use of various supplies to support incident operations. Supplies are defined as non-equipment related resources (ex. pH paper or colorimetric tubes) which a HMRT needs to complete a mission.

8.3.1 Acquisition and maintenance: The acquisition and maintenance of supplies is a key aspect of managing a hazardous materials response team (HMRT). It is important that HMRTs be properly stocked with needed supplies and that these supplies be properly maintained.

(a) HMRT supplies can be significant in scope, number, and size dependent on the HMRT size and mission. HMRT program managers should identify needed supplies, storage location(s) for those supplies, and develop a maintenance plan for managing team supplies.

(b) Supplies may be stored and maintained in various locations including team facilities, response vehicles, vendor warehouses, and or storage buildings (ex. sheds).

(c) Maintenance of HMRT supplies is a critical process which can be time consuming. HMRT program managers should identify and enlist qualified team members to manage this responsibility for the team. This position is often referred to as the team quartermaster.

(d) Some supplies may have a defined shelf life. These types of supplies should be clearly identified and the HMRT should have a defined process for the management and restocking of such items. Supplies that have a defined shelf life and or older stock which may be dated should be identified for first use at incidents. This permits HMRTs to avoid having to discard unused or out of date supplies. Another method of rotating supplies is to use dated or out of date supplies during training exercises.

(e) HMRT program managers should ensure that policies, procedures and or processes are developed and documented for the proper management of team supplies. These documents should account for vendor identification and relations, purchasing practices, inventory management, restocking, storage, and other pertinent information.

8.3.2 Vendor identification: Supplies related to hazardous materials and or weapons of mass destruction incident response may be of a specialized nature with a limited number of vendors available for the purchase of such items. HMRT program managers should ensure that vendors are identified for all supplies
maintained by the team and that vendor relationships are established to provide for the quick and efficient restocking of expended supplies.

(a) The purchase of HMRT supplies may be subject to municipal and or organizational purchasing laws, regulations and or processes. HMRT program managers and personnel assigned to manage team supplies should be familiar with the specific purchasing oversight which affects the HMRT and abide by the pertinent requirements that guide such purchases.

(b) Vendors should be identified in advance when possible. Many government regulations and industry purchasing practices require vendors to be identified in advance and approved for use. HMRT program managers must be aware of such requirements and ensure that vendors are pre-qualified and approved to avoid delays in purchasing needed supplies.

(c) Various government and industry purchasing practices also require that standing purchasing agreements be developed and maintained with approved vendors. This process may involve competitive bidding activities and that formal, contractual relationships be developed with vendors. This can be a time consuming and convoluted process. HMRT program managers should seek assistance from purchasing professionals and ensure that such requirements are met prior to supplies needing to be replenished.

8.3.3 Resupply and restock: HMRT program managers should develop internal processes to ensure that team supplies are properly identified and maintained and that restocking of supplies can be done quickly and efficiently.

(a) A standard inventory of required supplies should be developed and maintained for use by HMRTs. This inventory should be reviewed and updated periodically to ensure that it meets team requirements and is up to date with team practices and equipment.

(b) Various state and local laws permit HMRTs to be reimbursed for use of supplies by responsible parties. HMRT program managers should be familiar with the laws or regulations pertinent to their response mission and maintain internal processes for documenting supplies used and billing responsible parties after response to incidents.

(c) Certain supplies may be critical to the operation of the team when on a mission. These types of supplies should be identified and maintained in proper numbers. Critical supplies should be noted as such in inventory systems and a process for the rapid restocking of such supplies should be developed by the HMRT.
8.3.4 Record keeping: Proper documentation of inventory and use is an important aspect of supply management. A thorough and complete recording system should be established and maintained by HMRT program managers to ensure that supply management is properly documented.

(a) Computerized inventory systems may be available for use. HMRT program managers should assess such systems to determine suitability for their team.

(b) Some supplies may be subject to being funded through various federal, state, and or local programs. Supplies which are purchased through these funding streams may be subject to additional recordkeeping and auditing requirements.

8.3.5 Storage: Supplies should be stored and maintained in suitable facilities. Many HMRTs maintain their supplies in the same facilities as team apparatus to facilitate restocking after responses or training. Regardless of location, supply storage facilities should be secure and appropriate for the type and amount of supplies being maintained. Some supplies may require storage in climate controlled conditions.

8.3.6 Transportation: During some responses, HMRTs may require that additional supplies be transported to incident scenes for restocking during an active mission. Supplies may also have to be transported from remote storage locations to team facilities under routine circumstances. HMRT program managers should anticipate such needs and develop plans to manage both routine and non-routine supply transportation needs.

8.4 Equipment

8.4.1 Identify equipment needs: HMRT program managers must realize the depth and breathe of securing and maintaining the necessary equipment in preparation for hazardous material/weapons of mass destruction response. The HMRT program manager must understand the essential equipment, proper maintenance of equipment and updating requirements to reflect technological changes with equipment. Providing the necessary equipment for responders is critical based upon hazard identification and risk assessment of the event. Field testing and detection, air monitoring, sampling, radiation monitoring/detection, chemical protective clothing, ancillary protective equipment, technical reference, special capabilities, intervention, decontamination, communications, respiratory protection and hand tools are all critical components to outfitting a HMRT response team. The following list provides some of the potential equipment needs and requirements for an incident:

(a) Field testing and detection.
   i. Color Change Analysis - Non-Electronic
ii. Qualitative Analysis, Kits - Non-Electronic
iii. Qualitative Analysis, Kits - Electronic
iv. Colorimetric Analysis - Non-Electronic
v. WMD Biological Detection - Electronic

(b) Air monitoring
i. Confined Space Monitoring
ii. Multiple Gas Monitoring, Toxic
iii. Specialty Gas Capability
iv. WMD Chemical Dedicated Instruments

(c) Sampling
i. Substance Capture
ii. Bulk Liquid Transfer – Mechanical
iii. Containerization, Labeling, Documentation
iv. Transportation

(d) Radiation detection and monitoring
i. Gamma, Beta, and Alpha Detection and Survey
ii. Radionuclide Detection
iii. Dosimeters

(e) Chemical protective clothing
i. Vapor Protective
ii. Liquid Splash Protective
iii. Limited Use Protective

(f) Ancillary protective equipment
i. Hand Protection
ii. Foot Protection
iii. Head and Eye Protection
iv. Support Systems

(g) Technical reference
i. Printed References, Industrial and WMD Chemicals
ii. Electronic References, Industrial and WMD Chemicals
iii. Plume Air Modeling, Program Support
iv. Computer, Support Hardware, Software

(h) Special capabilities
i. Advanced Technologies; Vision, Heat, Sound
ii. Advanced Technologies; Weather, GPS

(i) Intervention
i. Chemical Intervention
ii. Environmental Intervention
iii. Mechanical Intervention

(j) Decontamination
i. Ground Protection
ii. Support Tools for Decontamination
iii. Water Supply, Distribution Tools
iv. Collection

(k) Communications
i. Radio
ii. Cellular Phone

(l) Respiratory protection
i. Self-Contained
ii. Air Purifying Respirator
(m) Tools and other equipment
i. General Purpose, Large Hand Tools
ii. General Purpose, Small Hand Tools
iii. Special Purpose Hand Tools

The HMRT program manager may also include other non-critical equipment for the response team.

8.4.2 Identification of funding streams (reference Finance chapter): The HMRT program manager must realize the cost of acquiring the necessary equipment and effective resource management to properly prepare a response team. Although certain grant programs, such as, the Assistance to Fire Grants, are available, the program guidance for each funding source varies from year to year. The HMRT program manager must prepare to properly fund, maintain and update a response team. Securing consistent funding is an important aspect of HMRT management.

8.4.3 Initial purchase / acquisition: The HMRT program manager must understand the response team typed resource credentialing. The initial purchase of equipment must be aligned with the recommended minimum equipment list. The Standardized Equipment List (SEL) is provided for the purpose of being used as a tool by the emergency response community. The HRMT program manager should review this Standardized Equipment List (SEL) when preparing to develop equipment specifications, purchase orders, creating or updating local master hazardous materials equipment inventory lists, and for reviewing requirements for hazardous materials / WMD chemical-biological response equipment grants. The SEL is a reference document only, and should be used as a guide in an attempt to meet the minimum level of standardization.

(a) Purchasing equipment for a hazardous materials response must adhere to standardization. The HMRT program manager must adopt standardization and follow proper purchasing regulations to ensure the safety of personnel, provide protection to the public and to maintain effective emergency response.

(b) The HMRT program manager must follow the recommended purchasing agreements, as covered under a recommended authority, and purchase all equipment from approved, authorized vendors.

(c) To properly maintain a response team, the HMRT program manager must secure and maintain standing purchase agreements with approved...
vendors. Delays in purchasing may affect the safety and response of the team.

8.4.4 Sustainment: In order to properly prepare and sustain a response team, the HMRT program manager must constantly maintain the necessary equipment. Daily checks of equipment, functionality, operation and confirming expiration dates is critical to the proper state of readiness of the team. Equipment must be properly stored, charged, and at the ready. Proper replacement plans must be developed and instituted. The replacement schedule must be reviewed to coordinate financial measures through the budgetary process. Maintenance agreements must be organized and secured. Arrangements should be in place, when certain equipment may be out of service for calibration or other replacement, repair needs.

(a) A coordinated, scheduled replacement plans must be developed and maintained.

(b) Maintenance agreements must be entered and followed to maintain the proper functioning of all equipment. These agreements must be carefully scheduled in order to maintain a proper state of readiness. Planning and creative scheduling of equipment under maintenance agreements will ensure the proper response level.

(c) Equipment must be purchased in a timely manner, and must be purchased through approved, certified vendors. A positive relationship with the vendor is advisable. Keeping equipment in top notch functioning order is critical to the mission of the response team.

(d) Maintenance practices are an essential component in preparation for a response to an emergency. The HMRT program manager must establish and maintain a checklist procedure to ensure all equipment is in working order. Team members must take pride and ownership of the equipment and daily routines must be adhered and followed precisely as outlined by the HMRT program manager.

8.4.5 Purchasing: The HMRT program manager must develop and adhere to strict policies and procedures when implementing the purchasing of all equipment. Ensuring that the team is properly prepared with essential resources in place maximizes the safety and security of responders and the public at large.

(a) Rating and comparing equipment are critical to the mission of the emergency response. Approved equipment and vendor purchasing agreements should be in place and updated as necessary.
(b) There are various categories the HMRT program manager must consider while purchasing equipment including motorized, prime movers, fixed, portable, disposable, date sensitive, etc.

(c) The HMRT program manager must gain an understanding of the coordinated effort between the use of the responder knowledge base, training needs and the recommended use of all equipment. Allowing for a scheduled training needs; including technological updates, component add-ons, new equipment purchases and new technologies will enhance the response readiness.

(d) It is important for the HMRT program manager to realize that the true cost of equipment goes beyond that of the initial purchase. Maintenance procedures and manufacturer’s requirements including calibration procedures, equipment, and supplies, must be considered prior to purchasing the resources for the team. Maintaining a proper maintenance schedule, replacement schedule and updates must be planned for through the budgetary process.

8.4.6 Instruments: The HMRT program manager must consider acquiring the required equipment and resources to maintain the readiness of the team. This would include inventories of various instrumentation to include, but not limited to; field testing; air monitoring; detection and radiation monitoring; and detection equipment. Identification and sampling equipment, special capabilities and field interventions must be secured.

8.4.7 PPE / CPE: The HMRT program manager is responsible for the safety of all team members, proper acquisition of all appropriate personal protective equipment (PPE) and chemical protective clothing (CPE); including all necessary ancillary protective equipment must be a priority. All personal protective equipment must meet or exceed the highest standards possible, including respiratory protective equipment.

8.4.8 Resource Typing: In order to assure an organized approach to incidents involving hazardous materials emergencies, the HMRT program manager must adhere to certain resource typing credentialing. Standardized typed resource management is essential in developing mutual aid response plans and interagency operability. Technical reference materials, decontamination equipment, communications equipment, tools and components of an effective team are critical to the mission.

8.4.9 Resupply and restock: HMRT program managers should develop internal processes to ensure that team supplies are properly identified and maintained, and that restocking of supplies can be done quickly and efficiently.
(a) Proper documentation of inventory and use is an important aspect of resource and equipment management. A thorough and complete recording keeping system should be established and maintained by HMRT program managers to ensure that equipment management is properly documented.

(b) Some equipment may be subject to being funded through various federal, state, and or local programs. Equipment which is purchased through these funding streams may be subject to additional documentation, reporting, and auditing requirements.

(c) Decontamination equipment is designed with proper configurations of the incident in mind. Preparing for, and designing a decontamination unit to fully protect the public and first responders is critical to the mission.

(d) Equipment should be stored and maintained in suitable facilities; trailers and prime movers must be dedicated to the response. Many HMRTs maintain their equipment in the same facilities as team apparatus to facilitate restocking after responses or training. Regardless of location, equipment storage facilities should be secure and appropriate for the type and amount of equipment being maintained. Certain equipment will require storage with charging/recharging capabilities and climate controlled conditions.

8.5 Incident Management

8.5.1 National Incident Management System (NIMS): The NIMS Command and Management component of the National Incident Management System (NIMS) stresses effective and efficient incident management and coordination through the use of a flexible, standardized incident management structure. This structure should include these three key organizational constructs: the Incident Command System, Multiagency Coordination Systems, and Public Information.

8.5.2 NIMS Resource Management: NIMS also emphasizes that careful management of resources is essential before, during, and after incidents. NIMS emphasizes standardized resource management practices such as typing, inventorying, organizing, and tracking to allow for effective sharing and integration of critical resources across jurisdictions.

8.5.3 Preparedness and response: Per NIMS, the resource management process can be separated into two parts: resource management as an element of preparedness and resource management during an incident. The preparedness activities (resource typing, credentialing, and inventorying) are conducted on a continual basis to help ensure that resources are ready to
be mobilized when called to an incident. Resource management during an incident is a finite process, as shown in the figure below with a distinct beginning and ending specific to the needs of the particular incident.

8.5.4 Incident response: Hazardous materials response personnel should be proficient in the management of resources prior to, during, and following incident responses per NFPA 472: Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents.

Chapter 9 - Staffing

9.1 General.
9.1.1 Introduction.
9.1.1.1 This chapter provides information and guidance to the program manager in understanding staffing requirements for different types of hazardous materials/WMD response teams and deployment models to mobilize those resources.

9.2.1 General.
9.2.1.1 Introduction.
9.2.1.1.1 The HMRT program manager shall determine the staffing levels necessary for the AHJ (locally and regionally) to determine the most effective way to deploy assets to events involving hazardous materials/weapons of mass destruction (WMD). This evaluation should include the following:
(1) Identify staffing requirements for the mission.
(2) Develop a plan for staffing.
(3) Identify requirements for sustainment of personnel.

9.2.1.2 Goal.

9.2.1.2.1 The goal of this chapter is to provide guidance to the HMRT program manager to determine staffing requirements relative to hazardous materials/WMD response. These challenges include evaluating current and future staffing plans, deployment models, and team typing within the organization and/or regionally to assess the ability of the AHJ to meet the identified mission of hazardous materials/WMD response.

9.2.2 Evaluating Deployment Models.

9.2.2.1 Staffing solutions are complex, having both benefits and limitations for each staffing option. Response to a hazardous materials/WMD event requires familiarity with all resources (personnel, supplies and equipment) including those from other jurisdictions or agencies. Deployment of these resources must take into consideration community risk assessment; response times; financial constraints; standard operating procedures/guidelines; automatic and mutual aid agreements and other policies and procedures of the AHJ. Long term plans for retention and recruitment should also be considered. Deployment models should be developed in the best interest of the community.

(1) Determination of daily staffing levels based on community risk analysis relative to hazardous materials/WMD events.

(2) Assessment of deployment models
   (A) Dedicated staffing
      i Hazardous materials responders assigned to specific unit
      ii Training may be easier to deliver and sustain
   (B) Cross staffed units
      i Personnel with multiple response duties
      ii Personnel assigned to more than one unit in a single location. Examples include personnel assigned to other response apparatus and a designated hazardous materials response team. Nature of the response dictates staffing.
      iii May allow for more flexibility in staffing
      iv Multiple responsibilities may impact training and the ability to maintain proficiency/competency in all required job duties
      v One type of response may leave the other unit (or discipline) unstaffed or on delayed response.
   (C) Regional response teams
      i Teams comprised of several organizations that respond to a specified geographic area, or a single organization with responsibilities for a particular geographic area.
      ii When made up of multiple organizations, personnel may respond to an assembly point to gather tools, equipment, personnel and apparatus prior
to response.

iii Training/competency assessment may be more challenging due to interagency dynamics

(D) Satellite units

i Personnel & resources assigned to a central location (fire stations, deployment centers, etc.) supplemented by other responders trained to various levels at nearby locations.

ii This deployment model places hazardous materials response personnel on scene in order to start the size up and scene control process, however it does not place all assets on scene at once. It allows for the determination whether to call for additional resources.

(E) Mutual aid

i Agencies that provide or receive assistance to mitigate/manage hazardous materials/WMD incidents.

(D) Contract

i Private and public agencies may utilize outside contracts and/or contractors to augment existing response mechanisms or mitigate the incident on behalf of the

9.2.3 Resource Typing and Staffing.

9.2.3.1 Resource typing (federal, state or local) may have an impact on staffing in terms of daily staffing; deployment; program sustainment and team member recruitment and retention. Team typing categorizes and describes resources by capacity and capability; includes measurable standards and is intended to produce an identifiable response to a hazardous materials/WMD incident.

(1) Resource typing can assist the HMRT program manager as well as on scene incident management by:

(a) Enhancing emergency readiness
(b) Providing guidance in equipment purchasing and subsequent training
(c) Allows incident commanders or emergency managers to identify, request, and track resources by type

9.3.1 Specialty Personnel

9.3.1.1 HMRT program managers should be aware of other agencies (public and private) capable of providing personnel and/or specialized equipment to the incident, or that could be otherwise available to the AHJ. These resources could come from private industry response teams; military units such as Civil Support Teams or United States Coast Guard National Strike Force; and specialized assets such as railroad response teams; pipeline experts, airline experts, etc. This pool of personnel and equipment resources is constantly changing due to funding and/or other influences, but the HMRT program managers should be aware of the availability of allied professionals. Chapter 9 of NFPA 472 offers detailed information on Specialty employees and the conditions under which they could be utilized at a hazardous materials incident.

Chapter 10 - Finances

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10.1 Overview.

Financial considerations may by one of the most challenging parts of any Hazardous Materials Response Team (HMRT) program. Hazardous Materials response is costly for start-up, personnel, equipment, medical surveillance, as well as many other aspects. The majority of cost will be personnel wages, equipment, apparatus, and training. Program managers will need a full understanding of their jurisdictions financial policies on budgets and purchasing. It will benefit every HMRT to have an internal strategic plan developed and updated regularly. The strategic plan should be the basis for you budget justification and should identify current capabilities and gaps in capabilities and technology. While it need not be as lengthy or comprehensive as your department or jurisdictional strategic plan, it is recommended that it contain all the elements. The information in Chapter 10 is meant to assist you with your financial considerations that go along with starting and sustaining a HMTR. It is far from a complete list of every consideration for every team.

10.2 Revenue Streams.

Most HMRT’s will find that the majority of their revenue will come from within their organizational operating budgets. For single jurisdiction teams, this will be part of your annual budget. For multi-jurisdictional teams, agreements will need to be completed defining the responsibilities for each jurisdiction. Program managers should be prepared to develop annual budget request for line item funding for the revenues to fund the required needs of the HMRT. Because of the constant competition for budget funding, program managers should be prepared to justify revenue request via the strategic plan. This should include personnel, supplies, services, capital, and non-capital cost. In addition to operational budgets, program managers should be looking for alternative methods of revenue streams that can assist in deferring to cost of the HMRT that may be available.

10.2.1 Department Operating Budgets

10.2.1.1 Types of Budgets

There are many different types of budget in use by jurisdictions. It is imperative that the program manager be intimately knowledgeable of the budget process that governs their HMRT. This source of funding should be the basis of the HMRT budget and cover the required funding needs. It should include all expenditures that are required by law to operate or that have been identified annual expenditures by the AHJ. We will look at some common budget systems.

1) Line-item budgets-this will looks much a shopping list with each budget category provides on a list. It allows for flexibility in expenditures based on needs.

2) Zero-based budgets-This is best thought of as a “justification” budget. Each year the budget process starts a zero dollars and there is no balance brought forward from the preceding year. While it provides a process for each program to be scrutinized and validated on a yearly basis, it is time consuming and difficult to forecast all expenditures.
3) Program budgets—This type of budget is organized to the activities of the organization. The overall budget becomes a sum of its programs and is a way to plan a budget and track expenditures.

10.2.2 Grant Programs.

10.2.2.1 Federal Grant Programs. (NOTE: this subject is changing rapidly and should reference the programs and not the process)

There are a variety of grant programs available for first responders at both the local, state and federal level. The National Preparedness Grant Program focuses on development and sustainment of capabilities outlined in the National Preparedness Goal. Most grants should be tied to either local or regional strategic plans. Each grant program will have its own application and reporting processes. Most grant systems will require that the jurisdiction expend its own funds up front and then get reimbursed and may require matching funds, usually as a percentage basis. It is important to remember that grant funds are for those items that are used to augment or increase capability the operation of a HMRT. A grant may be a “one time thing” and should not be relied upon for the basic operation of the HMRT. Listed are some of the grant programs to assist the HMRT, the list is not all-inclusive.

1) DHS National Preparedness Grant Program
   A. Urban Area Security Initiative Grants
   B. State Homeland Security Program Grants

2) US Department of Transportation Pipeline and Hazardous Materials Safety Administration Hazardous Materials Emergency Preparedness Grant

3) FEMA Assistance to Firefighters Grant Program

10.2.2.2 State and Local Grant Programs.

State and Local grant program vary from state to state and region to region. Some grant programs may be from private industry or from governmental agencies. It is recommended to contact your local agency and industry representatives to see what is available in your jurisdiction.

10.2.2.3 Cost Recovery Programs.

Many jurisdictions have implemented procedures to recover the cost of response to incidents. This may be a flat rate, per-hour rate or the actual cost of time and materials. Program managers will need to work with their chain-of-command and department fiscal agents to determine what guidelines will be implemented for cost recovery, if any.

10.3 Sustainment.

As previously mentioned, three important budget considerations for any hazmat team are the cost of equipment, apparatus and manpower. Thirty years ago you could equip an entire hazmat rig for $50,000 to $100,000, depending on the local target hazards that needed to be addressed. Today, one instrument can cost well over $50,000. Initial costs to start a hazmat team are significant, but sustainment costs are often even more challenging because they are ongoing for the life of the team.
10.3.1 Apparatus are expensive to purchase and maintain, but managers must understand that apparatus need to be maintained and will eventually have to be replaced. What is often overlooked is the myriad other expenses required to keep a team up and running efficiently and safely. A smart way to look at every new purchase is to calculate the future costs required to sustain that item and include that information in the purchasing decision model. It may end up that the initial purchase price is within the budget but the ongoing costs are not sustainable.

10.3.2 Electronic monitoring instruments are another “high maintenance” item. Sending these instruments out for routine maintenance is costly. Many teams are fortunate to have individuals in-house who are qualified to calibrate these instruments monthly and may even be able to perform light repairs. But calibration gases are expensive and some have expiration dates. With all the high tech monitoring equipment teams now carry there is the high cost of calibrating, repairing and replacing supplies.

10.3.3 A colorimetric kit can prove invaluable, and the initial cost of this kit is fairly reasonable, but all colorimetric tubes have an expiration date. The team needs to budget for the replacement tubes so they do not experience a large expense a year or two later when they need to replace many boxes of tubes all at once.

10.3.4 Field biological agent detectors are relatively affordable but there is also an annual sustainment cost to replace test cartridges that expire.

10.3.5 There are many other supplies and equipment that have lifespan issues that need to be researched prior to making any commitment.

10.4 Personnel.
A critical area of concern is personnel costs and training personnel is one of the “high ticket” items. This includes both initial training to develop new Technicians and continuing training to maintain skills. Once the team is up and running the members will need refresher training, as well as training on new techniques and equipment. Teams make a considerable investment in each member and there must be a return on that investment if the team is going to stay functional.

10.4.1 Retaining response personnel is a major concern for HMRT’s. It does not do any good to invest scarce resources training individuals to start a hazmat team only to have the team become dysfunctional later due to a lack of maintaining the training. It is unsafe and a waste of resources in the long run. The number of hours required to stay proficient will vary depending on the organizational model of the team, but safe and efficient hazmat response requires a robust training regimen. It is not possible to have a proficient hazmat team if the training provided is minimal or even sub-par. It requires a significant “buy in” from the organization because it is difficult to sustain adequate training from within any organization. Funding sources need to be budgeted to send team members to outside training and specialty conferences, as well as bringing outside experts in to deliver high quality training that is not available locally. Even dedicated hazmat teams
with a wealth of experience and knowledge need to network with the outside response world to stay current.

10.4.2 There are several different team formats and all have pros and cons regarding personnel training. Part-time response teams, regional response teams, co-operative response teams, mutual aid based response teams, public/private response teams, industry based response teams, multi-agency response teams and full-time response teams are a few of the models currently in use but there are others. For example, there are very few cities with enough hazmat calls to justify a dedicated, full-time hazmat team. These teams are often very busy covering a large geographic response and scheduling the time to keep up-to-date with all the required skills and competencies is not easy. Busy response teams gain valuable experience during incidents, but may not have enough time to spend on all the competencies.

10.4.2.1 Smaller, part-time teams have the problem of having to cover a plethora of different training skills and suffer from a lack of actual street experience. There are many examples of competent small teams and they all place a premium on training to compensate for the lack of calls.

10.4.2.2 Teams that draw response personnel from several different agencies may a difficult time scheduling training when everyone is available. Often it is necessary to schedule repeated training classes just to get everyone to attend. Unless the controlling authority sets firm guidelines for training the actual training content can be open to interpretation. One agency may require their responders to attend 100% of the training sessions while another participating agency may set a lower standard. Clear team guidelines can help eliminate these issues.

10.4.2.3 Industry based response teams often are expected to provide other services or draw responders from employees that have other assigned jobs when there is not an emergency.

10.4.3 Individual participation as a hazmat team responder may depend on how the team is funded and what incentives are offered. For example, it is not unusual to have a team that is entirely made of volunteers drawn from the ranks. But, there are teams that provide incentives to join and maintain competency as a team member. This may include overtime in some organizations and/or incentive pay differential to compensate the individual for the addition work and risk involved. There is not one “right” answer in this regard; it is a decision that is based on multiple factors.

10.5 Supplies.

10.5.1 Cost associated with equipment and supplies are a significant draw upon department operating budgets. These costs should be identified prior to purchasing equipment. Many hazmat teams currently rely heavily on grants to purchase equipment, often without taking into consideration the funds that will be needed to replace damaged or lost equipment, upgrade older equipment, purchase consumable replacement supplies, and routine maintenance costs. While these grants help teams purchase equipment a team
may not be able to afford due to budget constraints, the grants may not provide for future maintenance and some of this maintenance requires several thousand dollars annually to keep the equipment working properly. Unfortunately, grant opportunities are shrinking and seem to be disappearing.

10.5.2 Consumables.
Consumable supplies are often overlooked when planning to fund a hazmat team. It would be great if every item used during a response was covered under a “spiller pays” regulation or some other cost recovery program, but some supplies are really hard to track at times. There is also the added burden of proportioning the cost of supplies that are used on several responses before needing to be replaced. For example, it is a straightforward proposition to count bags of oil dry during an incident and then charge accordingly. But it is a challenge to figure out how much to charge for other less obvious supplies, such as the calibration gas used during an incident. Or, how do you portion the cost of disposable batteries used during a particular incident? Some teams have had success charging a basic response fee in addition to supplies used to cover all those little “hidden” expenses. Still others report that they are not permitted to charge any extra for hazmat responses. It may depend on your charter and/or local/state laws.

10.5.3 A comprehensive inventory system will assist with replacement of supplies used during an incident, or expired. There are computer programs available to handle this task and actually make the process relatively easy. In addition to equipment and supplies, some programs track everything from personnel rosters, training information, operational readiness, calibration service intervals, incident logs & reports, certification requirements, repairs and a host of other needs.

10.6 Services.
10.6.1 Examples of this type of cost are annual physical exams for members.

10.7 Capital.
10.7.1 Capital costs are fixed, one-time expenses incurred on the purchase of land, buildings, construction, and equipment used in the production of goods or in the rendering of services. Put simply, it is the total cost needed to bring a project to a commercially operable status. Whether a particular cost is capital or not depend on many factors such as accounting, tax laws, and materiality.

10.8 Non-Capital.
10.8.1 Examples of non-capital cost are computers, books, software, and office supplies. Due to the increase in records keeping, research, and training of the HMRT personnel and responses, consideration for additional non-capital cost must be considered. These are often considered “hidden cost” and can be absorbed into the operational budget but they should be identified as cost particularly when considering the start-up of a new team.

10.9 Cost Recovery Analysis.
Operating a HMRT is an expensive service to get into and to maintain. Once an organization starts to provide the service, public and political demands will make it very difficult to get out of the service. Any organization operating a HMRT should be conducting ongoing program analysis to track the cost of the program and investigate all options available to recover costs in an effort to offset overall program costs.

10.9.1 Cost Analysis

10.9.1.1 Ongoing program analysis will help HM program managers to accurately track the costs involved with operating a HMRT. This information is needed to be able to forecast expenditures, determine inventory limits, manage training, track staffing costs and rationalizes the program to management and political entities. Program cost analysis will also assist with any external billing or cost recovery initiatives that the AHJ undertakes. The final objective of HMRT program cost analysis is to determine whether the program is better managed from within the AHJ or by external contract.

10.9.1.2 Cost analysis should focus on the following areas associated with the HMRT program:

a) Apparatus – the annual operating costs associated with vehicles including fuel, maintenance, wear and tear, and depreciation
b) Equipment – operation and maintenance costs related to response equipment that includes calibration and bump testing, power supplies, consumable components, annual testing, licensing and replacement costs
c) Staffing – all costs associated with staffing a HMRT. These may include salary and wages, benefits, overtime, backfilling, medical assessments, personal kit assigned
d) Supplies – HMRT use a variety of consumable supplies daily in their operations
e) Training – initial certification, continuing education or re-certification, materials, instructors, props and associated costs for travel, lodging, meals, and backfill
f) Miscellaneous – costs such as administrative, office costs, disposal of materials, contractors, storage or special facilities

10.9.2 Cost Recovery

10.9.2.1 Cost recovery options are available in many formats and opportunities vary between States, Provinces, industry and local jurisdictions. Prior to the initiation of a HMRT, the AHJ should investigate all possibilities for cost recovery to offset program operational costs. Justification for a HMRT establishment will be increased when the AHJ can support even partial costs with independent funding.

10.9.2.2 The following examples of cost recovery are provided to demonstrate some of the options that are available for the AHJ to pursue:

a) Federal, State, Provincial programs – in both the United States and Canada programs exist to allow local jurisdictions the ability to offset equipment purchase costs, claim for disposal and cleanup costs, or assist with training costs
   i) CERCLA – Comprehensive Environmental Response, Compensation and Liability Act
ii) EPA’s Local Government Reimbursement program (LGR)
iii) State Statutes
iv) Provincial Regulations
b) Grant programs - exist for a variety of HMRT components such as training, equipment or vehicles
   i) DHS
   ii) FEMA
   iii) JEPP – Joint Emergency Preparedness Program through Public Safety Canada
c) Local Ordinances or Bylaws – that may allow for recovery of response and/or cleanup costs
d) Cost Sharing – some jurisdictions may partner together to help fund the HMRT of one AHJ if response is provided into the other jurisdiction
   i) Regional HMRT
e) Industry – some industry and responsible partner groups will fund HMRT that respond to their sites or may help fund training initiatives between their team and the local HMRT
f) Charge back or Fee for Service – Some HMRT will bill for responses out of their jurisdiction or even within if HazMat response is considered an additional service provided. Others bill back to the originators of a response if the cause of the incident can be determined to be from the violation of a law, regulation, ordinance or bylaw. There is also the opportunity to set limits within a HMRT of what is included in a response and what is determined to be billable.
   i) Consumables – Some HMRT bill the spiller for any consumables used in the response but not for the balance of the response itself.

10.10 Personnel Hidden Cost:
10.10.1 As with most programs, within the staffing of a HMRT there are also some hidden costs to consider when evaluating the establishment of a program or not. Some of these hidden costs are not going to occur in all situations but may occur throughout the life of a HMRT Program.
10.10.1.1 The following are examples of some hidden personnel costs associated with a HMRT:
1) Staffing – within staffing of a HMRT hidden costs may include
   a) Backfilling - the cost of replacement personnel to ensure staffing levels are maintained. This could be due to training, vacation, sickness and accident, long term disability
   b) Medical – costs related to medical monitoring or illness. This could include annual baseline testing for staff which may include heavy metal screen and could also include ongoing medical costs related to treatment and/or compensation for a work related condition attributed to the HMRT.
   c) Equipment – costs associated with individual HMRT personnel. This may include uniforms or special uniform considerations such as Nomex® coveralls, safety glasses, or individual SCBA and/or respirators. The size of your personnel can also incur special costs if the “off the rack” sizing does not accommodate staff for Chemical protective Clothing (CPC), chemical boots and gloves.

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2) Communications – costs associated with communication devices or technology that personnel may need. These will vary based on the deployment and/or HMRT model utilized. This may include:
   a) Cell Phone
   b) Pager
   c) Computer, software and data accounts
   d) Radios
   e) Tablet or smart device

3) Sustainability – ongoing costs of sustaining the HMRT based on turnover and promotion. Consideration needs to be given in regards to costs incurred if HMRT members no longer want to participate in the program; members are promoted up into new roles, and retirement rates to identify how often the initial training and outfitting of members takes place. Initial costs are generally the highest direct cost due to training and therefore a high turnover rate can significantly increase overall program costs.

4) Collective Agreements – there may be costs identified within individual collective or bargaining agreements that will impact the program costs of a HMRT. Some of these may include:
   a) Standby or callout pay – costs for those that must be available on standby or those for members called in off duty
   b) Special duty pay – costs specific to those members that are part of a special team over and above their normal pay
   c) Hazard pay – costs specific to those members that are put in situations that fall within special hazards or are exposed to certain products
   d) Training pay – costs specific to any training that falls outside of regular scheduled hours of work or shift patterns

Chapter 11 - Operational Guidelines

11.1 Introduction:

11.1.1 Purpose: The purpose of this chapter is to provide information and guidance for hazardous materials/weapons of mass destruction response team (HMRT) program managers in understanding the minimum requirements necessary for developing operational guidelines for the AHJ’s hazardous materials/WMD response program. Recommendations offered here are not intended to restrict any jurisdiction from using more stringent guidelines or applying greater administrative measures or management controls. Operational guidelines should include:

   (a) An Oil Spill/Hazardous Materials Annex as part of the AHJ’s Basic Plan
   (b) Regional Response Plan
   (c) An LEPC Community Emergency Response Plan
   (d) Policies
   (e) Standard operating procedures
   (f) Standard operating guidelines
   (g) Site specific pre-plans
11.1.2 Scope: This chapter should apply to all organizations that have responsibilities for developing plans, procedures, and operational guidelines for responding to hazardous materials/WMD incidents.

11.1.3 Application: The recommendations contained in this chapter are applicable to those jurisdictions that have or will be developing a hazardous materials/WMD response program. Operational guidelines and emergency response plans should create “Decision Points” (see definition) instead of just tactics and procedures so that responders can utilize a Risk-Based Response approach to choose the appropriate response options (offensive, defensive, non-intervention). “Decision Points” provide a systemic approach that can be applied to all phases of emergency situations.

11.2 Hazardous Materials/Oil Spill Annex to the AHJ’s Basic Emergency Management Plan: Every State has an Emergency Management Plan that compliments the National Response Framework and when needed works in concert with the FEMA - Robert T. Stafford Act for disaster relief and emergency assistance. Many states also require that local jurisdictions have a Basic Emergency Management Plan supported by functional annexes. Basic Plans are designed to provide general guidance for emergency management activities and an overview of methods to be used for mitigation, preparedness, response, and recovery. Emergency Management Plans often include the following Annexes:

(a) Annex A: Warning
(b) Annex B: Communications
(c) Annex C: Shelter and Mass Care
(d) Annex D: Radiological Protection
(e) Annex E: Evacuation
(f) Annex F: Firefighting
(g) Annex G: Law Enforcement
(h) Annex H: Health and Medical Services
(i) Annex I: Emergency Public Information
(j) Annex J: Recovery
(k) Annex K: Public Infrastructure and Engineering
(l) Annex L: Utilities
(m) Annex M: Resource Management
(n) Annex N: Direction and Control
(o) Annex O: Human Services
(p) Annex P: Hazard Mitigation
(q) Annex Q: Hazardous Materials and Oil Spill Response
(r) Annex R: Search and Rescue
(s) Annex S: Transportation
(t) Annex T: Donations Management
(u) Annex U: Legal
(v) Annex V: Terrorist Incident
Annex W: Finance

Some local Emergency Management Plans may mirror the National Response Framework and use Emergency Support Functions (ESFs) in lieu of Annexes. ESFs may include:

(a) ESF #1: Transportation Annex
(b) ESF #2: Communications Annex
(c) ESF #3: Public Works and Engineering
(d) ESF #4: Firefighting Annex
(e) ESF #5: Emergency Management
(f) ESF #6: Mass Care, Emergency Assistance, and Human Services Annex
(g) ESF #7: Logistics Management and Resource Support Annex
(h) ESF #8: Public Health and Medical Services Annex
(i) ESF #9: Search and Rescue Annex
(j) ESF #10: Oil and Hazardous Materials Annex
(k) ESF #11: Agriculture and Natural Resources Annex
(l) ESF #12: Energy Annex
(m) ESF #13: Public Safety and Security Annex
(n) ESF #14: Long-Term Community Recovery Annex
(o) ESF #15: External Affairs Annex

11.2.1 Regional/Community Emergency Response Plan: When developing a Regional or Community Emergency Response Plan the AHJ should establish a planning team to research all related local, state, and federal plans, federal regulations, standards, mutual aid agreements, and memoranda of understanding which might influence the Jurisdiction’s final plan. Once the review is complete the Jurisdiction will need to perform a Risk Analysis (see Chapter 5) which will lead to a Risk Assessment that is essential in prioritizing preparedness efforts and determining the community’s capabilities compared to the potential response requirements in accordance with the National Preparedness Goals (insert link to National Preparedness Goals). Emergency Response Plans should be reviewed and updated at least annually.

11.2.2* Emergency Response Plan template (Annex)

11.3 HazMat Guidelines/Procedures (SOG/SOP): Standard Operating Guidelines/Procedures provide general guidance of specific procedures for strategic and tactical activities at a hazardous material/WMD incident. Standard Operating Guidelines/Procedures (SOG/SOP) enable HazMat responders to operate in a dynamic threat environment where hazards are identified, risk are assessed, and response options are chosen based on the responder’s level of training and the available resources or capabilities. Advantages of Standard Operating Guidelines/Procedures include:

  a) Improves coordination;
  b) Simplifies training;
  c) Improves personnel safety;
  d) Provides response consistency;
11.4 Hazardous Materials Incident Levels

11.4.1 Level I Incident - A Level I incident is a minor incident that can be controlled by first responders or within the capabilities of the HazMat Response Team.

11.4.2 Level II Incident – A Level II incident is an incident of greater magnitude or a greater hazard than a Level I and poses a potential threat to life and property. A Level II incident will require resources beyond the capabilities of the initial local response personnel.

11.4.3 Level III Incident – A Level III Incident involves a severe hazard or a large geographical area and poses an extreme threat to life and property and may require large-scale protective actions and resources beyond those available at the jurisdictional level. This type of incident may require resources and expertise from regional, state, federal, and private organizations.

11.5 Incident Response: The hazardous materials/WMD response will occur once a hazardous materials release has been discovered and the emergency response sequence has been initiated.

11.5.1 First Response: Actions taken by the initial arriving first responders will provide the framework for the progression of the event. The first few minutes after arrival of first responders are the critical to the success of the overall operation.

11.5.2 First Responder Incident Priorities: Actions taken by first responders should support the incident priorities of Life Safety, Incident Stabilization, and Property Conservation/Environmental Protection.

11.5.3 First Responder Actions: Actions taken by first responders are defensive in nature and are intended to keep the incident from becoming worse. First Responder actions may include:

(a) Isolating the area
(b) Denying entry into the area
(c) Protecting people, structures, and other exposures
(d) Extinguishment
(e) Emergency Decontamination
(f) Vapor suppression
(g) Confining and controlling the release
(h) Shutting off a remotely located valve
(i) Protecting the environment
The above First Responder actions should be performed by responders who have been trained to all of the competencies at the Awareness Level (NFPA 472; Chapter 4) and the competencies set forth in Chapter 5 of NFPA 472, First Responder Operations Level – Core.

11.5.4 First Responder Actions - Mission Specific: Actions taken by first responders who have received additional training beyond the First Responder Operations Level – Core and are based on the responder’s mission as defined by the Authority Having Jurisdiction. These actions should be taken under the direction of a Hazardous Materials Technician, an Allied Professional, or with direction from a strong SOP. First Responders Operations Level – Mission Specific responders should be trained to all of the competencies at the Awareness level (NFPA 472; Chapter 4), First Responder Operations – Core (NFPA 472; Chapter 5), and the applicable sections and competencies in Chapter 6 of NFPA 472. First Responder Operations Level - Mission Specific activities include:

(a) Personal Protective Equipment
(b) Mass Decontamination
(c) Technical Decontamination
(d) Evidence Preservation and Sampling
(e) Product Control
(f) Air Monitoring and Sampling
(g) Product Control
(h) Victim Rescue
(i) Illicit Lab Response
(j) Bomb Technician

11.6 Hazardous Materials Technician: The hazardous materials technician shall be that person who responds to hazardous materials/WMD incidents using a risk-based response process by which he or she analyzes a problem involving hazardous materials/WMD, selects applicable decontamination procedures, and controls a release using specialized protective clothing and control equipment. Hazardous materials technicians shall be trained to meet all the competencies at the awareness level (NFPA 472; Chapter 4), all the core competencies at the operations level (NFPA 472; Chapter 5), and Chapter 7 of NFPA 472.

11.7 Scene Safety: Scene safety at a hazardous materials/WMD incident is of the utmost importance. Hazardous materials operations require the use of a Hazardous Materials Safety Officer. According to Occupational Safety and Health Administration, 29 CFR 1910.120, the hazardous materials safety officer must be trained to the same level of the tasks being performed. The Hazardous Materials Safety Officer (NIMS: Assistant Safety Officer – Hazardous Materials) shall be that person who works within the incident management system (IMS) (specifically, the hazardous materials branch/group) to ensure that recognized hazardous materials/WMD safe practices are followed at hazardous materials/WMD incidents. Hazardous materials safety officers
shall be trained to meet all the competencies at the awareness level (NFPA 472; Chapter 4), all the core competencies at the operations level (NFPA 472; Chapter 5), all competencies at the hazardous materials technician level (NFPA 472; Chapter 7), and Chapter 11 of NFPA 472.

11.8 Personnel Accountability: A jurisdiction’s emergency response plan should include a personnel accountability system that can account for each member engaged in emergency activities at an incident scene. A personnel accountability system should have the ability to provide a rapid accounting of all members on the incident scene at any given time. Personnel accountability systems may be either electronic or manual and should be capable of specifically identifying and keeping track of all members entering and leaving the hot zone or those who are working in high hazard areas where special protective equipment is required.

11.9 Emergency Response Operations: Emergency response operations should be conducted in accordance with NFPA 472 - Standard for Competence of First Responders to Hazardous Materials/Weapons of Mass Destruction Incidents, NFPA 1500 - Standard on Fire Department Occupational Safety and Health Program, and the applicable federal regulation; Occupational Safety and Health Administration, 29 CFR 1910.120 or the Environmental Protection Administration 40 CFR 311.

11.10 Resource Typing and Personnel Credentialing: When a jurisdiction decides to establish a hazardous materials/WMD response program, a risk analysis should be conducted followed by a needs assessment. By evaluating the hazards and risk and determining the resources and capabilities needed to respond to and mitigate a potential hazardous materials release, the jurisdiction can consult the FEMA Resource Typing recommendations and make a decision about what level of hazardous materials response is needed for their respective jurisdiction. For individuals, the credentialing process entails the objective evaluation and documentation of an individual’s current certification, license, or degree; training and experience; and competence or proficiency to meet nationally accepted standards, and their ability to perform certain specific tasks during an incident. For the National Incident Management System, credentialing is the administrative process for validating a person’s qualifications and providing authorization to perform specific functions in an Incident Command System. Information about resource typing can be found on the FEMA website; Source: http://www.fema.gov/emergency/nims/ResourceMngmnt.shtm.

11.11 Terminating the Incident: During the termination phase, the incident transitions from emergency response to recovery. Incident briefings are in order and help maintain the command and control functions during this transition.

11.11.1 Termination activities are divided into three phases:
a) The Incident Debriefing which is conducted at the incident during the termination phase.
   1) Personnel are informed of the signs and symptoms of exposure to hazardous materials at the incident and receive instructions on what to do if they become symptomatic after leaving the scene.
   2) Identify any damaged equipment and items requiring immediate attention.
   3) Review hazmat incident strategies and contingencies.
   4) Summarize the activities performed by the specialized teams on scene.
   5) Identify any unsafe acts that took place during the incident.
   6) Identify a point of contact for each branch/group.
   7) Any follow-up activities that need to be addressed.

b) The Post Incident Analysis is scheduled as soon as practical after the incident and is used to review the incident in order to establish a clear picture of the events that took place and provide information for future incidents. A Post Incident Analysis usually includes;
   1) A reconstruction of the incident to establish clear picture of what events took place.
   2) Identify action items to improve tactics and Standard Operating Procedures/Guidelines.
   3) Document safety guidelines, site operations, hazards encountered, and lessons learned.

c) The Critique is a more formal process and can be combined with the post incident analysis or conducted separately. Information obtained in the critique can be used to improve performance by identifying weaknesses and providing assurance that those weaknesses will be corrected. Items that might be address in a critique include:
   1) Was standard operating procedures/guidelines were utilized?
   2) What equipment used?
   3) What steps were taken to minimize contamination – cross contamination?
   4) Was decontamination performed properly?
   5) Identify immediate corrective actions that need to be taken.

Chapter 11
Operational Guidelines
Annex Material

11.2.2 Annex:
Emergency Response Plan Template: The following template may be used as a guide for the development of an ERP that provides the information necessary for emergency response in a standardized format:

a) Introduction:
b) Scope:
c) Purpose:
d) Health & Safety:
e) Response Information:
f) Operations
g) Annex:
h) Glossary:
i) Equipment:
j) Documentation:
k) Site Specific:
l) Product Specific:

11.9* Personnel Credentialing:
Recommended NIMS Personnel Credentialing Process - When a request for mutual aid is received by a jurisdiction, the potential supporting department or agency evaluates its capacity to absorb the anticipated loss of resources that would be deployed. The assisting agency should not compromise their own mission (e.g., can a fire department allow 20 percent of its equipment and personnel to be deployed to another jurisdiction for 30 days and still meet its own community’s needs?). If the assisting department or agency determines that it can accommodate the request for resources, it must next identify specific personnel who will be deployed. The assisting department or agency should then select members for deployment. Some states have an authorized accrediting agency that will verify the responder’s credentials and clear those who can provide mutual aid. The accrediting agency evaluates each person’s credentials and determines whether the applicant meets the established criteria for the positions required by the mission. For responders that are approved by the authorized accrediting agency, the following steps are taken:

a) The applicant’s department or agency is notified.
b) A record is created on the individual in the official credentialing database.
c) An identification card or other credential is issued to the individual. (The identification card or credential should include an expiration date and be reissued as appropriate.)
d) Information on the applicant is uploaded to the incident management infrastructure.

The following figure illustrates the recommended credentialing process:
Definitions:
Decision point: A pre-defined circumstance in which the emergency responder must determine a path forward to maximize responder safety and public protection.

FEMA: [http://www.fema.gov/emergency/nims/ResourceMngmnt.shtm#item3](http://www.fema.gov/emergency/nims/ResourceMngmnt.shtm#item3)
Chapter 12 - Community Outreach and Marketing

12.1 Introduction

12.1.1 Purpose. The purpose of this chapter is to provide guidance and suggestions for program managers on the opportunities to perform community outreach and marketing of the Hazardous Materials/WMD Emergency Response team. The program manager will have the opportunity to conduct external and internal outreach.

12.1.2 Definition. Community outreach and marketing are interrelated and are not mutually exclusive. Both involve the education of the Hazardous Materials/WMD Emergency Response teams’ capabilities and potential services to customers within their own agency and to a range of outside agencies.

12.1.3 Objectives
(1) Identify methodology to market the Hazardous Materials Response (HMR) services with their own agency.

(2) Identify methodology to market the HMR services with other emergency response organizations, such as a fire, police, emergency medical services, emergency management and others.

(3) Identify potential external customers for community outreach and marketing.

(4) Identify potential programs that could be developed and utilized in a community outreach and marketing program.

12.1.4 HMR has special capabilities and expertise, which should be utilized within their own agency. The program manager should explore areas where the HMR can showcase their capabilities to their peers within their agency. Some suggestions include;

(1) The specialized skills and equipment of the HMR provide the ability for the HMR team to act as health and safety officials, which can be specifically targeted towards responder safety, some examples include;

(a) Developing response profiles which would allow for HMR teams to monitor for toxic gases and other potentially hazardous situations at fires;

(b) Assisting with the pre-planning of target hazards, such as EHS and tier 2 facilities;

(c) Assisting with air monitoring during USAR operations;

(d) Assisting with air monitoring during flammable gas releases;
(e) Assisting with CO alarms and investigations, which can also include odor investigations (sick buildings)

(2) Developing training programs and policies which integrate the first responders into HMR activities;

(a) Develop training programs and policies which allow for first responders to perform mission specific activities prior to the arrival of the HMRT, which results in more efficient responses and lessens on-scene time.

(b) Develop training programs that permit first responders to perform mission specific activities and tasks (assist with decon, EMS, fire suppression, standbys, etc.) in support of the HMRT during incident operations.

(b) Explore potential equipment that could be supplied to first response agencies which could be utilized prior the HMR team’s arrival.

12.1.5 The program manager should evaluate response profiles which would allow for safe and efficient responses, and minimize the impact to the first response community.

12.1.6 The program manager should be familiar with the local FBI Division and the WMD and HazMat Response Team Coordinators. A relationship should be developed between the HMRT and the FBI resources.

(a) Training efforts and exercises can be coordinated.

(b) The FBI HMRT may need assistance from the local jurisdiction for when operating at a high hazard crime scene. Having coordinating a relationship prior to the event ensures an efficient response.

12.1.7 The program manager should develop a relationship with the local bomb squad, local state and federal bomb technicians. There are many HMRT activities that can be supported by the bomb squad and vice versa, there are many bomb squad activities, which can be supported by the HMRT. Having the two units work together on a regular basis is key to success at larger or more complex incidents. Bomb squads are typically short staffed, and the process to set up for an explosive device entry is very similar. The HMRT, if properly trained and the relationship is developed, can assist with many set up activities. The bomb squad has unique tools, which can be useful in a variety of hazardous situations. Most bomb technician’s are also HazMat technicians and can assist with HMRT activities.

12.2 The Program Manager should become familiar with the State Emergency Response Commission (SERC) and should attend the scheduled meetings as available. The SERC influences and in some cases determines the statewide response to hazardous materials/WMD incidents. All of the agencies that are involved in HM/WMD incidents attend the meetings.
(a) It is always best to meet the people and agencies that would be involved in a large scale incident, before the incident occurs.

(b) The SERC may have the ability to sponsor, coordinate, and/or deliver training programs; some on the local level, and some at the statewide level.

(c) The SERC is also a source of planning and training grant funding, and in most cases funding distribution is done at the SERC level. Most federal grant money is provided to the SERC for distribution at the local level.

12.3 The program manager should be familiar with and participate actively with the Local Emergency Planning Committee (LEPC). The LEPC is usually set up on a countywide or city basis depending on the size of the jurisdiction. The LEPC is a requirement of the SARA Title III law and emergency services is one of the required members of the LEPC.

12.3.1 In many locations the HMRT program manager is also the chairman of the LEPC or plays a major leadership role. The program manager may provide administrative support to the LEPC. Many activities of the LEPC involve the HMRT, and it is highly recommended that the program manager play a very active role in this organization.

(a) The main focus of the LEPC is to ensure that there is an emergency plan for the community and that the local community is prepared for a HM/WMD emergency. If the local response agencies are not prepared, the LEPC should develop a plan to ensure the local community is prepared.

(b) The LEPC is a forum for facility-emergency responder interface and relationship building. The key contacts for EHS and Tier 2 facilities are usually involved with the LEPC, along with other emergency response and management agencies. The public is also represented at the LEPC and it brings facilities, emergency response and the public together to ensure that the local jurisdiction is prepared for a HM/WMD event.

(c) The LEPC is required to have an annual exercise for hazardous materials response, which would involve the local HMR team. These exercises can take the form of tabletop or full-scale exercises. EHS and Tier 2 facilities can be used for the exercises, or transportation containers can be used from a facility. Realistic exercises can be developed to enhance HMR capabilities.

(d) One of the best ways to test a local jurisdictions capability is to conduct an unannounced exercise, which involves a select group of planners.

(e) At the conclusion of the exercise an after action report (AAR) is developed and delivered to the LEPC, which includes a plan to correct deficiencies.
12.3.2 The LEPC is a potential source of training, as local industry can offer their expertise to the local response agencies by providing training at their facilities and or referencing their products and services.

12.3.3 The LEPC is also eligible for planning funding, which comes from the SERC, and which can assist with the planning and delivery of the annual exercise. There are a number of planning functions—which are eligible for funding through the LEPC.

(a) On occasions the EPA levies environmental fines against facilities, and in some instances the facility is required to provide funding to the LEPC for their activities. In some cases, response equipment is provided to the HMR team through the LEPC.

(b) The LEPC may also be the source of industry funding and support for HMRTs.

12.3.4 EPA regional activities are coordinated through the LEPC, which can include training, funding, and enforcement actions.

12.3.5 Some LEPC’s provide outreach to the local EHS and Tier 2 facilities by providing regulatory education sessions. These sessions can relate to laws and regulations directly under the purview of the LEPC, or can be safety related. When new regulations are issued, the LEPC (assisted by the HMRT) can be delivering outreach programs, which can help the local facilities.

(a) In some jurisdictions the program manager or members of the HMRT are the ones providing the training or they assist with the training. Hosting the training at the HMRT station is great community outreach and marketing.

12.4 Local facilities which use and store hazardous materials should be known to the HMRT. Typically the information about these facilities is obtained through EHS, RMP and Tier 2 reporting. (which should be covered by risk assessment chapter) The program manager should establish a program to have the HMRT conduct familiarization tours of all EHS facilities in the jurisdiction.

12.4.1 Depending on the number of EHS facilities the HMRT should also conduct familiarization tours of high risk Tier 2 facilities. The program should include the frequency these tours should take place.

12.5 Program managers in jurisdictions with industrial mutual aid groups should become involved with those groups. Industrial mutual aid groups are typically found in areas if the country where there are large number of chemical facilities. Where a group does not exist the program manager should explore the feasibility of forming one. Some of the benefits of a industrial mutual aid group include;

(a) Access to firefighting foam, which can include specialized foam
(b) Large quantities of neutralizing materials or agents

(c) Access to chemists, chemical engineers, industrial hygienists, and product/material experts. In some cases HMRT had the benefit of on-scene assistance with these experts.

(d) Access to specialized equipment and response vehicles

(e) Access to facility-based response teams and other trained personnel.

12.6 The HMR program manager should develop a program that markets the skills of the HMR team within their agency. This program should include other emergency response agencies within their own jurisdiction. Policies and programs should be established so that the customers within their own agencies see a benefit to coordinating efforts with the HMR team.

(a) Develop response profiles in which the HMR can reduce on-scene time of the first responding companies

(b) Develop training for the first responding companies so that they serve a purpose during a hazardous materials response other than their initial efforts. Any training that can be provided that enables the first responding companies to assist the HMR can be of benefit.

(c) The HMR team should develop a relationship with the local bomb squad and develop a dual response profile. Cross training should be coordinated with both teams. The program should encourage dual response profiles so that both teams respond together, and become familiar with each other’s capability and personnel.

(d) Training programs and exercises should be developed with emergency management councils and groups to coordinate activities and training opportunities. Many grants and training programs are coordinated at the state emergency management level and distributed to the local level. Developing and maintaining good relationships and communications with emergency management agencies can assist with funding and training.

(e) Partnering with emergency management agencies, environmental agencies, and hazardous waste companies to hold household hazardous waste days is an excellent method of marketing to the general public. Using the HMR team as the safety and characterization group reinforces valuable skills and provides training with real materials. Having contact with the public and other government agencies where the public is receiving a valuable service brings substantial benefits.

(f) Developing a relationship with the local health department is recommended so that suspected materials can be analyzed for a biological threat. Health
laboratories, especially those in the Laboratory Referral Network (LRN) system, have established procedures for the handling of materials suspected of being a biological threat. Knowing how the laboratory desires to receive samples is essential to a good relationship. Understanding the laboratory process and the procedures that they follow assists in the coordination to a potential threat.

(g) Radiological incidents are a low frequency but can be high profile events. Developing a relationship with a radiological specialist can assist with the challenges of a radiological response. At the state level there are radiological specialists responsible for radiological licensing and response. Some larger cities and in facilities that use or store radiological materials often have specialists who can assist with planning, training and response issues.

(h) Specialists, such as chemistry instructors, are usually available from local colleges and universities and can help in their respective fields. These specialists are helpful in responses outside their facilities, but educational institutions can also be locations of frequent HazMat responses. Having an established relationship with the facility enables the response to be well coordinated.

(i) Having advocates in the business community can reap benefits with the local government officials. They may not be actual recipients of a HazMat response mitigation activities but their business may be impacted by a potential release or spill. Developing a relationship with the local Chamber of Commerce or other local business groups can provide benefits when evacuations require businesses to be closed. Demonstrating competency and having a relationship can reduce the impact from an evacuation or business closure standpoint.

(j) With all of the groups mentioned above and also for elected officials, HMRT demonstrations and exercises should be scheduled. These demonstrations should showcase the HMRT capabilities and provide an overview of the equipment, which can show how the local government funds have been allocated. These exercises should be well rehearsed and different from an evaluative exercise where the players shouldn’t know the training scenario in advance. Using facilities that may be controversial and demonstrating a cooperative response can often ease community fears. Having a community activist participate in the planning can also work benefits as they are working to make sure the community response is appropriate.

12.7 The HMRT should engage in public education activities that include pre-planning, emergency sheltering and evacuations, and providing for overall public awareness of chemical emergencies.

(a) The HMRT should develop school training programs, which cover sheltering, and evacuation procedures, and chemical safety. These programs should be age appropriate. There are a number of existing programs such as Safe Schools™, which are available and provide a number of appropriate course templates.
(b) A number of law enforcement, fire agencies and emergency management agencies conduct public training academies. In some communities there are Community Emergency Response Teams (CERT) that are trained to assist with disaster response activities. The HMRT should integrate into these academies and provide training on their specific activities. A standalone program should also be considered to provide training for the general public.

(c) Outreach print materials and web based information should be developed to provide an overview of citizens’ response to chemical emergencies, including pre-incident planning and community events. Informational documents which provide an overview of response capabilities is also helpful for communicating with chemical facilities and community groups. Calendars, which provide helpful tips, contact numbers and local history, are popular items. Teaming with local artists and photographers can assist with the design of the materials and increases the popularity of the material.

(d) Conducting awareness training and response activity overviews for homeowner associations, neighborhood groups and community activity groups can provide benefits relating to the community reaction to a chemical release. The more outreach that is conducted prior to a release reduces the impact of a release. Using Tier 2 data, the HMRT can discuss potential impacts to the surrounding community, and partnering with the facilities to discuss these issues develops positive relationships.

(e) Developing materials and programs with Toxic Release Inventory (TRI) 313 data is helpful. It is best to inform local elected officials of the data as soon as possible, especially if the data shows a number of releases or includes a serious release. Bad news never gets better with time. Getting out in front of the information is better than ignoring it.

12.8 There are a number of regulations that mandate HMRT interactions. Certain facilities and some operations are required by various OSHA, DOT and EPA regulations to hold training, exercises and informational sessions. Given the inherent risks which are present, HMRT should already have developed a relationship with these facilities, but should also use these regulatory requirements to enhance the required interaction.

(a) The EPA Risk Management Program (RMP) requires the facilities covered by RMP to conduct annual exercises with the local HMRT and the LEPC. These facilities, which store or use high risk materials that if released could impact the community, are required to notify the LEPC that they are a RMP facility.

(b) The DOT PHMSA requires owners of pipelines to conduct awareness and informational training sessions for response agencies where the pipelines runs. HMRT should be aware of all pipelines and operators who operate these pipelines and should be educated on their operation and risks.
(c) HMRT should be aligned with the AHJ fire code enforcement division. In many jurisdictions the responsibility to conduct fire inspections and chemical storage inspections falls to the HMRT.

1. The HMRT or designated persons on the HMRT should be the subject matter experts with regard to the applicable chemical storage and use codes. The balance between outreach and code enforcement is a fine line and the objective should be to ensure proper storage and use of dangerous materials. The more the HMRT knows about a facility the better prepared they are. When a facility stores and uses dangerous materials according to the code, the less likely there is to be a release.

2. In some instances the AHJ fire marshal also has investigatory and enforcement responsibilities for hazardous materials releases and chemical-related facilities. The HMRT should be familiar with local jurisdictional requirements and develop and maintain a working relationship with these personnel.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1.1 Outside the United States, hazardous materials might be called dangerous goods (see Annex H). Weapons of mass destruction (WMD) are known by many different abbreviations and acronyms, including CBRNE (chemical, biological, radiological, nuclear, explosive), B-NICE (biological, nuclear, incendiary, chemical, explosive), COBRA (chemical, ordinance, biological, radiological agents), and NBC (nuclear, biological, chemical).

A.1.2 The committee believes that this document specifies the minimum job performance requirements for emergency response personnel to hazardous materials/weapons of mass destruction incidents given specific levels. The committee recognizes that emergency services organizations might have to invest considerable resources to provide the equipment and training needed to perform at hazardous materials/weapons of mass destruction incidents safely and efficiently. The committee does not mean to imply that organizations with limited resources cannot provide hazardous materials/weapons of mass destruction emergency response services, only that the individuals charged with performing hazardous materials/weapons of mass destruction responsibilities are qualified to specific levels according to this standard.

A.1.2.3 Organization/management responsibilities should be addressed by the agency that the emergency response personnel represent. The authority having jurisdiction should define the agency requirements for progression to positions of management responsibility.

A.1.2.5 See Annex B.
A.1.2.6 Continuing education or training is necessary to ensure that all remain current and up to date with their knowledge and skills by attending workshops and seminars, undergoing competency testing, participating in recurring proficiency evolutions, and/or accessing professional publications as determined by the AHJ. Nationally recognized certification is one means of demonstrating proficiency in current practices.

A.1.3.2 See Annex B.

A.1.3.3 It is recommended, where practical, that evaluators be individuals who were not directly involved as instructors for the requirement being evaluated.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the AHJ may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The AHJ may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a police chief, sheriff, fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.3 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.1 Allied Professional. Examples could include Certified Safety Professional (CSP), Certified Health Physicist (CHP), Certified Industrial Hygienist (CIH), Radiation Safety Officer (RSO) or similar credentialed or competent individuals as determined by the AHJ. May also be referred to as a Subject Matter Expert (SME) in a mission-specific area. [472, 2013]

A.3.3.8 Confined Space. Additionally, a confined space is further defined as having one or more of the following characteristics:

1. The area contains or has the potential to contain a hazardous atmosphere, including an oxygen-deficient atmosphere.
2. The area contains a material with the potential to engulf a member.
3. The area has an internal configuration such that a member could be trapped by
inwardly converging walls or a floor that slopes downward and tapers to a small cross section.

(4) The area contains any other recognized serious hazard. [472, 2013]

A.3.3.15 Control Zones. Law enforcement agencies might utilize different terminology for site control, for example, *inner and outer perimeters* as opposed to *hot or cold zones*. The operations level responder should be familiar with the terminology and procedures used by the AHJ and coordinate on-scene site control operations with law enforcement. Many terms are used to describe these control zones; however, for the purposes of this standard, these zones are defined as the hot, warm, and cold zones. [472, 2013]

A.3.3.15.4 Warm Zone. The warm zone includes control points for the decontamination corridor, thus helping to reduce the spread of contamination. This support may include staging of backup personnel and equipment, staging of evidence, and personnel and equipment decontamination. Additionally, portions of this area may be used as a safe refuge for initial patient evacuation and triage. [472, 2013]

A.3.3.17 Decontamination. There are two types of decontamination (commonly known as “decon”) performed by emergency responders: gross and technical. Gross decontamination is performed on the following:

1. Entry team members before their technical decontamination
2. Victims during emergency decontamination
3. Persons requiring mass decontamination

Technical decontamination is performed on entry team members. Decontamination sometimes performed on victims in a hospital setting is generally referred to as *definitive decontamination*, but is not covered in this standard.

The types of decontamination (except *definitive decontamination*) are further defined in A.3.3.17.1 through A.3.3.17.4. [472, 2013]

A.3.3.17.1 Emergency Decontamination. This process can be as simple as removal of outer or all garments from the individual to washing down with water from a fire hose or emergency safety shower. The sole purpose is to quickly separate as much of the contaminant as possible from the individual to minimize exposure and injury. [472, 2013]

A.3.3.17.2 Gross Decontamination. Victims of a hazardous material release that is potentially life threatening due to continued exposure from contamination are initially put through a gross decontamination, which will significantly reduce the amount of additional exposure. This is usually accomplished by mechanical removal of the contaminant or initial rinsing from handheld hose lines, emergency showers, or other nearby sources of water. Responders operating in a contaminated zone in personal protective equipment (PPE) are put through gross decontamination, which will make it safer for them to remove the PPE without exposure and for members assisting them. [472, 2013]

A.3.3.17.3 Mass Decontamination. Mass decontamination is initiated where the number of victims and time constraints do not allow the establishment of an in-depth decontamination process. Mass decontamination is a gross decontamination process utilizing large volumes of low-pressure water to reduce the level of contamination. A soap-and-water solution or universal decontamination solution would be more effective;
however, availability of such solutions in sufficient quantities cannot always be ensured. Extensive research into mass decontamination operations at terrorist incidents involving hazardous materials and chemical warfare agents has been conducted by the U.S. Army's Research, Development, and Engineering Command (RDECOM), and the resulting guidelines and documents are available on the Internet (see K.1.2.5).

Mass decontamination should be established quickly to reduce the harm being done to the victims by the contaminants. Initial operations will likely be through handheld hose lines or master streams supplied from fire apparatus while a more formal process is being set up. Examples of mass decontamination methods are the ladder pipe decontamination system and the emergency decontamination corridor system, both of which are described in RDECOM's guidelines. [472, 2013]

A.3.3.17.4 Technical Decontamination. Technical decontamination is the process subsequent to gross decontamination designed to remove contaminants from responders, their equipment, and victims. It is intended to minimize the spread of contamination and ensure responder safety. Technical decontamination is normally established in support of emergency responder entry operations at a hazardous materials incident, with the scope and level of technical decontamination based on the type and properties of the contaminants involved. In non life-threatening contamination incidents, technical decontamination can also be used on victims of the initial release. Examples of technical decontamination methods are the following:

1. Absorption
2. Adsorption
3. Chemical degradation
4. Dilution
5. Disinfecting
6. Evaporation
7. Isolation and disposal
8. Neutralization
9. Solidification
10. Sterilization
11. Vacuuming
12. Washing

The specific decontamination procedure to be used at an incident is typically selected by a hazardous materials technician (see 7.3.4) and is subject to the approval of the incident commander. [472, 2013]

A.3.3.19 Demonstrate. This performance can be supplemented by simulation, explanation, illustration, or a combination of these. [472, 2013]

A.3.3.25 Exposure. The magnitude of exposure is dependent primarily on the duration of exposure and the concentration of the hazardous material. This term is also used to describe a person, animal, the environment, or a piece of equipment. The exposure can be external, internal, or both. [472, 2013]

A.3.3.26 Fissile Material. Department of Transportation (DOT) regulations define fissile
material as plutonium-239, plutonium-242, uranium-233, uranium-235, or any combination of these radionuclides. This material is usually transported with additional shipping controls that limit the quantity of material in any one shipment. Packaging used for fissile material is designed and tested to prevent a fission reaction from occurring during normal transport conditions as well as hypothetical accident conditions. [472, 2013]

A.3.3.28 Hazardous Material. The following are explanations of several CBRN-related terms:

(1) **CBRN.** An abbreviation for chemicals, biological agents, and radiological particulate hazards.

(2) **CBRN terrorism agents.** Chemicals, biological agents, and radiological particulates that could be released as the result of a terrorist attack. Chemical terrorism agents include solid, liquid, and gaseous chemical warfare agents and toxic industrial chemicals. Chemical warfare agents include, but are not limited to, GB (Sarin), GD (Soman), HD (sulfur mustard), VX, and specific toxic industrial chemicals. Many toxic industrial chemicals (e.g., chlorine and ammonia) are identified as potential chemical terrorism agents because of their availability and the degree of injury they could inflict. Biological agents are bacteria, viruses, or the toxins derived from biological material.

(3) **Chemical terrorism agents.** Liquid, solid, gaseous, and vapor chemical warfare agents and toxic industrial chemicals used to inflict lethal or incapacitating casualties, generally on a civilian population as a result of a terrorist attack.

(4) **Biological terrorism agents.** Liquid or particulate agents that can consist of a biologically derived toxin or pathogen to inflict lethal or incapacitating casualties.

(5) **Radiological particulate terrorism agents.** Particles that emit ionizing radiation in excess of normal background levels used to inflict lethal or incapacitating casualties, generally on a civilian population, as the result of a terrorist attack.

(6) **Toxic industrial chemicals.** Highly toxic solid, liquid, or gaseous chemicals, which have been identified as mass casualty threats that could be used to inflict casualties, generally on a civilian population, during a terrorist attack. [472, 2013]

A.3.3.29 Hazardous Materials Branch/Group. This function is directed by a hazardous materials officer and deals principally with the technical aspects of the incident. [472, 2013]

A.3.3.30 Hazardous Materials Officer. This individual might also serve as a technical specialist for incidents that involve hazardous materials/WMD. [472, 2013]

A.3.3.31 Hazardous Materials Response Team (HMRT). The team members respond to releases or potential releases of hazardous materials/WMD for the purpose of control or stabilization of the incident. [472, 2013]

A.3.3.32 Hazardous Materials Safety Officer. The hazardous materials safety officer will be called on to provide technical advice or assistance regarding safety issues to the hazardous materials officer and incident safety officer at a hazardous materials/WMD incident. [472, 2013]
A.3.3.33 Hazardous Materials Technician. These persons might have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ. [472, 2013]

A.3.3.33.1 Hazardous Materials Technician with a Cargo Tank Specialty. The hazardous materials technicians are expected to use specialized chemical-protective clothing and specialized control equipment. [472, 2013]

A.3.3.33.3 Hazardous Materials Technician with an Intermodal Tank Specialty. See A.3.3.33.1. [472, 2013]

A.3.3.33.4 Hazardous Materials Technician with a Tank Car Specialty. See A.3.3.33.1. [472, 2013]

A.3.3.36 Incident Commander (IC). This position is equivalent to the on-scene incident commander as defined in OSHA 1910.120(8), Hazardous Waste Operations and Emergency Response. The IC has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site. [472, 2013]

A.3.3.38 Incident Management System (IMS). The IMS provides a consistent approach for all levels of government, private sector, and volunteer organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. An IMS provides for interoperability and compatibility among all capability levels of government, the private sector, and volunteer organizations. The IMS includes a core set of concepts, principles, terminology, and technologies covering the incident command system, multiagency coordination systems, training, and identification and management of resources. [472, 2013]

A.3.3.40 Material Safety Data Sheet (MSDS). Under the Global Harmonization System, the MSDS is known as an SDS (Safety Data Sheet) and contains more detailed information. [472, 2013]

A.3.3.43 Packaging. Packaging for hazardous materials includes bulk and nonbulk packaging. [472, 2013]

A.3.3.43.1 Bulk Packaging. Bulk packaging can be either placed on or in a transport vehicle or vessel or constructed as an integral part of the transport vehicle. [472, 2013]

A.3.3.43.3 Radioactive Materials Packaging. Excepted packaging is packaging used to transport materials with extremely low levels of radioactivity that meet only general design requirements for any hazardous material. Excepted packaging ranges from a product's fiberboard box to a sturdy wooden or steel crate, and typical shipments include limited quantities of materials, instruments, and articles such as smoke detectors. Excepted packaging will contain non-life-endangering amounts of radioactive material.

Industrial packaging is packaging used to transport materials that present limited hazard to the public and environment. Examples of these materials are contaminated equipment and radioactive waste solidified in materials such as concrete. This packaging is grouped into three categories (IP-I, IP-2, IP-3), based on the strength of packaging. Industrial packaging will contain non-life-endangering amounts of radioactive material.

Type A packaging is used to transport radioactive materials with concentrations of radioactivity not exceeding the limits established in 49, CFR, Part 173.431. Typically,
Type A packaging has an inner containment vessel made of glass, plastic, or metal and packing material made of polyethylene, rubber, or vermiculite. Examples of materials shipped in Type A packaging include radiopharmaceuticals and low-level radioactive waste. Type A packaging will contain non-life-endangering amounts of radioactive material.

Type B packaging is used to transport radioactive materials with radioactivity levels higher than those allowed in Type A packaging, such as spent fuel and high-level radioactive waste. Limits on activity contained in a Type B packaging are provided in Title 49, CFR 173.431. Type B packaging ranges from small drums [55 gal (208 L)], to heavily shielded steel casks that sometimes weigh more than 98 tons (100 metric tons). Type B packaging can contain potentially life-endangering amounts of radioactive material.

Type C packaging is used for consignments, transported by aircraft, of high-activity radioactive materials that have not been certified as “low dispersible radioactive material” (including plutonium). They are designed to withstand severe accident conditions associated with air transport without loss of containment or significant increase in external radiation levels. The Type C packaging performance requirements are significantly more stringent than those for Type B packaging. Type C packaging is not authorized for domestic use but can be authorized for international shipments of these high-activity radioactive material consignments. Regulations require that both Type B and Type C packaging be marked with a trefoil symbol to ensure that the package can be positively identified as carrying radioactive material. The trefoil symbol must be resistant to the effects of both fire and water so that it will be likely to survive a severe accident and serve as a warning to emergency responders.

The performance requirements for Type C packaging include those applicable to Type B packaging with enhancements on some tests that are significantly more stringent than those for Type B packaging. For example, a 200 mph (321.8 km/hr) impact onto an unyielding target is required instead of the 30 ft (9.1 m) drop test required of a Type B packaging; a 60-minute fire test is required instead of the 30-minute test for Type B packaging; and a puncture/tearing test is required. These stringent tests are expected to result in packaging designs that will survive more severe aircraft accidents than Type B packaging designs. [472, 2013]

A.3.3.46 Personal Protective Equipment. Personal protective equipment includes both personal protective clothing and respiratory protection. Adequate personal protective equipment should protect the respiratory system, skin, eyes, face, hands, feet, head, body, and hearing. [472, 2013]

A.3.3.48.1 Emergency Response Plan. Emergency response plans can be developed at organizational, agency, local, state, and federal levels. [472, 2013]

A.3.3.48.2 Incident Action Plan. It can include the identification of operational resources and assignments. It can also include attachments that provide direction and important information for management of the incident during one or more operational periods. [472, 2013]

A.3.3.48 Planned Response. The following site safety plan considerations are from the EPA’s Standard Operating Safety Guides:
A.3.3.50 Protective Clothing. Protective clothing is divided into three types:

1. Structural fire-fighting protective clothing
2. High temperature–protective clothing
3. Chemical-protective clothing
   a. Liquid splash–protective clothing
   b. Vapor-protective clothing [472, 2013]

A.3.3.50.1 Chemical-Protective Clothing. Chemical-protective clothing (garments) can be constructed as a single- or multipiece garment. The garment can completely enclose the wearer either by itself or in combination with the wearer's respiratory protection, attached or detachable hood, gloves, and boots. [472, 2013]

A.3.3.50.2 High Temperature–Protective Clothing. This type of clothing is usually of limited use in dealing with chemical commodities. [472, 2013]

A.3.3.50.3 Liquid Splash–Protective Clothing. This type of protective clothing is a component of EPA Level B chemical protection. Liquid splash–protective clothing should meet the requirements of NFPA 1992, Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies. [472, 2013]

A.3.3.50.4 Structural Fire-Fighting Protective Clothing. Structural fire-fighting protective clothing provides limited protection from heat but might not provide adequate protection from the harmful gases, vapors, liquids, or dusts that are encountered during hazardous materials/WMD incidents. [472, 2013]

A.3.3.50.5 Vapor-Protective Clothing. This type of protective clothing is a component of EPA Level A chemical protection. Vapor-protective clothing should meet the requirements of NFPA 1991, Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies. [472, 2013]

A.3.3.52 Respiratory Protection. Respiratory protection is divided into three types:

1. Positive pressure self-contained breathing apparatus
2. Positive pressure air-line respirators
3. Air-purifying respirators [472, 2013]

A.3.3.53 Response. The activities in the response portion of a hazardous materials/WMD incident include analyzing the incident, planning the response, implementing the planned
response, evaluating progress, and terminating the emergency phase of the incident. [472, 2013]

**A.3.3.58.1 Specialist Employee A.** Consistent with the organization's emergency response plan and/or standard operating procedures, the specialist employee A is able to analyze an incident involving chemicals within the organization's area of specialization, plan a response to that incident, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response. Specialist employees are those persons who, in the course of their regular job duties, work with or are trained in the hazards of specific chemicals or containers within their organization's area of specialization. In response to emergencies involving hazardous materials/WMD in their organization's area of specialization, they could be called on to provide technical advice or assistance to the incident commander relative to specific chemicals or containers for chemicals. Specialist employees should receive training or demonstrate competency in their area of specialization annually. Specialist employees also should receive additional training to meet applicable DOT, OSHA, EPA, and other appropriate state, local, or provincial occupational health and safety regulatory requirements. Specialist employees respond to hazardous materials/WMD incidents under differing circumstances. They respond to incidents within their facility, inside and outside their assigned work area, and outside their facility. Persons responding away from the facility or within the facility outside their assigned work area respond as members of a hazardous materials response team or as specialist employees as outlined in this definition and in Chapter 9. When responding to incidents away from their assigned work area, specialist employees should be permitted to perform only at the response level at which they have been trained.

Persons responding to a hazardous materials/WMD incident within their work area are not required to be trained to the levels specified by this chapter. Persons within their work area who have informed the incident management structure of an emergency as defined in the emergency response plan who have adequate personal protective equipment and adequate training in the procedures they are to perform and who have employed the buddy system can take limited action in the danger area (e.g., turning a valve) before the emergency response team arrives. The limited action taken should be addressed in the emergency response plan. Once the emergency response team arrives, these persons should be restricted to the actions that their training level allows and should operate under the incident command structure. [472, 2013]

**A.3.3.58.2 Specialist Employee B.** Because of the employee's education, training, or work experience, the specialist employee B can be called on to respond to incidents involving specific chemicals or containers. The specialist employee B can be used to gather and record information, provide technical advice, and provide technical assistance (including work within the hot zone) at the incident consistent with the organization's emergency response plan and/or standard operating procedures and the emergency response plan. See 3.3.47.1. [472, 2013]

**A.3.3.58.3 Specialist Employee C.** Consistent with the organization's emergency response plan and/or standard operating procedures, the specialist employee C can be called on to gather and record information, provide technical advice, and/or arrange for technical assistance. A specialist employee C does not enter the hot or warm zone at an
emergency. See 3.3.15. [472, 2013]

A.3.3.60 Termination. Termination is divided into three phases: debriefing the incident, post incident analysis, and critiquing the incident. [472, 2013]

A.3.3.61 UN/NA Identification Number. United Nations (UN) numbers are four-digit numbers used in international commerce and transportation to identify hazardous chemicals or classes of hazardous materials. These numbers generally range between 0000 and 3500 and usually are preceded by the letters “UN” (e.g., “UN1005”) to avoid confusion with number codes.

North American (NA) numbers are identical to UN numbers. If a material does not have a UN number, it may be assigned an NA number. These usually are preceded by “NA” followed by a four-digit number starting with 8 or 9. [472, 2013]

A.3.3.63 Weapon of Mass Destruction (WMD). The source of this definition is 18 USC 2332a. [472, 2013]

A.3.3.63.1 Radiological Weapons of Mass Destruction. The intent of this annex material is to provide information on the different types of radiological/nuclear devices that can be used as a weapon by those with malicious intent. [472, 2013]

A.3.3.63.1.1 Radiation Exposure Device. Sealed source means radioactive material encased in a capsule or closely bonded to another material in order to contain the radioactive material and prevent its leakage or escape under normal conditions of intended use. Radioactive material may be in a sealed or unsealed (dispersible) form. Shipments of sealed and dispersible forms of radioactive material are made in accordance with Department of Transportation regulations in a variety of packaging dependent on the physical and chemical form of the material, quantity of radioactive material present, and associated radiation levels on the exterior of the packaging. An RED may cause a few deaths, but normally would not cause widespread radiological contamination.

An RED may be concealed in public transportation (under a bus or subway seat), a busy shopping mall (the food court, for example), movie theater, or any other location where a large number of people may sit, stand, or pass close by individuals who come in contact with, touch, or sit on a radioactive material container do not become contaminated. The danger is from exposure, for extended periods of time, to high levels of radiation close to the radioactive material or generating device. If radioactive material was used in the RED and it was to break open, some of the radioactive material could be released, causing contamination. If this occurs, the RED becomes a Radiological Dispersal Device (RDD), and people coming in contact with the radioactive material could spread contamination elsewhere. [472, 2013]

A.3.3.64.2 Radiation Dispersal Device. Any device that intentionally spreads radioactive material across an area with the intent to cause harm, without a nuclear explosion occurring. An RDD that uses explosives for spreading or dispersing radioactive material is commonly referred to as a “dirty bomb” or “explosive RDD.” Non-explosive RDDs could spread radioactive material using common items such as pressurized containers, fans, building air-handling systems, sprayers, crop dusters, or even spreading by hand. [472, 2013]

A.3.3.64.3 Improvised Nuclear Device. The nuclear explosion from an IND produces extreme heat, powerful shockwaves, and prompt radiation that would be acutely lethal for
a significant distance. It also produces potentially lethal radioactive fallout, which may spread and deposit over very large areas. A nuclear detonation in an urban area could result in over 100,000 fatalities (and many more injured), massive infrastructure damage, and thousands of square kilometers of contaminated land. If the IND fails to work correctly and does not create a nuclear explosion, then the detonation of the conventional explosives would likely disperse radioactive material like an explosive Radiological Dispersal Device (RDD). [472, 2013]

A.3.4.4 Operations Level Responders. The source of this definition is 29 CFR 1910.120. These responders can have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ. [472, 2013]

Annex C Informational References

C.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

C.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

C.1.2 Other Publications.

C.1.2.1 American Chemistry Council (formerly Chemical Manufacturers Association) Publications. American Chemistry Council, 1300 Wilson Blvd., Arlington, VA 22209.

C.1.2.2 API Publications. American Petroleum Institute, 1220 L Street, N.W., Washington, DC 20005-4070.

C.1.2.3 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

C.1.2.4 IMO Publications.


C.1.2.7 Additional Publications.

C.2 Informational References. The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

C.2.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

C.2.2 ASTM Publication. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA, 19428-2959.

C.3 References for Extracts in Informational Sections. (Reserved)
MEMORANDUM

TO: Amy Cronin, Secretary to the NFPA Standards Council
FROM: Derek Duval, Staff Liaison to CMD-FUN
DATE: September 28, 2012
SUBJECT: Release of Preliminary Draft for NFPA 652 and Requested Revision Cycle
CC: Paul Hart, Guy R. Colonna, Linda Fuller, Joanne Goyette

Dear Amy,

On behalf of the Technical Committee on the Fundamentals of Combustible Dusts, I am submitting this request for the NFPA Standards Council to release the Preliminary Draft for NFPA 652, *Standard on Combustible Dusts*. The request is supported by the results of the committee ballot, attached. The technical committee requests that the proposed NFPA 652 be entered into the Fall 2014 revision cycle.

Please let me know if you need anything else. Thank you.

Best Regards,

Derek Duval
MEMORANDUM

TO: NFPA Technical Committee on Fundamentals of Combustible Dusts

FROM: Joanne Goyette, Administrator, Technical Projects

DATE: September 24, 2012

SUBJECT: NFPA 652 TC Final Results on Release of Draft

The Final Results of the NFPA 652 Release of Draft are as follows:

28 Members Eligible to Vote
0 Not Returned
25 Affirmatives (B. McLelland, T. Myers, J. Osborn, E. Ural, and R. Zalosh w/Comment)
3 Negatives (M. Drake, R. Gombar, and B. Rottner)
0 Abstentions

According to the final ballot results, the ballot item received the necessary simple majority affirmative votes required to pass ballot.

Final ballot comments are attached for your review. Ballots received from alternate members are not included unless ballot from the principal member was not received.
Technical Committee on Fundamentals of Combustible Dusts
Letter Ballot to Release NFPA 652
Standard on Combustible Dusts

Please record me as voting:

_____ AFFIRMATIVE  _____ NEGATIVE*  _____ ABSTAINING*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a negative or abstaining vote.

1.4.1 - Requirements of this standard are less stringent than those in NFPA 484 in many cases, applying 652 instead of 484 may lead to lack of adequate protection, and therefore unintended accidents/losses.

Please Note: Annex B of ANSI Essential Requirements, Section B.1.3 requires a 2/3 Affirmative vote of the Committee for this ballot to pass.

Signature

MARK W. DRAKE
Name (Please Print)

09-05-12
Date

Please return your ballot no later than Friday, September 14, 2012.

RETURN TO:

Joanne Goyette, Administrator, Technical Projects
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
EMAIL: jgoyette@nfpa.org
FAX: 617-984-7110

October 24, 2012  Supplemental Agenda October 29-30, 2012  Page 717 of 951
Technical Committee on Fundamentals of Combustible Dusts
Letter Ballot to Release NFPA 652
Standard on Combustible Dusts

Please record me as voting:

_____ AFFIRMATIVE  ❑ NEGATIVE*  _____ ABSTAINING*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a negative or abstaining vote.

PLEASE SEE THE ATTACHED STATEMENT    
EXPLAINING THE NEGATIVE VOTE.

Please Note:  Annex B of ANSI Essential Requirements, Section B.1.3 requires a 2/3 Affirmative
vote of the Committee for this ballot to pass.

Signature

NAME (Please Print)

Date

Please return your ballot no later than Friday, September 14, 2012.

RETURN TO:

Joanne Goyette, Administrator, Technical Projects
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
EMAIL:  jgoyette@nfpa.org
FAX:  617-984-7110
September 14, 2012

Attachment to ballot for a negative vote
Robert C. Gombar, Sr.
Representative for the United States Beet Sugar Association

On behalf of the United States Beet Sugar Association, I respectfully vote against sending this draft of NFPA 652 to the Standards Council for issuance for public input.

The principal problem with the draft is that it contains 24 sections (and 2 sections in the Annex material) marked as “Reserved,” which means they contain no information for the public to consider.

A few of the many examples of sections marked as “Reserved” are:

The figure accompanying Section 1.3.1 to explain the overall application of NFPA 652.

The important definitions in Chapter 3 for Fugitive Dusts (Section 3.3.1.6) and Transient Releases (Section 3.3.28).

Section 4.8 on Fire Identification/Hazards.

In Chapter 5, potentially significant sections dealing with Risk Component and Acceptability (Section 5.2) and Retained Prescriptive Requirements (Section 5.6).

These are just six of the 24 “Reserved” sections in this draft of NFPA 652. Ideally, when asking for public input, there should be no sections marked as “Reserved.” At the very least, however, the number of sections marked as “Reserved” should be reduced dramatically before NFPA 652 is released for public input.

In addition to the significant number of sections marked as “Reserved,” this draft of NFPA 652 would impose requirements that many users will find too onerous or not suited to their operations.

For example, Section 1.4.1 would override all other dust standards. This is inappropriate. Although the NFPA 652 Committee is supposed to deal with the “Fundamentals of Combustible Dusts,” this draft goes beyond stating the “basic
principles” mentioned in Section 1.1. The other industry or commodity-specific dust standards were drafted by committee members intimately familiar with their substances and industries. They have a better appreciation than the members of the NFPA 652 Committee concerning what is feasible and practical and whether, in their particular application, there is a significant risk warranting the measures prescribed in this draft. If there is an improvement that the NFPA 652 Committee believes should be made to the other dust standards, they should be recommended as such to the other committees for their consideration and decision.

Moreover, this draft does not reflect a systemic attempt to judge whether particular provisions are needed or feasible in particular industries or for particular substances. For example, in Annex B, PHA Example (section 2.4.2), it states that the PHA should be “deterministic” – that is, without taking the probabilities of different event sequences into account. This indicates an overall philosophy that, as long as an event is possible, the probability of the event should not be considered for purposes of preventing or mitigating the event.

Additional reasons for the negative vote are as follows:

Chapter 6, Hazard Assessment: Sections in this Chapter are to be applied retroactively. Section 6.2.1, with its cross-reference to the objectives in Section 4.9, essentially makes the objectives in Section 4.9 retroactive as well. When Section 6.2.1 is combined with Section 6.2.4, which includes precisely the type of physical changes to equipment and facilities that the grandfather provision (Section 1.6.2) is designed to avoid, it appears to make Section 1.6.2, the grandfather provision, a nullity. At the very least, this situation requires clarification.

Section 7.6.1.2: This provision would require flame resistant garments if there is a “threat” of exposure to a dust deflagration hazard. The word “threat” is so nebulous that it can indicate risks ranging from a mere possibility to a significant risk. As written, the provision would arguably require flame resistant garments in circumstances that do not warrant their use.

Section 8.8.2(2) and A.3.3.23: This provision, which is applied retroactively, would appear to require that a PHA be modified every time a management-of-change procedure is invoked. Such a requirement for an “evergreen PHA” would impose a paperwork and resource nightmare. Moreover, it is neither necessary nor feasible. Even under OSHA’s PSM Standard, the Agency recognizes that the MOC requirement, among others in the Standard, serves to protect employees between PHA re-validations and that “evergreen PHAs” are neither required nor necessary.
Additional comments on other sections are as follows:

Sections 4.3, 4.4.2(2), 5.3.1.3: The scope of NFPA 652 is “fire and explosion hazards from combustible dusts and particulate solids.” It is not appropriate to have provisions on other hazards.

Section 4.5.3.2: The phrase “some or all” is too vague.

Section 5.4.1.1: The crucial term “fuel object” is not defined.

Section 5.5.2: This refers to a “design professional,” which the standard does not elsewhere require. Moreover, it expects that design professional to “establish” “numerical performance criteria” for achieving the life safety goals of section 5.3. The standard provides no basis for the design professional’s choices, however, and thus leaves the user and its design professional to their own devices.

A.7.9.1.2.2: The statement that, “Manual firefighting poses an unacceptable risk to facility personnel and emergency responders” is too broad and emphatic. It appears inappropriate for an Annex.

Finally, the following general observations are also included in support of the negative vote:

Chapter 6, Hazard Assessment: As already noted, the sections in this Chapter are to be applied retroactively. This Chapter is not appropriate for many industries in which the characteristics of the substance and the technology are well understood, such as agricultural dusts. Process hazard analysis was developed in the chemical industry, which has novel chemicals as well as varied and complex chemical processes, the behavior of which together can be dynamic and often difficult to predict. So long as a facility with combustible dusts is designed by a qualified person, a PHA in many industries is not justifiable and will unnecessarily impose large costs on many small entities.

Section 8.8: This Section regarding management of change, which is applied retroactively, is not appropriate for many industries and for small entities. In small establishments, whether by reason of the size of the facility or the small number of managers, all changes come to the attention of a qualified person; so long as a
qualified person approves the change, this Section would not add appreciably to safety. Outside the chemical industry, in which management-of-change precautions originated, safety can be sufficiently assured through review by a qualified person.

/s/ Robert C. Gombar, Sr.
For the US Beet Sugar Association
Technical Committee on Fundamentals of Combustible Dusts
Letter Ballot to Release NFPA 652
Standard on Combustible Dusts

Please record me as voting:

_____ AFFIRMATIVE  _X_ NEGATIVE*  _____ ABSTAINING*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a negative or abstaining vote.

See Attached

Please Note:  Annex B of ANSI Essential Requirements, Section B.1.3 requires a 2/3 Affirmative vote of the Committee for this ballot to pass.

\[Signature\]

BRUCE L. ROTTNER
Name (Please Print)

\[Date\]

September 14, 2012

Please return your ballot no later than Friday, September 14, 2012.

RETURN TO:

Joanne Goyette, Administrator, Technical Projects
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
EMAIL:  jgoyette@nfpa.org
FAX:  617-984-7110
Technical Committee on Fundamentals of Combustible Dusts  
Letter Ballot to Release NFPA 652  
Explanation of Negative Vote  
September 14, 2012  

Overall Comment: In reading the standard, I did not get the impression that the topic of secondary dust explosions has been adequately addressed. We have a section on the propagation of an event in process equipment, and propagation of an event from one area of the building to another; but we, really do not emphasize propagation from equipment to work environment. As we know this is a life safety issue and it seems to lack attention.

Chapter 3 Definitions 3.3.17 Handling Any activity, including processing, that can expose the metal’s surface to air or any other substance capable of reacting with the metal under the conditions of the exposure.

Comment: This definition appears to have no correlation to this standard.

7.9 Fire Protection  

Comment: The entire section should be removed and marked as "Reserved". It is my opinion that this section needs further work and discussion. Manually fighting fires in which the fuel is a combustible dust is an extremely risky operation. To suggest or hint that a facility's emergency response team should undertake manual firefighting can result in injury or death. Together with limited information and direction in the Emergency Planning and Response section (8.6) we are putting people at risk. Though it is discussed further in Appendix A, I do not believe the explanatory information is enough to provide guidance.

7.9.5 Automatic Sprinklers 7.9.5.4 Where automatic sprinklers are installed, dust accumulation on overhead surfaces shall be minimized to prevent an excessive number of sprinkler heads from opening in the event of a fire.

Comment: The basis for this statement eludes me. This should be an existing practice under fugitive dust control.

Comment: Equally important we do not address loading of sprinkler heads with combustible dusts. This may delay activation of the sprinkler system causing the fire to spread.
Technical Committee on Fundamentals of Combustible Dusts
Letter Ballot to Release NFPA 652
Standard on Combustible Dusts

Please record me as voting:

\( X \) AFFIRMATIVE  \( \_ \) NEGATIVE*  \( \_ \) ABSTAINING*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a negative or abstaining vote.

VOTING, AFFIRMATIVE TO BE RELEASED AS A DRAFT
DOCUMENT FOR FURTHER WORK BY THE COMMITTEE AND
COMMENT BY THE PUBLIC.

Please Note: Annex B of ANSI Essential Requirements, Section B.1.3 requires a 2/3 Affirmative
vote of the Committee for this ballot to pass.

\( \) [Signature]

\( \) [Name (Please Print)]

\( \) [Date]

Please return your ballot no later than Friday, September 14, 2012.

RETURN TO:
Joanne Goyette, Administrator, Technical Projects
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
EMAIL: jgoyette@nfpa.org
FAX: 617-984-7110
Technical Committee on Fundamentals of Combustible Dusts
Letter Ballot to Release NFPA 652
Standard on Combustible Dusts

Please record me as voting:

_X__ AFFIRMATIVE       ___ NEGATIVE*       ___ ABSTAINING*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a negative or abstaining vote.

I do not agree with all sections of the standard. However, it is ready to enter the next phase of development.

Please Note: Annex B of ANSI Essential Requirements, Section B.1.3 requires a 2/3 Affirmative vote of the Committee for this ballot to pass.

Signature

Timothy J. Myers
Name (Please Print)

9/4/2012
Date

Please return your ballot no later than Friday, September 14, 2012.

RETURN TO:

Joanne Goyette, Administrator, Technical Projects
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
EMAIL: jgoyette@nfpa.org
FAX: 617-984-7110
Joanne,

To make sure you have my response PLEASE accept this e-mail as that response. Cannot guarantee I can get back to Little Rock (my office) by tomorrow given my “wonderful” situation here.

I agree with the document proposed, but do have questions:

1. NO definitions for dust collection system and centralized vacuum system are included in section 3 – yet we refer to them in section 7 and there are DEFINITE differences between the three(3) systems (pneumatic conveying, dust collection, and centralized vacuum cleaning system).

2. These definitions were included in the information I provided previously to the committee.

3. Was this an oversight? Or were they purposely deleted? (I was not at the meeting due to a death in our family – my wife’s mother).

I do NOT want to hold up the document just for this (vote affirmative in my case), but would like to know the situation. Will we be able to correct this in the near future (or at least propose the change)? Or is this to be issued and not corrected for an extended time.

I do vote affirmative for issuing. Like what was done in general, even though I hope we improve it later.

Thank you for allowing me this alternative – I am definitely losing patience – this car is only 3 weeks old and cost me a small fortune. Major disappointment.

Please confirm.

Jack Osborn – Airdusco

Dear Committee Members:

This is a brief note to remind you that your NFPA 652 Ballot on the Release of Document is due on tomorrow, September 14, 2012. Please review the attached ballot and return it to Joanne Goyette either by email to: jgoyette@nfpa.org or by fax to the following number: 617-984-7110.

Please note for clarification purposes, this Ballot is for the Release of the Preliminary Draft of 652 and per NFPA Regulations requires only a simple majority to enter into a Revision Cycle.

Thank you,

Joanne Goyette
Administrator, Technical Projects
Technical Committee on Fundamentals of Combustible Dusts
Letter Ballot to Release NFPA 652
Standard on Combustible Dusts

Please record me as voting: Affirmative with Comment

Explanation of Vote: In my opinion, balloted document is nowhere near ready for release. The only reason I am voting affirmative is to put an end, without further delay, to the wide discrepancies among the levels of safety provided by different NFPA occupancy Standards (e.g. NFPA 61 vs 654).

September 14, 2012

Dr. Erdem A. Ural
Technical Committee on Fundamentals of Combustible Dusts
Letter Ballot to Release NFPA 652
Standard on Combustible Dusts

Please record me as voting:

X AFFIRMATIVE  ___ NEGATIVE*

I am voting affirmative with the understanding that the new combustible dust correlating committee will pass judgement on the validity of the paragraph 1.4.1 statement about conflicting requirements between dust standards. I am OK with 652 being a primary standard as long as the specific provisions are either based on greatest challenge dusts, allow for suitable material-specific applications, or pass jurisdiction onto the commodity-specific standard when a more rigorous requirement is needed for that commodity, e.g. combustible metals.

Annex B of ANSI Essential Requirements, Section B.1.3 requires a 2/3 Affirmative vote of the Committee for this ballot to pass.

[Signature]
Robert Zaloscz
Name (Please Print)
9/14/2012
Date

Please return your ballot no later than Friday, September 14, 2012.

RETURN TO:

Joanne Goyette, Administrator, Technical Projects
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
EMAIL: jogoyette@nfpa.org
FAX: 617-984-7110
Committee Scope: This Committee shall have primary responsibility for information and documents on the management of fire and explosion hazards from combustible dusts and particulate solids.

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex F. Editorial changes to extracted material consist of revising references to an appropriate division in this document or the inclusion of the document number with the division number when the reference is to the original document. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2

Chapter 1 Administration

1.1 Scope This standard shall provide the basic principles of and requirements for identifying and managing the fire and explosion hazards of combustible dusts and particulate solids.

1.2 Purpose. This standard shall provide the user with general requirements and direct the user to the appropriate industry or commodity-specific NFPA standard for additional requirements.
1.3 Application.

1.3.1 The provisions of this standard shall be applied in accordance with Figure 1.3.1.

(FIGURE RESERVED)

Figure 1.3.1 Document Flow Diagram for Combustible Dust Hazard Evaluation

1.3.2 This standard establishes the basic principles and requirements that shall be applied to all facilities where combustible dusts or particulate solids are present.

1.3.3 Where an industry or commodity-specific NFPA standard exists its requirements shall be applied in addition to those in this standard.

1.4 Conflicts

1.4.1 Where requirements between this standard and an industry or commodity-specific NFPA standard differ, the requirements of this standard shall apply.

1.4.2 Where a conflict between a general requirement of this standard and a specific requirement of this standard exists, the specific requirement shall apply.

1.5 Goal. The goal of this standard is to provide safety measures to prevent and mitigate fires and dust explosions in facilities that handle combustible particulate solids.

1.6 Retroactivity.

1.6.1 The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.6.2 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.6.3 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.6.4 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.7 Equivalency.

1.7.1 Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.7.2 Technical documentation shall be submitted to the authority having jurisdiction to
demonstrate equivalency.

1.7.3 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.8 Units and Formulas.

1.8.1 SI Units. Metric units of measurement in this standard shall be in accordance with the modernized metric system known as the International System of Units (SI).

1.8.2* Primary and Equivalent Values. If a value for a measurement as given in this standard is followed by an equivalent value in other units, the first stated value shall be regarded as the requirement.

1.8.3 Conversion Procedure. SI units shall be converted by multiplying the quantity by the conversion factor and then rounding the result to the appropriate number of significant digits.)

Chapter 2 Referenced Publications

2.1 General.

The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


2.3 Other Publications.

2.3.1 ASME Publications. American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.


2.3.2 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.


2.3.2 UN Publications.


2.3.4 Other Publications.


2.4 References for Extracts in Mandatory Sections.


NFPA 221, Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls, 2012
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.

3.3.2* Air–Material Separator (AMS). A collector designed to separate the conveying air from the material being conveyed. [654, 2013]

3.3.3* Combustible Dust. A finely divided combustible particulate solid that presents a flash fire or explosion hazard when suspended in air or the process specific oxidizing medium over a range of concentrations. [654, 2013]

3.3.4* Combustible Metal. Any metal composed of distinct particles or pieces, regardless of size, shape, or chemical composition that will burn. [484, 2012]

3.3.5* Combustible Metal Dust. A combustible particulate metal that presents a fire or explosion hazard when suspended in air or the process specific oxidizing medium over a range of concentrations, regardless of particle size or shape. [484, 2012]

3.3.6* Combustible Particulate Solid. Any solid material composed of distinct particles or pieces, regardless of size, shape, or chemical composition that presents a fire hazard. [654, 2013]

3.3.7 Compartment. A space completely enclosed by walls and a ceiling. The compartment enclosure is permitted to have openings in walls to an adjoining space if the openings have a minimum lintel depth of 8 in. (203 mm) from the ceiling and the openings do not exceed 8 ft (2.44 m) in width. A single opening of 36 in. (914 mm) or less in width without a lintel is permitted when there are no other openings to adjoining spaces. [13, 2007]

3.3.8 Cyclone. See 3.3.20.1.

3.3.9* Damage-Limiting Construction. A building construction method that incorporates exterior wall or roof sections, or both, designed to relieve deflagration pressures without jeopardizing the structural integrity of the building and without allowing the deflagration to propagate into adjacent interior spaces. [664, 2012]

3.3.10* Deflagration. Propagation of a combustion zone at a velocity that is less than the speed of sound in the unreacted medium. [68, 2007]

3.3.11 Detachment. Locating a combustible particulate solid process in the open air or in a separate building. [654, 2013]

3.3.12 Duct. Pipes, tubes, or other enclosures used for the purpose of pneumatically conveying materials. [91, 2004]

3.3.13 Dust Collector. See 3.3.2, Air-Material Separator (AMS).

3.3.14* Explosion. The bursting or rupture of an enclosure or container due to the development of internal pressure from a deflagration. [69, 2008]

3.3.15* Flash Fire. A fire that spreads by means of a flame front rapidly through a diffuse fuel, such as dust, gas, or the vapors of an ignitible liquid, without the production of damaging pressure.[921, 2011]
3.3.16 Fugitive Dusts. (Reserved)

3.3.17 Handling. Any activity, including processing, that can expose the metal's surface to air or any other substance capable of reacting with the metal under the conditions of the exposure.

3.3.18 Hot Work. Work involving burning, welding, or a similar operation that is capable of initiating fires or explosions. [51B, 2009]

3.3.19* Hybrid Mixture. A mixture of a flammable gas with either a combustible dust or a combustible mist. [68, 2007]

3.3.20* Minimum Explosible Concentration (MEC). The minimum concentration of a combustible dust suspended in air, measured in mass per unit volume, that will support a deflagration. [654, 2013]

3.3.21 Owner/Operator. The organization with fiscal responsibility for the operation, maintenance, and profitability of the facility. [654, 2013]

3.3.22* Pneumatic Conveying System. An equipment system that comprises a material feeding device; an enclosed ductwork, piping, or tubing network; an air-material separator; and an air-moving device and that is used to transfer a controlled flow of solid particulate material from one location to another using air or other gases as the conveying medium. [654, 2013]

3.3.23* Process Hazards Analysis. A systematic review of the potential hazards associated with the presence of one or more combustible particulate solids in a process or facility compartment.

3.3.24 Qualified Person. A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the ability to deal with problems relating to a particular subject matter, work, or project. [1451, 2007]

3.3.25 Segregation. The interposing of a fire- and explosion-resistant barrier between the combustible particulate solid process and other operations. [654, 2013]

3.3.26 Separation. The interposing of distance between the combustible particulate solid process and other operations that are in the same room. [654, 2013]

3.3.27 Spark. A moving particle of solid material that emits radiant energy due to either its temperature or the process of combustion on its surface. [654, 2013]

3.3.28 Transient Releases. (Reserved)

3.3.29 Wall

3.3.29.1 Fire Barrier Wall. A wall, other than a fire wall, having a fire resistance rating. [221, 2012]

3.3.29.2 Fire Wall. A wall separating buildings or subdividing a building to prevent the spread of fire and having a fire resistance rating and structural stability. [221, 2012]

3.3.30 Ullage Space. The open space above the surface of the stored solids in a storage vessel.
Chapter 4 Hazard Identification

4.1* Scope. The owner/operator shall identify fine particulate solid and dust flash fire and explosion hazards.

4.2 Overview.

4.2.1 Fine solid particulates and dusts shall be assessed to identify their combustibility and explosibility characteristics.

4.2.2 The assessment shall be based on representative samples and materials including in-process and fugitive dusts.

4.2.3 Where it is not clear whether a material is combustible or explosible, samples shall be subject to screening tests for combustibility and explosibility hazard characteristics in Section 4.5.

4.2.4 Test data shall be acceptable to AHJ.

4.2.5 For materials that are combustible or explosible, additional specific tests data shall be acquired where applicable to the requirements for performance-based design described in Chapter 5, hazard assessment in chapter 6 and for hazard mitigation and prevention specified in Chapter 7.

4.2.6 A sampling plan shall be developed and documented to identify samples, processes, and their location, accounting for potential for attrition of larger particles into dust and times that represent where realistic conditions are favorable for the sample exhibiting combustibility and explosibility characteristics.

4.3.* Physical Hazards Other than Combustibility. (Reserved)

4.4 General Requirements.

4.4.1* The owner/operator of a facility with combustible particulate solids and dust shall be responsible to identify, sample, analyze and test materials to ensure the materials are combustible and the hazards are adequately assessed.

4.4.2* Combustible fine particulate solids and dust hazard identification, assessment and mitigation shall address all known hazards which include:

1) Personnel hygiene issues from exposure to dust or combustion products
2) Environmental hazards caused by dust or combustion products
3) Reactivity hazards (e.g. binary compatibility, or water reactivity)
4) Smoldering fire in a layer or pile
5) Flaming fire of a layer or a pile
6) Deflagration resulting in flash fire (dust cloud combustion)
7) Deflagration resulting in dust explosion in equipment
8) Deflagration resulting in dust explosion in rooms and buildings

4.4.3 Historical process incidents such as flash fires, small fires, sparkling fires, pops, booms, or evidence of vessel, tank or container overpressure shall not be used as a substitute for analysis and testing.

4.4.4 If a test for combustibility or explosibility produces a positive result, the material shall be considered a combustible dust and additional analysis, particularly hazard analyses, shall be required.

4.4.5 Test results shall be documented and the test results shall be provided when requested by the AHJ.

4.4.6* If the owner and operator are not able to identify samples or interpret test results, a qualified person that is knowledgeable of combustible dust hazards shall be contacted.

4.5 Combustibility and Explosibility Tests.

4.5.1* Determination of Combustibility.


4.5.1.2 For the purposes of determining the combustibility of fine particulate and dust composed of non-metals, the results of the screening test shall be categorized as one of the following three reactions:

   (1) No reaction
   (2) Ignites but does not propagate (e.g., self-extinguishes)
   (3) Ignites and propagates combustion

4.5.1.3 For fine particulate and dust composed of metals and metal containing mixtures, the results of the screening test shall be categorized as one of the following three categories:

   (1) No reaction
   (2) glowing but no propagation along the train
   (3) propagation along the powder train past the heated zone

4.5.2 Determination of Flash Fire Hazard. (Reserved)

4.5.3* Determination of Explosibility.

4.5.3.1 The determination of explosibility of fine particulate and dusts shall be determined according to a ‘go/no-go’ screening test methodology described in ASTM E 1226 Standard test method for explosibility of dust clouds.
4.5.3.2 If explosible, some or all of the standard test methods listed in Table 4.5.3.2 shall be performed for the purpose of risk assessment.

<table>
<thead>
<tr>
<th>Test Method</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM E 2019 Standard test method for minimum ignition energy of a dust cloud in air</td>
<td>Minimum ignition energy (MIE) of dust cloud in air</td>
</tr>
<tr>
<td>ASTM E 1491 Standard test method for minimum autoignition temperature of dust clouds</td>
<td>Minimum ignition temperature (Tc) of dust clouds</td>
</tr>
<tr>
<td>ASTM E 1226 Standard test method for explosibility of dust clouds</td>
<td>Maximum explosion pressure ($P_{\text{max}}$), rate and maximum rate of pressure rise ($dP/dt$), and explosion severity ($K_{\text{st}}$)</td>
</tr>
<tr>
<td>ASTM E 1515 Test method for minimum explosible concentration of combustible dusts</td>
<td>Minimum explosible concentration (MEC)</td>
</tr>
<tr>
<td>ASTM WK1680 - New Test method for standard test method for limiting oxygen (oxidant) concentration of combustible dust clouds</td>
<td>Limiting oxygen concentration (LOC)</td>
</tr>
</tbody>
</table>

**TABLE 4.5.3.2 Tests to Determine Explosibility for Risk Evaluation**

4.6 Sampling.

4.6.1 **Sampling Plan.** Representative samples of fine particulate solids and dusts shall be identified and collected for testing according to a sampling plan.

4.6.1.1 **General.** The sampling plan shall:

1. Identify locations where fine particulate and dust is present
2. Identify representative samples
3. Collect representative samples
4. Preserve sample integrity
5. Communication with the test laboratory regarding sample handling
6. Documentation

4.6.2 **Mixtures.**

4.6.2.1 If the particulate solid is a mixture of organic, inorganic and/or combustible metals, the amount or concentration of each constituent shall be determined by laboratory testing.

4.6.2.2 If the mixture of fine particulate solid is composed of or contains metal, the requirements of NFPA 484, *Standard for Combustible Metals* shall apply.

4.6.3* **Sample Location.** Particulate solid and dust samples shall be collected from rooms and sources known to pose or amplify combustible dust fires and explosions.

4.6.3.1 Special consideration shall be given to samples from equipment in facilities such as but
not limited to dust collectors, impact equipment, silos and bins, processing equipment, ovens, furnaces, dryers, conveyors, bucket elevators and grain elevators.

4.6.3.1.1 If sample is from a dust collection or pneumatic conveying system, the sample shall be a representative of the hazard subject to evaluation.

4.6.3.2 Samples shall be collected from rooms and buildings facility where combustible dusts may exist including rooms where abrasive blasting, cutting, grinding, polishing, mixing, conveying, sifting, screening, bulk handling or storage, packaging, agglomeration, and coating are performed.

4.6.4 Representative Samples.

4.6.4.1 Samples collected from each location shall be representative of the material at that location, process, equipment or surface.

4.6.4.2* Special consideration shall be given to collecting samples from processes and equipment that result in attrition.

4.6.4.3 When changes in the materials or processes occur, new samples shall be identified, collected and tested.

4.6.5* Sample Collection. Fine particulate solids and dust samples shall be collected in a safe manner using acceptable tools, containers and methodologies such that the sample is preserved.

4.6.5.1* Particulate solids, fines, powder and dusts shall be identified using as many identifiers as practical including lot, origin, composition (pure, mixture), process, age, location and date collected.

4.6.5.2* Because the degree of combustibility and explosibility are strongly influenced by material properties, the specific form and composition of the particulate solid shall be tested.

4.6.6 Sample Preservation. Samples collected shall be preserved to prevent oxidation and ageing.

4.6.7 Communication with the Laboratory. Accredited laboratories shall be used to test samples for combustibility and explosibility according to Section 4.5.

4.7* Combustion Chemistry.

4.7.1* Evaluation of a combustible dust hazard and prevention techniques employed shall be determined by the means of actual test data from Section 4.5.

4.7.1.1 Each facility, process, situation and scenario shall be evaluated and the applicable tests selected.

4.7.2 Sources of combustible dust ignition shall be identified where combustible dusts are present.

(1) Open flames or hot work such as welding, hot riveting, grinding, heat treating, and activities using torches for such activities of thawing of pipes and demolition activities.
(2) Hot surfaces that exceed the minimum ignition temperatures such as over-heated belt drives, bearings, and bushings. Additionally, the external surfaces of operating equipment such as compressors and process piping for steam,

(3) Friction caused from grinding sparks or tramp metal in the processing systems.

(4) Electrostatic sparks

4.8* Fire Identification/Hazards. (Reserved)

4.9 Objectives.

4.9.1 Life Safety.

4.9.1.1 The facility, combustible particulate processes, and human element programs shall be designed, constructed, equipped, and maintained to protect occupants not in the immediate proximity of the ignition from the effects of fire, deflagration, and explosion for the time needed to evacuate, relocate, or take refuge.

4.9.1.2 The structure shall be located, designed, constructed, and maintained to minimize the propagation of fire or explosion to adjacent properties and to avoid injury to the public.

4.9.2 Structural Integrity. The facility shall be designed, constructed, and equipped to maintain its structural integrity in spite of the effects of fire or explosion for the time necessary to evacuate, relocate, or defend in place occupants not in the immediate proximity of the ignition.

4.9.3* Mission Continuity. The facility, processes and equipment, and human element program shall be designed, constructed, equipped, and maintained to limit damage to levels that ensure the ongoing mission, production, or operating capability of the facility to a degree acceptable to the owner/operator.

4.9.4 Mitigation of Fire Spread and Explosions. The facility and processes shall be designed to prevent fires and explosions that can cause failure of adjacent compartments, emergency life safety systems, adjacent properties, adjacent storage, or the facility's structural elements.

4.9.4.1* The structure shall be designed, constructed, and maintained to prevent fire or explosions from causing failure of load-bearing structural members, propagating into adjacent interior compartments, and incapacitating fire protective and emergency life safety systems in adjacent compartments.

4.9.4.2 The structure shall be located, designed, constructed, equipped, and maintained to prevent the propagation of fire or explosion to or from adjacent storage or structures.

4.9.5* Compliance Options. The goal in Section 1.5 and the objectives in Section 4.9 shall be achieved by either of the following means:

(1) The prescriptive provisions in accordance with Chapters 4, 6, 7, 8, in conjunction with any additional prescriptive provisions of applicable commodity specific standards.

(2) The performance-based provisions in accordance with Chapter 5.
Chapter 5 Performance-Based Design Option

5.1 General Requirements.

5.1.1 Approved Qualifications. The performance-based design shall be prepared by a person with qualifications acceptable to the owner/operator.

5.1.2 Independent Review. The authority having jurisdiction shall be permitted to obtain an independent third-party review of the proposed design.

5.1.3* Performance-based designs shall be documented with all calculations, references, assumptions, and sources from which material characteristics and other data have been obtained or on which the designer has relied for some material aspect of the design in accordance with Chapter 5 of NFPA 101, Life Safety Code.

5.1.3.1 A sensitivity analysis shall be performed for each assumption that is not provided in an authoritative reference acceptable to the authority having jurisdiction to show that variation of said assumption does not result in a failure to meet design criteria.

5.1.3.2 The source of all calculation methods and models shall be documented with their limits of applicability.

5.1.4* Performance-based designs and documentation shall be updated and subject to re-approval if any of the assumptions on which the original design was based are changed.

5.1.5 Sources of Data.

5.1.5.1 Data sources shall be identified and documented for each input data requirement that must be met using a source other than a design fire scenario, an assumption, or a building design specification.

5.1.5.2 The degree of conservatism reflected in such data shall be specified, and a justification for the sources shall be provided.

5.1.6 Maintenance of the Design Features. To continue meeting the performance goals and objectives of this standard, the design features required for each hazard area shall be maintained for the life of the facility. This shall include complying with originally documented design assumptions and specifications. Any variation from the design shall require approval of the authority having jurisdiction prior to actual change.

5.2 Risk Component and Acceptability. (RESERVED)

5.3 Performance Criteria. A system and facility design shall be deemed to meet the objectives specified in Section 4.9 if its performance meets the criteria in 5.3.1 through 5.3.5.

5.3.1 Life Safety.

5.3.1.1 The life safety objectives of 5.3.1 with respect to a fire hazard shall be achieved if either of the following criteria is met:

   (1) Ignition has been prevented.
(2) Under all fire scenarios, no person, other than those in the immediate proximity of the ignition, is exposed to untenable conditions due to the fire, and no critical structural element of the building is damaged to the extent that it can no longer support its design load during the period of time necessary to effect complete evacuation.

5.3.1.2 The life safety objectives of 5.3.1 with respect to an explosion hazard shall be achieved if either of the following criteria is met:

(1) Ignition has been prevented.

(2) Under all explosion scenarios, no person, other than those in the immediate proximity of the ignition, is exposed to untenable conditions, including missile impact or overpressure, due to the occurrence of an explosion, and no critical structural element of the building is damaged to the extent that it can no longer support its design load during the period of time necessary to effect complete evacuation.

5.3.1.3 The life safety objectives of 5.3.1 with respect to the release of hazardous materials that don’t result in a fire or explosion shall be achieved if the following criteria are met:

(1) The physical and health hazards identified are mitigated.

(2) Releases of all hazardous materials offsite are minimized.

5.3.2 Structural Integrity. The structural integrity objective of 5.3.2 with respect to fire and explosion shall be achieved when no critical structural element of the building is damaged to the extent that it can no longer support its design load under all fire and explosion scenarios.

5.3.3 Mission Continuity. The mission continuity objectives of 5.3.3 shall be achieved when damage to equipment and the facility has been limited to a level of damage acceptable to the owner/operator.

5.3.4 Mitigation of Fire Spread, Explosions, or the Release of Hazardous Materials. When limitation of fire spread is to be achieved, all of the following criteria shall be demonstrated:

(1) Adjacent combustibles shall not attain their ignition temperature.

(2) Building design and housekeeping shall prevent combustibles from accumulating exterior to the enclosed process system to a concentration that is capable of supporting propagation.

(3) Particulate processing systems shall prevent fire or explosion from propagating from one process system to an adjacent process system or to the building interior.

5.3.5 Effects of Explosions. Where the prevention of damage due to explosion is to be achieved, deflagrations shall not produce any of the following conditions:

(1) Internal pressures in the room or equipment sufficient to threaten its structural integrity

(2) Extension of the flame front outside the compartment or equipment of origin except where intentionally vented to a safe location
(3)*Rupture of the compartment or equipment of origin and the ejection of fragments that can constitute missile hazards

5.4* Design Scenarios.

5.4.1 Fire Scenarios.

5.4.1.1* Each fuel object in the compartment shall be considered for inclusion as a fire scenario.

5.4.1.2 The fuel object that produces the most rapidly developing fire during startup, normal operating conditions, or shutdown shall be included as a fire scenario.

5.4.1.3 The fuel object that produces the most rapidly developing fire under conditions of a production upset or single equipment failure shall be included as a fire scenario.

5.4.1.4 The fuel object that produces the greatest total heat release during startup, normal operating conditions, or shutdown shall be included as a fire scenario.

5.4.1.5 The fuel object that produces the greatest total heat release under conditions of a production upset or single equipment failure shall be included as a fire scenario.

5.4.1.6 The fuel object that can produce a deep-seated fire during startup, normal operating conditions, or shutdown shall be included as a fire scenario.

5.4.1.7 The fuel object that can produce a deep-seated fire under conditions of a production upset or single equipment failure shall be included as a fire scenario.

5.4.2 Explosion Scenarios.

5.4.2.1 Each duct, enclosed conveyor, silo, bunker, cyclone, dust collector, or other vessel containing a combustible dust in sufficient quantity or conditions to support the propagation of a flame front during startup, normal operating conditions, or shutdown shall be included as an explosion scenario.

5.4.2.2 Each duct, enclosed conveyor, silo, bunker, cyclone, dust collector, or other vessel containing a combustible dust in sufficient quantity or conditions to support the propagation of a flame front under conditions of production upset or single equipment failure shall be included as an explosion scenario.

5.4.2.3 Each building or building compartment containing a combustible dust in sufficient quantity or conditions to support the propagation of a flame front during startup, normal operating conditions, or shutdown shall be included as an explosion scenario.

5.4.2.4 Each building or building compartment containing a combustible dust in sufficient quantity or conditions to support the propagation of a flame front under conditions of production upset or single equipment failure shall be included as an explosion scenario.

5.4.2.5* Where the combustible dust can cause other explosion hazards such as generation of hydrogen or other flammable gases, those hazards should be included as explosion scenarios.

5.5 Evaluation of Proposed Design.
5.5.1* General. A proposed design’s performance shall be assessed relative to each performance objective in Section 5.3 and each applicable scenario in Section 5.4, with the assessment conducted through the use of appropriate calculation methods acceptable to the authority having jurisdiction.

5.5.2 The design professional shall establish numerical performance criteria for each of the objectives in Section 5.3.

5.5.3 The design professional shall use the assessment methods to demonstrate that the proposed design will achieve the goals and objectives, as measured by the performance criteria in light of the safety margins and uncertainty analysis, for each scenario, given the assumptions.

5.6 Retained Prescriptive Requirements. (Reserved)

Chapter 6 Hazard Assessment

6.1* General Requirements.

6.1.1 Responsibility. The owner/operator of a facility where combustible particulate solids are present in either a process or a facility compartment shall be responsible to ensure a Process Hazards Analysis is completed in accordance with the requirements of this chapter.

6.1.2 The requirements of Chapter 6 shall be applied retroactively.

6.2* Criteria.

6.2.1 The Process Hazard Analysis shall consider the fire, flash-fire, and explosion hazards and provide recommendations to ensure that the objectives in Section 4.9 are met.

6.2.2* Qualifications. The Process Hazards Analysis shall be performed or led by a qualified person.

6.2.3 Minimum Interval. A review of the Process Hazards Analysis shall be performed a minimum of every five (5) years.

6.2.4 Documentation. The results of the Process Hazards Analysis review shall be documented, including any necessary action items requiring change to the process materials, changes to the physical process, changes to the process operations, or changes to the facilities associated with the process.

6.3 Methodology.

6.3.1 General. The Process Hazards Analysis shall:

   (1) Identify the portions of the process or facility areas where a fire or deflagration hazard exists

   (2) Identify specific fire and deflagration scenarios and determine their consequences, including fires, flash-fires, and explosions

   (3) Identify the means by which fire or deflagration events can be prevented or mitigated
6.3.2 Material Evaluation.

6.3.2.1 The Process Hazards Analysis shall be based upon test data of material that is representative of the combustible particulate solids present.

6.3.3 Process Systems.

6.3.3.1 Each part of the process system shall be evaluated.

6.3.3.2 The potential for a dust fire or deflagration in a process system component shall be based upon whether the conditions necessary and sufficient for a fire or deflagration exist.

6.3.3.3 Where there is the potential for a dust fire or deflagration within a process system, the hazards of the fire or deflagration shall be managed in accordance with this standard.

6.3.4 Facility Compartments.

6.3.4.1 Each facility compartment where a combustible particulate solid is present shall be evaluated.

6.3.4.2 The potential for a dust fire or deflagration in a facility compartment shall be based upon whether the conditions necessary and sufficient for a fire or deflagration can exist.

6.3.4.2.1 The evaluation of dust deflagration hazards in facility compartments shall include a comparison of actual or intended dust accumulation to the threshold dust accumulation that would present a potential for flash-fire exposure to personnel or compartment failure due to explosive overpressure.

6.3.4.2.2 The dust accumulation levels shall be in accordance with the relevant industry or commodity-specific NFPA standards. (See Section 1.3.1)

6.3.4.3 Where there is the potential for a dust fire or deflagration within a facility compartment, the effects of the fire or deflagration shall be managed in accordance with this standard.

Chapter 7 Hazard Management: Mitigation and Prevention

7.1 Inherently Safe Designs. (Reserved)

7.2 Building Design

7.2.1 Construction The type of construction shall be in accordance with the building code adopted by authority having jurisdiction.

7.2.2 Building/Room Protection

7.2.2.1 General. Each room, building or other enclosure containing a combustible dust in sufficient quantity to support the propagation of flame shall be protected from the consequence of deflagration.
7.2.2.2 If a room or building contains a dust explosion hazard in a facility compartment and outside of equipment, such areas shall be provided with deflagration venting to a safe area in accordance with NFPA 68 *Standard on the Explosion Protection by Deflagration Venting*.

7.2.2.2.1 Venting shall be located to relief pressure through an outside wall or roof.

7.2.2.2.2 The fireball, blast hazards and missile hazards that are created by deflagration venting shall not expose additional personnel or property assets.


7.2.3.1 Where a dust deflagration hazard exists in a facility compartment and outside of equipment, building configuration and appurtenances shall comply with NFPA 101, *Life Safety Code* for hazardous occupancy.

7.2.3.2* Where a dust explosion hazard exists in a facility compartment and outside of equipment, enclosed exit and egress paths shall be designed to withstand potential overpressures from dust explosion.

7.2.4 Methods to Limit Accumulation

7.2.4.1* Interior surfaces where dust accumulations can occur shall be designed and constructed so as to facilitate cleaning and to minimize combustible dust accumulations.

7.2.4.2* Enclosed building spaces inaccessible to routine housekeeping shall be sealed to prevent dust accumulation.

7.2.4 Separation of Hazard Areas from other Occupancies

7.2.4.1 Where a dust deflagration hazard exists in a facility compartment and outside of equipment, those areas shall be segregated, separated, or detached from other occupancies to minimize damage from a fire or explosion.

7.2.4.2 Use of Segregation

7.2.4.2.1 Physical barriers erected for the purpose of limiting fire spread shall be designed in accordance with NFPA 221, *Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls*.

7.2.4.2.2 Physical barriers erected to segregate fire hazard areas, including all penetrations and openings of floors, walls, ceilings, or partitions shall have a minimum fire resistance rating based on the anticipated fire duration.

7.2.4.2.3 Physical barriers, including all penetrations and openings of floors, walls, ceilings, or partitions, that are erected to segregate dust explosion hazard areas shall be designed to preclude failure of those barriers during a dust explosion per NFPA 68, *Standard on Explosion Protection by Deflagration Venting*.

7.2.4.3 Use of Separation

7.2.4.3.1* Separation shall be permitted to be used to limit the dust explosion hazard or dust
flash fire hazard area within a building where supported by a documented engineering evaluation acceptable to the authority having jurisdiction.

7.2.4.3.3 The required separation distance between the dust explosion hazard or flash fire hazard area and surrounding exposures shall be determined by an engineering evaluation that addresses the following:

(1) Properties of the materials
(2) Type of operation
(3) Amount of material likely to be present outside the process equipment
(4) Building and equipment design
(5) Nature of surrounding exposures

7.2.4.3.4 The separation area shall be free of dust or where dust accumulations exist on any surface, the surface colors below shall be readily discernible.

7.2.4.3.5 When separation is used to limit the dust flash fire or dust explosion hazard area determined in Chapter 6, the minimum separation distance shall not be less than 35 ft (11m).

7.2.4.3.6* When separation is used, housekeeping, fixed dust collection systems employed at points of release, and the use of physical barriers shall be permitted to be used to limit the extent of the dust explosion hazard or flash fire hazard area.

7.2.4.4 Use of Detachment

7.2.4.4.1. Detachment shall be permitted to be used to limit the dust hazard area to a physically separated adjacent building.

7.2.4.4.2* The required detachment distance between the dust explosion hazard or flash fire hazard area and surrounding exposures shall be determined by an engineering evaluation that addresses the following:

(1) Properties of the materials
(2) Type of operation
(3) Amount of material likely to be present outside the process equipment
(4) Building and equipment design
(5) Nature of surrounding exposures

7.3 Equipment Design

7.3.1* Risk Evaluation. A documented risk evaluation acceptable to the authority having jurisdiction shall be permitted to be conducted to determine the level of protection to be provided per Section 7.3.

7.3.1 * Design for Dust Containment
7.3.1.1 All components of enclosed systems that handle combustible particulate solids shall be designed to prevent the escape of dust, except for openings intended for intake and discharge of air and material.

7.3.1.2 Where the equipment cannot be designed for dust containment, dust collection shall be provided. (See also Section 7.3.3 Transfer Points)

7.3.2* Pneumatic Conveying, Dust Collection, and Centralized Vacuum Cleaning Systems:

7.3.2.1 General Requirements

7.3.2.1.1 Where used to handle combustible particulate solids, systems shall be designed by and installed under the supervision of qualified persons who are knowledgeable about these systems and their associated hazards.

7.3.2.1.2* Where it is necessary to make changes to an existing system, all changes shall be managed in accordance with Chapter 8.

7.3.2.1.3* The system shall be designed and maintained to ensure that the air/gas velocity used shall at all times meet or exceed the minimum required to keep the interior surfaces of all piping or ducting free of accumulations.

7.3.2.1.4* Operations.

7.3.2.1.4.1 Sequence of Operation. Pneumatic conveying, dust collection, and centralized vacuum cleaning systems shall be designed with the operating logic, sequencing, and timing outlined in 7.3.2.1.4.2 and 7.3.2.1.4.3.

7.3.2.1.4.2* Startup. Pneumatic conveying, dust collection, and centralized vacuum cleaning systems shall be designed such that, on startup, the system achieves and maintains design air velocity prior to the admission of material to the system.

7.3.2.1.4.3 Shutdown.

7.3.2.1.4.3.A Pneumatic conveying, dust collection, and centralized vacuum cleaning systems shall be designed such that, on normal shutdown of the process, the system maintains design air velocity until material is purged from the system.

7.3.2.1.4.3.B The requirements of 7.3.2.1.4.3.A shall not apply during emergency shutdown of the process, such as by activation of an emergency stop button or by activation of an automatic safety interlocking device.

7.3.2.1.4.3.C Dilute phase pneumatic conveying systems shall be designed such that, upon restart after an emergency shutdown, residual materials can be cleared and design air velocity can be achieved prior to admission of new material to the system.

7.3.2.1.4.3.D Dense Phase. (Reserved)

7.3.2.2* Specific Requirements for Pneumatic Conveying Systems.

7.3.2.2.1* The design of the pneumatic conveying system shall address required performance parameters and properties of the materials being conveyed.
7.3.2.2* Where a pneumatic conveying system or any part of such systems operates as a positive-pressure-type system and the air-moving device's gauge discharge pressure is 15 psi (103 kPa) or greater, the system shall be designed in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code or ASME B31.3, Process Piping or international equivalents.

7.3.2.3* The pneumatic conveying system shall be designed and maintained in a manner that will assure minimum conveying velocities are provided at all times.

7.3.2.4* Pneumatic conveying systems conveying combustible particulate solids shall be protected in accordance with Section 7.8.

7.3.2.3* Specific Requirements for Dust Collection Systems.

7.3.2.3.1* At each collection point, the system shall be designed to achieve the minimum required face velocity for dust capture over the entire opening of the hood or pickup point.

7.3.2.3.2* The hood or pick up point for each dust source shall have a documented minimum air volume flow based upon the system design.

7.3.2.3.3* Branch lines shall not be disconnected and unused portions of the system shall not be blanked off without providing a means to maintain required and balanced airflow.

7.3.2.3.5* The addition of branch lines shall not be made to an existing system without redesigning the entire system.

7.3.2.3.6 Dust collection systems that remove material from operations that generate flames, sparks, or hot material shall not be interconnected with dust collection systems that transport combustible particulate solids or hybrid mixtures.

7.3.2.3.7* The system shall be designed to assure that the air/gas flow used shall at all times meet or exceed the minimum required to keep interior duct surfaces free of accumulations.

7.3.2.3.8* The system shall be maintained to assure that the air/gas flow used shall at all times meet or exceed the minimum required to keep interior duct surfaces free of accumulations.

7.3.2.3.9* The Air Material Separator selected for the system shall be designed to allow for the characteristics of the combustible dust being separated from the air or gas flow.

7.3.2.3.9 AMS Locations. (Reserved)

7.3.2.3.9.1 AMS Indoor Locations. (Reserved)

7.3.2.3.9.2 AMS Outdoor Locations. (Reserved)

7.3.2.3.10* Fans or blowers (AMD) shall be of appropriate type and sufficient capacity to maintain the required rate of air flow in all parts of the system.

7.3.2.3.11 Recycle of Clean Air AMS. (Reserved)

7.3.2.4.* Specific Requirements for Centralized Vacuum Cleaning Systems.

7.3.2.4.1* The system shall be designed to assure minimum conveying velocities at all times whether the system is used with a single or multiple simultaneous operators.
7.3.2.4.2* The hose length and diameter shall be sized for the application and operation.

7.3.2.4.3* Where ignition sensitive materials are collected, vacuum tools shall be constructed of metal or of conducting materials and provide for proper grounding to the hose.

7.3.2.4.4* Vacuum cleaning hose shall be static dissipative or conductive and grounded.

7.3.2.4.5 AMS Location. (Reserved)

7.3 Transfer Points. (Reserved)

7.4 Housekeeping.

7.4.1 General. Unless otherwise specified, the requirements of Section 7.4 shall be applied retroactively.

7.4.2* Methodology.

7.4.2.1 Procedure.

7.4.2.1.1* Housekeeping procedures shall be documented in accordance with the requirements of Chapter 6 and 8.

7.4.2.1.2 Surfaces shall be cleaned in a manner that minimizes the risk of generating a fire or explosion hazard.

7.4.2.1.3* Cleaning procedures shall be in accordance with this standard and the industry or commodity-specific NFPA standard. (See Section 1.3.1)

7.4.2.2.2 Cleaning methods to be used shall be based on the characteristics of the material and quantity of material present.

7.4.2.2 Vacuum Cleaning Method.

7.4.2.2.1* For residual accumulations, vacuum cleaning shall be the preferred method.

7.4.2.2.2* Portable vacuum cleaners that meet the following minimum requirements shall be permitted to be used to collect combustible particulate solids:

(1) Materials of construction shall comply with Section 7.5.7.1 of this standard and Section 7.13.2 of NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids.

(2) Hoses shall be conductive or static dissipative.

(3) All conductive components, including wands and attachments, shall be bonded and grounded

(4) Dust-laden air shall not pass through the fan or blower

(5) Electrical motors shall not be in the dust laden air stream, unless listed for Class II, Division 1 locations

(6)* When liquids or wet material are picked up by the vacuum cleaner, paper filter
elements shall not be used

(7) Vacuum cleaners used for metal dusts shall meet the requirements of NFPA 484, Standard for Combustible Metals

7.4.2.2.3* In Class II electrically classified (hazardous) locations, vacuum cleaners shall be listed for the purpose and location or shall be a fixed-pipe suction system with remotely located exhauster and air-material separator installed in conformance with Section 7.3.2 and shall be suitable for the dust being collected.

7.4.2.2.4 Where flammable vapors or gases are present, vacuum cleaners shall be listed for Class I and Class II hazardous locations.

7.4.2.3* Sweeping/Shoveling/Scoop and Brush Cleaning Method.

7.4.2.3.1 For spills, cleaning with scoops and natural bristle brushes shall be the preferred method.

7.4.2.4* Water Wash Down Cleaning Method.

7.4.2.4.1 Where vacuuming is impractical, the use of water wash-down shall be a permitted cleaning method.

7.4.2.5 Water Foam Wash Down Systems. (Reserved)

7.4.2.6 Compressed Air-Blow Down Method.

7.4.2.6.1 Blow downs using compressed air or steam shall be permitted to be used for cleaning inaccessible surfaces or surfaces where other methods of cleaning result in greater personal safety risk.

7.4.2.6.2* Where blow down using compressed air is used, the following precautions shall be followed:

(1) Vacuum cleaning, sweeping, or water wash-down methods are first used to clean surfaces that can be safely accessed prior to using compressed air.

(2) Dust accumulations in the area after vacuum cleaning, sweeping, or water wash-down do not exceed the threshold dust accumulation.

(3) Compressed air hoses are equipped with pressure relief nozzles limiting the discharge pressure to 30 psig in accordance with OSHA requirements 29 CFR 1910.242(b).

(4) All electrical equipment potentially exposed to airborne dust in the area meets, as a minimum, NFPA 70, National Electrical Code (NEC) NEMA 12 requirements, or equivalent.

(5) All ignition sources and hot surfaces capable of igniting a dust cloud or dust layer are shut down or removed from the area.

7.4.2.7 Steam Blow Down Method. (Reserved)

7.4.3 Training.
Operator and contractor training shall include housekeeping procedures, required personal protective equipment during housekeeping, and proper use of equipment.

7.4.4 Equipment.

7.4.5 Vacuum Trucks. (Reserved)

7.4.6 Frequency and Goal.

7.4.6.1* Housekeeping frequency and accumulation goals shall be established to ensure that the accumulated dust levels on surfaces, does not exceed the threshold housekeeping dust accumulation limits.

7.4.6.2 The dust accumulation limits shall be in accordance with the industry or commodity-specific NFPA standard. (See Section 1.3.1)

7.4.6.3* Housekeeping frequency and provisions for unscheduled housekeeping shall include specific requirements establishing time to clean local dust spills or transient releases.

7.4.7 Auditing and Documentation.

7.4.7.1* Housekeeping effectiveness shall be assessed based on the results of routine scheduled cleaning and inspection, not including transient releases.

7.4.7.3 The owner/operator shall retain documentation supporting the established frequency of routinely scheduled cleaning.

7.5 Ignition Source Control.

7.5.1 General. Unless otherwise specified, the requirements of Section 7.5 shall be applied retroactively.

7.5.2* Risk Evaluation. A documented risk evaluation acceptable to the authority having jurisdiction shall be permitted to be conducted to determine the level of ignition source control to be provided per Section 7.5.

7.5.3 Hot Work.

7.5.3.1* All hot work activities shall comply with the requirements of NFPA 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work.

7.5.3.2* The hot work permit system shall include a designation of the size of the area surrounding the hot work that will be thoroughly cleaned of combustible dust.

7.5.3.3 Equipment within the hot work area that contains combustible dust shall be shut down, shielded, or both.

7.5.3.4 Floor and wall openings within the hot work area shall be covered or sealed.

7.5.3.5 Portable Electrical Equipment. (Reserved)

7.5.4 Hot Surfaces.
7.5.4.1 This section shall not be required to be applied retroactively.

7.5.4.2* Heated external surfaces of process equipment and piping in [fire hazard] areas containing combustible dust shall be maintained at a temperature at least 50°C below the dust layer hot surface ignition temperature measured in a standardized test acceptable to the AHJ.

7.5.4.3* Internal surfaces of process equipment heated with hot air, and having a potential for dust accumulation, shall be maintained at a temperature at least 20°C below a standard dust layer hot air ignition temperature acceptable to the AHJ.

7.5.5 Bearings.

7.5.5.1 This section shall not be required to be applied retroactively.

7.5.5.2* Bearings that are directly exposed to or separated by a single seal from dust containing equipment shall be monitored with alarms for overheating.

7.5.5.3 Bearing overheating alarms shall be located in a normally occupied area such as a control room.

7.5.5.4 Bearing overheating monitors and alarms shall be inspected and tested at intervals no greater than 3 months.

7.5.5.4.1 The frequency of inspection and testing in 7.5.5.4 shall be permitted to be increased or decreased based on documented operating experience or a documented Process Hazard Analysis, and only with the approval of both the manufacture of the monitor and alarms and the AHJ.

7.5.5.4.2 The maximum inspection and testing interval shall not exceed 2 years.

7.5.5.5 It shall be permitted to eliminate bearing monitors, based on a risk assessment acceptable to the AHJ.

7.5.6 Electrical Equipment and Wiring.

7.5.6.1 The identification of the possible presence and extent of Class II and Class III locations shall be made based on the criteria in NFPA 70, *National Electrical Code*, Article 500.5 C and D.

7.5.6.1.1 The locations and extent of Class II and Class III areas shall be documented and such documentation shall be preserved for access at the facility.

7.5.6.2 Electrical equipment and wiring within Class II locations shall comply with Article NFPA 70, *National Electrical Code*, Article 502.

7.5.6.3 Electrical equipment and wiring within Class III locations shall comply with Article NFPA 70, *National Electrical Code*, Article 503.

7.5.6.4 Preventive maintenance programs for electrical equipment and wiring in Class II and Class III locations shall include provisions to verify that dusttight electrical enclosures are not experiencing significant dust ingress.

7.5.7 Electrostatic Discharges.
7.5.7.1 **Conductive Equipment.**

7.5.7.1.1 Particulate handling equipment shall be conductive unless the provisions of 7.5.7.1.2 are applicable.

7.5.7.1.2 Nonconductive system components shall be permitted where all of the following conditions are met:

- (a) Hybrid mixtures are not present
- (b) Conductive dusts are not handled
- (c) The MIE of the material being handled is greater than 3 mJ determined without inductance
- (d) The nonconductive components do not result in isolation of conductive components from ground
- (e)* The breakdown strength across nonconductive sheets, coatings, or membranes does not exceed 4 kV when used in high surface charging processes

7.5.7.1.3 Bonding and grounding with a resistance of less than $1.0 \times 10^6$ ohms to ground shall be provided for conductive components.

7.5.7.1.4 **Flexible Connectors.**

7.5.7.1.4.1 Flexible Connectors shall have an end-to-end resistance of less than $1.0 \times 10^6$ ohms to ground even when an internal or external bonding wire connects the equipment to which the flexible connector is attached.

7.5.7.1.4.2* Flexible connectors with a resistance equal to or greater than $1.0 \times 10^6$ ohms shall be permitted when all the particulate materials within and on the surface of the connector have Minimum Ignition Energies greater than 2 joules when measured using ASTM E 2019, *Standard Test Method for Minimum Ignition Energy of a Dust Cloud in Air*.

7.5.7.2 **Maximum Particulate Transport Rates.**

7.5.7.2.1* The maximum permitted container discharge or transport rate of particulate material with a volume resistivity greater than $1.0 \times 10^{10} \, \Omega \cdot m$ shall be 1.4 kg/s.

7.5.7.2.2 The limit on particulate material transport or discharge rate shall not be applicable to particulate materials with Minimum Ignition Energies greater than 20 mJ.

7.5.7.3* **Grounding of Personnel.**

7.5.7.3.1 Personnel involved in manually filling or emptying particulate containers or vessels, or handling open containers of combustible particulates, shall be grounded during such operations.

7.5.7.3.2* Personnel grounding is not required for particulate materials with Minimum Ignition Energies greater than 10 mJ.

7.5.7.4 **Flexible Intermediate Bulk Containers.**
7.5.7.4.1 The potential for electrostatic discharges from Flexible Intermediate Bulk Containers (FIBCs) transporting or storing combustible particulate shall be evaluated.

7.5.7.4.2* The evaluation of the FIBC electrostatic ignition hazard shall include a determination of the type of FIBC being used and the expected range of MIE values for combustible particulates being stored or transported in the FIBCs.

7.5.8 Open Flames and Fuel Fired Equipment

7.5.8.1 Production, maintenance or repair activities that can release or lift combustible dust shall not be conducted within 30 feet of an open flame or pilot flame.

7.5.8.2 Fuel fired space heaters drawing local ambient air shall not be located within 30 feet of equipment transporting, processing, or storing combustible dust.

7.5.8.3 Fuel fired process equipment shall be operated and maintained in accord with the pertinent NFPA standard for the equipment, including the following standards:

   (1) NFPA 31, Standard for the Installation of Oil-Burning Equipment.

   (2) NFPA 54, National Fuel Gas Code.

   (3) NFPA 86, Standard for Ovens and Furnaces.

7.5.8.4 Inspections and preventive maintenance for fuel fired process equipment shall include verification that there are no significant combustible dust accumulations within or around the equipment.

7.5.9 Industrial Trucks

7.5.9.1 Industrial trucks shall be listed or approved for the electrical classification of the area, as determined by Section 7.5.6, and shall be used in accordance with NFPA 505, Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations.

7.5.9.2* Where industrial trucks, in accordance with NFPA 505, Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations, are not commercially available a documented risk assessment acceptable to the authority having jurisdiction shall be permitted to be used to specify the fire and explosion prevention features for the equipment used.

7.5.10 Process Air and Media Temperatures

7.5.10.1 Unless the process media is an inert gas, process air and media temperatures in equipment containing combustible dust suspensions shall be maintained below the combustible dust cloud Minimum Auto-Ignition Temperature.

7.5.10.2 Unless the process media is an inert gas, process air and media temperatures in equipment containing combustible dust accumulations shall be maintained below the higher dust layer hot air ignition temperature.

7.5.11 Self-Heating
7.5.11.1* Silos and other large storage piles of particulates prone to self-heating shall have self-heating detection provisions.

7.5.11.2 Self-heating detection provisions shall not be required when the storage pile particulate residence time is less than the greater of one week or the self-heating ignition time of a particular material and pile size.

7.5.11.3 Materials that are prone to self-heating shall be cooled to a temperature below the self-heating onset temperature before they are placed into silos or other large storage piles.

7.5.11.4 Provisions shall be established for carefully emptying or inerting a storage silo or bin upon self-heating detection.

7.5.12 Friction and Impact Sparks.

7.5.12.1* Tramp materials that present a friction or impact spark potential shall be removed from the material inlet stream to size reduction equipment and other equipment with moving parts in contact with combustible dusts.

7.5.12.2 Tramp materials that present a friction or impact spark potential shall be permitted to be in the material inlet stream if the equipment is provided with explosion protection.

7.5.12.3 Clearances and alignment of high-speed moving parts in equipment processing combustible particulates shall be checked at intervals of no greater than six months unless the equipment is equipped with vibration monitors and alarms.

7.5.12.4 The alignment and clearance of buckets in elevators transporting combustible particulates shall be checked at intervals no greater than six months unless the elevators are equipped with belt alignment monitoring devices.

7.6 Personal Protective Equipment.

7.6.1 Workplace Hazard Assessment.

7.6.1.1* An assessment of workplace hazards shall be conducted as described in NFPA 2113, Standard on Selection, Care, Use and Maintenance of Flame-Resistant Garments for the Protection of Industrial Personnel Against Flash Fire.

7.6.1.2 Personnel working in areas where the threat of exposure to a dust deflagration hazard exists shall be provided with and wear flame resistant garments.

7.6.1.3 Potential exposure to flame and thermal hazards shall be considered when selecting flame resistant clothing and other personal protective equipment.

7.6.1.3.1 When protecting personnel from exposure to flash fire, flame resistant clothing shall comply with the requirements of NFPA 2112, Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire.

7.6.1.3.2* When protecting personnel from exposure to electric arc, flame resistant clothing shall comply with NFPA 70E®, Standard for Electrical Safety in the Workplace®.

7.6.1.6* Consideration shall be given to the following:
(1) Thermal protective characteristics of the fabric over a range of thermal exposures
(2) Physical characteristics of the fabric
(3) Garment construction and components
(4) Avoidance of static charge buildup
(5) Design of garment
(6) Conditions under which garment will be worn
(7) Garment fit
(8) Garment durability/wear life
(9) Recommended laundering procedures
(10) Conditions/features affecting wearer comfort

7.6.1.7 Flame resistant garments shall be selected, procured, inspected, worn and maintained in accordance with NFPA 2113, Standard on Selection, Care, Use and Maintenance of Flame-Resistant Garments for the Protection of Industrial Personnel Against Flash Fire.

7.6.1.8 The Employer shall implement a policy regarding care, cleaning and maintenance for flame resistant garments.

7.6.2 Limitations of PPE Application. (FRG)

7.6.2.1 Flame resistant or non-melting undergarments shall be used.

7.6.2.2 Only flame resistant outer wear shall be worn over flame resistant daily wear.

7.6.3 Limitations of PPE to Combustible Dust Flash-Fires. (Reserved)

7.6.4 Face, Hands, and Footwear Protection. (Reserved)

7.7 Dust Control.

7.7.1 Continuous suction to minimize the escape of dust shall be provided for processes where combustible dust is liberated in normal operation.

7.7.1.2 The dust shall be conveyed to air-material separators designed in accordance with Section 7.3.2.

7.7.2* Liquid Suppression Methods for Dust Control.

7.7.2.1 Where liquid suppression is used to prevent the accumulation of dust or the reduce its airborne concentration, the liquid suppressant shall not result in adverse reaction with the combustible dust.

7.7.2.2 Where liquid suppression is used, controls and monitoring equipment shall be provided to ensure the suppression system is functioning properly.

7.7.3 Fans to Limit Accumulation. (Reserved)

7.8 Explosion Prevention/Protection.

7.8.1 General. If an explosion hazard exists with a building, enclosure or a process system, measures shall be taken to protect personnel from the consequences of an explosion.
7.8.2* Risk Evaluation. A documented risk evaluation acceptable to the authority having jurisdiction shall be permitted to be conducted to determine the level of protection to be provided per Section 7.8.

7.8.4 The requirements of 7.8 shall not apply where the explosion hazard is managed in accordance with the requirements of the relevant industry or commodity-specific NFPA standard. (See Section 1.3.1)

7.8.2 Equipment Protection

7.8.2.1 General. Where an explosion hazard exists within any operating enclosure such as air material separators, storage enclosures, mixers/blenders, particle size reductions, dryers and blowers/fans the enclosure shall be protected from the effects of a deflagration.

7.8.2.2 Explosion protection systems shall incorporate one or more of the following methods of protection:

(1) Oxidant concentration reduction in accordance with NFPA 69, Standard on Explosion Prevention Systems.

(2) Deflagration venting in accordance with NFPA 68, Standard on the Explosion Protection by Deflagration Venting.

(3) Deflagration venting through listed flame-arresting devise in accordance with NFPA 68, Standard on the Explosion Protection by Deflagration Venting.

(4) Deflagration pressure containment in accordance with NFPA 69, Standard on Explosion Prevention Systems.

(5) Deflagration suppression system in accordance with NFPA 69, Standard on Explosion Prevention Systems.

(6) Dilution with a noncombustible dust to render the mixture noncombustible

7.8.2.3 Enclosures and all interconnections shall be designed to withstand expected pressures resulting from the deflagration protection system.

7.8.3 Equipment Isolation

7.8.3.1 General. Where an explosion hazard exists within any operating enclosure, such as air material separators, storage enclosures, mixers/blenders, particle size reductions, dryers and blowers/fans the process design shall include measures to prevent deflagration propagation.

7.8.3.2 Isolation devises shall be provided to prevent deflagration propagation between connected enclosures in accordance with NFPA 69, Standard on Explosion Prevention Systems.

7.8.3.3 Isolation devises shall be provided to prevent deflagration propagation to any work space in accordance with NFPA 69, Standard on Explosion Prevention Systems.

7.8.3.4 Isolation devises shall be provided when recycling enclosure exhaust to building interiors
to prevent deflagration propagation and transmission of energy from a fire or explosion in accordance with NFPA 69, *Standard on Explosion Prevention Systems*.

7.9 Fire Protection.

7.9.1 General.

7.9.1.1 Manual firefighting equipment shall be provided in all areas where combustible dust fire hazards exist.

7.9.1.2 Automatic fire protection systems shall be provided when one or more of the conditions described in 7.9.1.2.1, 7.9.1.2.2, or 7.9.1.2.3 exist.

7.9.1.2.1 The hazard assessment described in Chapter 6 shall determine that a flash fire hazard exists.

7.9.1.2.2* An evaluation of the risk to facility personnel and firefighters for manual firefighting shall be made based on the review of the hazard assessment described in Chapter 6.

7.9.1.2.3* Manual firefighting shall be not expected to be effective for a fire hazard assessed per Chapter 6.

7.9.2 System Requirements.

Fire protection systems where provided shall comply with 7.9.2.1 through 7.9.2.4.

7.9.2.1* Fire-extinguishing agents shall be compatible with the conveyed, handled and stored materials.

7.9.2.2 Where fire detection systems are incorporated into pneumatic conveying systems, an analysis shall be conducted to identify safe interlocking requirements for air-moving devices and process operations.

7.9.2.3 Where firefighting water or wet product can accumulate in the system, vessel and pipe supports shall be designed to support the additional water weight.

7.9.2.4* Extinguishing agents shall be applied to the combustible particulate fire at a sufficiently low momentum to avoid generating a suspended dust cloud.

7.9.3 Fire Extinguishers.

7.9.3.1* Portable fire extinguishers shall be provided throughout all buildings in accordance with the requirements of NFPA 10, *Standard for Portable Fire Extinguishers*.

7.9.3.2* Personnel shall be trained to use portable fire extinguishers in a manner that minimizes the generation of dust clouds during discharge.

7.9.4 Hose, Standpipes, Hydrants, and Water Supply.

7.9.4.1 Standpipes and hose, where provided, shall comply with NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*.

7.9.4.2 Nozzles.
7.9.4.2.1* Portable spray hose nozzles that are listed or approved for use on Class C fires shall be provided in areas that contain dust, to limit the potential for generating unnecessary airborne dust during fire-fighting operations.

7.9.4.2.2* Straight-stream nozzles shall not be used on fires in areas where dust clouds can be generated.

7.9.4.2.3 It shall be permitted to use straight stream nozzles or combination nozzles to reach fires in locations that are otherwise inaccessible with nozzles specified in 7.9.4.2.1.

7.9.4.3 Water Supply.

7.9.4.3.1 Private hydrants and underground mains, where provided, shall comply with NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.

7.9.4.3.2 Fire pumps, where provided, shall comply with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*.

7.9.4.3.3 Fire protection water tanks, where provided, shall comply with NFPA 22, *Standard for Water Tanks for Private Fire Protection*.

7.9.5 Automatic Sprinklers.

7.9.5.1* Where a process that handles combustible particulate solids uses flammable or combustible liquids, a documented risk evaluation that is acceptable to the authority having jurisdiction shall be used to determine the need for automatic sprinkler protection in the enclosure in which the process is located.

7.9.5.2* Automatic sprinkler protection shall not be permitted in areas where combustible metals are produced or handled unless permitted by NFPA 484, *Standard for Combustible Metals*.

7.9.5.3 Automatic sprinklers, where provided, shall be installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

7.9.5.4 Where automatic sprinklers are installed, dust accumulation on overhead surfaces shall be minimized to prevent an excessive number of sprinkler heads from opening in the event of a fire.

7.9.6 Spark/Ember Detection and Extinguishing Systems.

Spark/ember detection and extinguishing systems shall be designed, installed, and maintained in accordance with NFPA 69, *Standard on Explosion Prevention Systems*, and NFPA 72®, *National Fire Alarm and Signaling Code®*.

7.9.7 Special Fire Protection Systems.

7.9.7.1 Automatic extinguishing systems or special hazard extinguishing systems, where provided, shall be designed, installed, and maintained in accordance with the following standards, as applicable:

(1) NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*

(2) NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*
(3) NFPA 12A, Standard on Halon 1301 Fire Extinguishing Systems
(4) NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection
(5) NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
(6) NFPA 17, Standard for Dry Chemical Extinguishing Systems
(7) NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
(8) NFPA 750, Standard on Water Mist Fire Protection Systems
(9) NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems

7.9.7.2 The extinguishing systems shall be designed and used in a manner that minimizes the generation of dust clouds during their discharge.

Chapter 8 Management Systems

8.1 This chapter shall apply to new and existing facilities and processes.
8.1.1 Where existing facilities are complying with this chapter, the facility shall start creating documents immediately.

8.2 Operating Procedures and Practices

8.2.1* The owner/operator shall establish procedures for safely operating its facility and equipment.

8.2.2* The owner/operator shall establish safe work practices to address hazards associated with operations including but not limited to hot work, confined space entry, and lockout/tagout, and the use of personal protective equipment.

8.2.2.1 The safe work practices shall apply to employees and contractors.

8.3 Inspection, Testing and Maintenance.

8.3.1* Equipment affecting the prevention, control and mitigation of fires and explosions, shall be inspected and tested in accordance with the applicable NFPA standard and the manufacturers’ recommendations.

8.3.2 The owner/operator shall establish procedures for maintaining its facility and equipment affecting the prevention, control and mitigation of fires and explosions, in a safe operating condition.

8.3.3 Where equipment deficiencies are identified or become known corrective actions shall be taken on a timely basis.
8.3.4* Inspections and testing activities shall be documented.

8.3.5 A thorough inspection of the operating area shall take place on an as-needed basis to help ensure that the equipment is in safe operating condition and that proper work practices are being followed.

8.4 Training and Hazard Awareness.

8.4.1* Employees, contractors, temporary workers, and visitors shall be included in a training program according to the potential exposure to combustible dust hazards and the potential risks to which they might be exposed or could cause.

8.4.2* General safety training and hazard awareness training shall be provided to all employees.

8.4.2.1* Job-specific training shall ensure that employees are knowledgeable about the hazards of their working environment.

8.4.2.2 Employees shall be trained before being assigned to a job.

8.4.2.3 Where explosion protection systems are installed, training of affected personnel shall include the operation and potential hazards presented by such systems.

8.4.3* Refresher training shall be provided at least every three years and as required by other relevant industry or commodity-specific NFPA standard. (See Section 1.3.1)

8.4.4* The training shall be documented.

8.5 Contractors

8.5.1 Owner/operators shall ensure the requirements of Section 8.5 are met.

8.5.2* Only qualified contractors shall be employed for work involving the installation, repair, or modification of buildings (interior and exterior), machinery, and fire protection equipment that could adversely affect the prevention, control, or mitigation of fires and explosions.

8.5.3* Contractor Training.

8.5.3.1 Contractors operating owner/operator equipment shall be trained and qualified to operate the equipment and perform the work.

8.5.3.2 Contractor training shall be documented.

8.5.3.3 Contractors working on or near a given process shall be made aware of the potential hazards from and exposures to fire, explosion, or toxic releases.

8.5.3.4 Contractors shall be trained and required to comply with the facility’s safe work practices and policies, including but not limited to equipment lockout/tagout permitting, confined space entry, hot work permitting, fire system impairment handling, smoking, housekeeping, and use of personal protective equipment.
8.5.3.5 Contractors shall be trained on the facility's emergency response and evacuation plan, including but not limited to emergency reporting procedures, safe egress points, and evacuation area.

8.6 Emergency Planning and Response.

8.6.1* A written emergency response plan shall be developed for preventing, preparing for, and responding to work-related emergencies including but not limited to fire and explosion.

8.6.2 The emergency response plan shall be reviewed and validated at least annually.

8.7* Incident Investigation.

8.7.1 Every incident that results in, or reasonably could have resulted in, a fire or explosion shall be investigated.

8.7.2 The investigation shall be documented and include findings and recommendations to prevent similar incidents in the future.

8.7.3 A system shall be established to address and resolve the findings and recommendations. The investigation findings and recommendations shall be reviewed with affected personnel.

8.8 Management of Change.

8.8.1* Written procedures shall be established and implemented to manage proposed changes to process materials, technology, equipment, procedures, and facilities.

8.8.2 The procedures shall ensure that the following are addressed prior to any change:

1. The technical basis for the proposed change
2. Safety and health implications, including process hazard analysis
3. Whether the change is permanent or temporary
4. Modifications to operating and maintenance procedures
5. Employee training requirements
6. Authorization requirements for the proposed change
7. Results of characterization tests used to assess the hazard, if conducted
8. Engineering controls (physical changes and Emergency response procedure changes

8.8.3* Implementation of the management of change procedure shall not be required for replacements-in-kind.

8.8.4 Design and procedures documentation shall be updated to incorporate the change.

8.9 Documentation Retention
8.9.1 The owner/operator shall establish a program and implement a process to manage the retention of documentation, including, but not limited to, the following:

(1) Training records
(2) Equipment inspection, testing, and maintenance records
(3) Incident investigation reports
(4) Process Hazards Analyses
(5)* Process and Technology information
(6) Management of Change documents
(7) Emergency response plan documents
(8)* Contractor records
(9)* Management Systems Review

8.9.2 The owner/operator shall evaluate the effectiveness of the management systems presented in this standard by conducting a review of each management system.

8.9.3 The owner/operator shall be responsible for maintaining and evaluating the ongoing effectiveness of the management systems presented in this standard.

8.10 Employee Participation. (Reserved)

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For
insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.4 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.2 Air–Material Separator (AMS). Examples include cyclones, bag filter houses, dust collectors, and electrostatic precipitators. [654, 2013]

A.3.3.3 Combustible Dust. The term combustible dust when used in this standard includes powders, fines, fibers, etc. Dusts traditionally were defined as material 420 µm or smaller (capable of passing through a U.S. No. 40 standard sieve). For consistency with other standards, 500 µm (capable of passing through a U.S. No. 35 standard sieve) is now considered an appropriate size criterion. Particle surface area-to-volume ratio is a key factor in determining the rate of combustion. Combustible particulate solids with a minimum dimension more than 500 µm generally have a surface-to-volume ratio that is too small to pose a deflagration hazard. Flat platelet-shaped particles, flakes, or fibers with lengths that are large compared to their diameter usually do not pass through a 500 µm sieve, yet could still pose a deflagration hazard. Many particulates accumulate electrostatic charge in handling, causing them to attract each other, forming agglomerates. Often agglomerates behave as if they were larger particles, yet when they are dispersed they present a significant hazard. Consequently, it can be inferred that any particulate that has a minimum dimension less than or equal to 500 µm could behave as a combustible dust if suspended in air or the process specific oxidizer. If the minimum dimension of the particulate is greater than 500 µm, it is unlikely that the material would be a combustible dust, as determined by test. The determination of whether a sample of combustible material presents a flash fire or explosion hazard could be based on a screening test methodology such as provided in the ASTM E 1226, Standard Test Method for Explosibility of Dust Clouds. Alternatively, a standardized test method such as ASTM E 1515, Standard Test Method for Minimum Explosible Concentration of Combustible Dusts, could be used to determine dust explosibility.

There is some possibility that a sample will result in a false positive in the 20 L sphere when tested by the ASTM E 1226 screening test or the ASTM E 1515 test. This is due to the high energy ignition source overdriving the test. When the lowest ignition energy allowed by either method still results in a positive result, the owner/operator can elect to determine whether the sample is a combustible dust with screening tests performed in a larger scale (≥1 m³) enclosure, which is less susceptible to overdriving and thus will provide more realistic results.

This possibility for false positives has been known for quite some time and is attributed to “overdriven” conditions that exist in the 20 L chamber due to the use of strong pyrotechnic igniters. For that reason, the reference method for explosibility testing is based on a 1 m³ chamber, and the 20 L chamber test method is calibrated to produce results comparable to those from the 1 m³ chamber for most dusts. In fact, the U.S. standard for 20 L testing (ASTM E
1226) states, “The objective of this test method is to develop data that can be correlated to those from the 1 m³ chamber (described in ISO 6184-1 and VDI 3673).” ASTM E 1226 further states, “Because a number of factors (concentration, uniformity of dispersion, turbulence of ignition, sample age, etc.) can affect the test results, the test vessel to be used for routine work must be standardized using dust samples whose KSt and Pmax parameters are known in the 1 m³ chamber.”

NFPA 68, *Standard on Explosion Protection by Deflagration Venting*, also recognizes this problem and addresses it stating that “the 20 L test apparatus is designed to simulate results of the 1 m³ chamber; however, the igniter discharge makes it problematic to determine KSt values less than 50 bar-m/sec. Where the material is expected to yield KSt values less than 50 bar-m/sec, testing in a 1 m³ chamber might yield lower values.”

Any time a combustible dust is processed or handled, a potential for deflagration exists. The degree of deflagration hazard varies, depending on the type of combustible dust and the processing methods used.

A dust deflagration has the following four requirements:

1. Combustible dust
2. Dust dispersion in air or other oxidant
3. Sufficient concentration at or exceeding the minimum explosible concentration (MEC)
4. Sufficiently powerful ignition source such as an electrostatic discharge, an electric current arc, a glowing ember, a hot surface, welding slag, frictional heat, or a flame

If the deflagration is confined and produces a pressure sufficient to rupture the confining enclosure, the event is, by definition, an “explosion.”

Evaluation of the hazard of a combustible dust should be determined by the means of actual test data. Each situation should be evaluated and applicable tests selected. The following list represents the factors that are sometimes used in determining the deflagration hazard of a dust:

1. MEC
2. MIE
3. Particle size distribution
4. Moisture content as received and as tested
5. Maximum explosion pressure at optimum concentration
6. Maximum rate of pressure rise at optimum concentration
7. KSt (normalized rate of pressure rise) as defined in ASTM E 1226, *Standard Test Method for Explosibility of Dust Clouds*
8. Layer ignition temperature
(9) Dust cloud ignition temperature
(10) Limiting oxidant concentration (LOC) to prevent ignition
(11) Electrical volume resistivity
(12) Charge relaxation time
(13) Chargeability

It is important to keep in mind that as a particulate is processed, handled, or transported, the particle size generally decreases due to particle attrition. Consequently, it is often necessary to evaluate the explosibility of the particulate at multiple points along the process. Where process conditions dictate the use of oxidizing media other than air (nominally taken as 21 percent oxygen and 79 percent nitrogen), the applicable tests should be conducted in the appropriate process-specific medium. [654, 2013]

A.3.3.4 Combustible Metal. See NFPA 484, Standard for Combustible Metals, for further information on determining the characteristics of metals.

A.3.3.5 Combustible Metal Dust. Any time a combustible dust is processed or handled, a potential for explosion or fire exists. The degree of hazard varies depending on the type of combustible dust, conditions, amount of material present, and processing methods used.

A dust explosion requires the following four conditions:

1. The dust is combustible. One method of determining combustibility of dusts is testing in accordance with ASTM E 1226, Standard Test Method for Pressure and Rate of Pressure Rise for Combustible Dusts.
2. The dust particles form a cloud at or exceeding the minimum explosible concentration (MEC).
3. A source of ignition is present.
4. Oxygen is present in sufficient quantities to support combustion.

Evaluation of a combustible dust explosion hazard and the prevention techniques employed should be determined by means of actual test data. All combustible dusts that can produce a dust explosion should be tested to determine the following information:

1. Particle size distribution
2. Moisture content as received and dried
3. Minimum dust concentration required for ignition
4. Minimum energy required for ignition (joules)
5. Maximum rate of pressure rise at various concentrations
6. Ignition layer temperature
(7) Maximum explosion pressure at optimum concentration

The following information can be determined by optional testing:

(1) Dust cloud ignition temperature
(2) Maximum permissible oxygen content to prevent ignition
(3) Electrical resistivity measurement [484, 2012]

A.3.3.6 Combustible Particulate Solid. Combustible particulate solids include dusts, fibers, fines, chips, chunks, flakes, or mixtures of these. The term combustible particulate solid addresses the attrition of material as it moves within the process equipment. Particle abrasion breaks the material down and produces a mixture of large and small particulates, some of which could be small enough to be classified as dusts. Consequently, the presence of dusts should be anticipated in the process stream, regardless of the starting particle size of the material. [654, 2013]

A.3.3.9 Damage-Limiting Construction. This construction method usually makes maximum use of exterior walls as pressure-relieving walls rather than relying on the minimum recommended. Pressure-resistant walls are sometimes included to help prevent explosion propagation into adjacent areas. Further information on this subject can be found in NFPA 68, *Standard on Explosion Protection by Deflagrations Venting* [664, 2012]

A.3.3.10 Deflagration. The primary concern of this document is a deflagration that produces a propagating flame front or pressure increase that can cause personnel injuries or the rupture of process equipment or buildings. Usually these deflagrations are produced when the fuel is suspended in the oxidizing medium. [68, 2007]

A.3.3.18 Flash Fire. A flash fire requires an ignition source and a hydrocarbon or an atmosphere containing combustible, finely divided particles (e.g., coal dust or grain) having a concentration greater than the lower explosive limit of the chemical. Both hydrocarbon and dust flash fires generate temperatures from 1000°F to 1900°F (538°C to 1038°C). The intensity of a flash fire depends on the size of the gas, vapor, or dust cloud. When ignited, the flame front expands outward in the form of a fireball. The resulting effect of the fireball’s energy with respect to radiant heat significantly enlarges the hazard areas around the point of ignition. [921, 2011]

A.3.3.19 Hybrid Mixture. The presence of flammable gases and vapors, even at concentrations less than the lower flammable limit (LFL) of the flammable gases and vapors, adds to the violence of a dust–air combustion.

The resulting dust–vapor mixture is called a hybrid mixture and is discussed in NFPA 68, *Standard on Explosion Protection by Deflagration Venting*. In certain circumstances, hybrid mixtures can be deflagrable, even if the dust is below the MEC and the vapor is below the LFL. Furthermore, dusts determined to be nonignitible by weak ignition sources can sometimes be ignited when part of a hybrid mixture.

Examples of hybrid mixtures are a mixture of methane, coal dust, and air or a mixture of gasoline vapor and gasoline droplets in air. [68, 2007]

A.3.3.20 Minimum Explosible Concentration (MEC). Minimum exploisable concentration is

**A.3.3.22 Pneumatic Conveying System.** Pneumatic conveying systems include a wide range of equipment systems utilizing air or other gases to transport solid particles from one point to another. A typical system comprises the following:

1. A device used to meter the material into the conveying air stream
2. Piping, tubing, hose, etc., used to provide the closed pathway from the metering device to the AMS
3. An AMS designed for the separation of comparatively large amounts of material from the conveying air/gas stream
4. An additional metering device (typically a rotary airlock valve or similar device) that might be used to allow discharge of the separated material from the conveying air stream without affecting the differential pressure of the system
5. An AMD designed to produce the necessary pressure differential and air/gas flow in the system (positive or negative)

A pneumatic conveying system requires the amount of material conveyed by the system to be considered as a major factor in the system pressure drop calculations. Both positive and negative (i.e., vacuum) differential pressure are used for pneumatic conveying. The decision of which is the best for a specific application should be based upon a risk analysis, equipment layout, and other system operational and cost factors. Dense phase conveying can also be considered for the application, especially with more hazardous materials (e.g., low MIE). The inherent design and operational features of this approach can provide significant safety and operational advantages over other types of pneumatic conveying systems. [654, 2013]

**A.3.3.23 Process Hazard Analysis.** The term “PHA” (Process Hazard Analysis) is often associated with one portion of Process Safety Management as defined in OSHA requirements 29 CFR 1910.119. The Process Hazard Analysis should be carried out as set forth in the American Institute of Chemical Engineers Center for Chemical Process Safety, *Guidelines for Hazard Evaluation Procedures.*

The Process Hazard Analysis (PHA) is the critical first step in hazard management. The Process Hazards Analysis typically includes at least the following key items:

1. Be a detailed analysis of the fire and/or explosion hazards at each point along the process
2. Be documented
3. Identify hazards
4. Quantify hazards
5. Document how the hazard is managed
(6) Be revised as part of the management of change requirements

A.4.1 Ignition and sustained combustion occurs when a fuel and competent ignition course come together in an atmosphere (oxidant) that supports combustion. The fire triangle represents the three elements required for a fire. Not all dusts are combustible and combustible dusts exhibit a range in degree of hazard. All dusts can exhibit explosion hazards accompanied by propagation away from the source. In the absence of confinement, a flash fire hazard results. If confined, the deflagration can result in damaging overpressures. Deflagration is the process resulting in a flash fire or an explosion. The four elements for a flash fire are:

1. A combustible dust sufficiently small enough to burn rapidly and propagate flame;
2. a suspended cloud at a concentration greater than the minimum explosion concentration;
3. the atmosphere to support combustion;
4. an ignition source of adequate energy or temperature to ignite the dust cloud.

The heat flux from combustible metal flash fires are greater than organic materials. A dust explosion requires the following five conditions:

1. A combustible dust sufficiently small enough to burn rapidly and propagate flame;
2. a suspended cloud at a concentration greater than the minimum explosion concentration;
3. confinement of the dust cloud by an enclosure or partial enclosure;
4. the atmosphere to support combustion;
5. an ignition source of adequate energy or temperature to ignite the dust cloud.
Elements required for fires, flash fires and explosions.

A.4.2.1 General categories of combustible dusts are metal dust (aluminum, magnesium, titanium, zirconium, etc.), agricultural (grain dust), wood dust (cellulosic, paper, etc.), chemicals (polymers, plastics, resins, rubber), formulations and mixtures, biosolids, coal dust, organic dust (flour, sugar, soap, etc.) and dust from certain textiles. Assessing the combustibility and explosibility may be performed by testing or by utilizing literature values. While some materials are well-characterized, testing is still the preferred method. Tables with explosibility properties often lack specific information such as particle size therefore it is recommended that literature values that do not provide particle size information be used with extreme caution. NFPA 61, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities, NFPA 499, Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process, NFPA 68, Standard on Explosion Protection by Deflagration Venting, and NFPA 484, Standard for Combustible Metals, have lists of combustible and explosible metals and dusts that are used for guidance or informational use only and not be used for design purposes. Composition, particle size and distribution, and moisture content are the three factors that are known to strongly influence test results. It is recognized in some industries have historical data on the same material; therefore, the frequency, number and extent of testing where historical data exists should be made by informed judgment. The owner/operator assumes the risk of using data from tables and historical data. A person or team performing a Process Hazard Analysis should scrutinize and make informed judgments about historical and published data and its applicability to the process.

A.4.3 Some materials have multiple potential physical and health hazards such as combustibility, explosibility, reactivity, propensity to self-heat, and toxicity. This standard does not specifically address reactivity or toxicity hazards of solid particulate materials. Users should consult Safety Data Sheet (SDS) for specific information and guidance on safe handling, personal protective equipment, storage and transportation of chemicals.
A.4.4.1 Prepare table or list of applicable NAICS codes.

A.4.4.2 Any time a combustible dust or a combustible metal is processed or handled, a potential for deflagration resulting in a flash fire or dust explosion exists. The degree of deflagration hazard and flash fire hazard varies, depending on the type of combustible dust or combustible metal and the processing methods used. Most carbon based organic materials and many elemental metals are explosible if they are of a size that is readily suspended in air. Combustible metals exist in many physical forms ranging from billets and ingots to fines, dusts, powders, chips and swarf. Depending on the form, composition and moisture content, some combustible metals ignite readily and propagate combustion depending on the composition and moisture content. Metal fires require special fire protection.

A.4.4.6 Enforcers, manufacturers of the material, manufacturers of the protection equipment and test laboratories may not be qualified to interpret test results especially if part of a process or a mixture.

A.4.5.1 This preliminary screening test used to demonstrate fire risk is the basis for the regulations governing the transport of dangerous goods for United Nations (UN) regulations, DOT, International Air Transport Association (IATA), and the International Maritime Dangerous Goods (IMDG) Code. The preliminary screening test is conducted in the following fashion:

1. The substance in its commercial form is formed into an unbroken strip or powder train about 250 mm (9.84 in.) long by 20 mm (0.79 in.) wide by 10 mm (0.39 in.) high on a cool, impervious, low-heat-conducting base plate.

2. A hot flame [minimum temperature of 1000°C (1832°F) from a gas burner] [minimum diameter of 5 mm (0.20 in.)] is applied to one end of the powder train until the powder ignites or for a maximum of 5 minutes. It should be noted whether combustion propagates along 200 mm (7.87 in.) of the train within a 20-minute test period.

3. If the substance does not ignite and propagate combustion either by burning with flame or smoldering along 200 mm (7.87 in.) of the powder train within the 20-minute test period, the material should not be considered a combustible metal, metal powder, or dust.

4. If the substance propagates burning of the 200 mm (7.87 in.) length of the powder train in less than 20 minutes, the full burning rate test should be conducted.

Because the specific form of the combustible metal, metal powder, or dust and the properties of the form determine the flammability and degree of combustibility of the material, it is critical that the substance be tested precisely in the condition in which it is processed or handled. Changes in particle size distribution, moisture content, degree of fines, and chemical composition can radically change the results. No generic substitute is allowable for accurate determination of fire risk.

If propagation of the powder train occurs along a length of 200 mm (7.87 in.) in 20 minutes or less, the burning rate test is required. The burning rate test requires specific preparation of the powder sample. The sample is prepared in a specific fixture as shown in Figure 4.5.1.
Preparation of the sample for the burning rate test should be done according to the following description.

The powdered or granular substance, in its commercial form, must be loosely filled into a mold. The mold, which must be 250 mm (9.84 in.) long with a triangular cross section of inner height 10 mm (0.39 in.) and width 20 mm (0.79 in.), is used to form the train for the burning rate test. On both sides of the mold, in the longitudinal direction, two metal sheets are mounted as lateral limitations that extend 2 mm beyond the upper edge of the triangular cross section. An impervious, noncombustible, low-heat-conducting plate is used to support the sample train. The mold is then dropped three times from a height of 20 mm (0.79 in.) onto a solid surface. The lateral limitations are then removed, and the impervious noncombustible low-heat-conducting plate is placed on top of the mold, the apparatus inverted, and the mold removed. Pasty substances must be spread on a noncombustible surface in the form of a rope 250 mm (9.84 in.)
in length with a cross section of about 100 mm$^2$ (0.16 in.$^2$). In the case of a moisture-sensitive
substance, the test must be carried out as quickly as possible after its removal from the container.
Test conditions are as follows:

(1) The pile is arranged across the draft in a fume cupboard. The airspeed is sufficient to
prevent fumes from escaping into the laboratory and is not varied during the test. A draft
screen can be erected around the apparatus.

(2) Any suitable ignition source such as a small flame or hot wire of minimum
temperature 1000$^\circ$C (1832$^\circ$F) is used to ignite the pile at one end. When the pile has
burned a distance of 80 mm (3.15 in.), the rate of burning is measured over the 100 mm
(3.94 in.). The test is performed six times using a clean cool plate each time, unless a
positive result is observed earlier.

The metal powder or metal alloy is classified in Division 4.1, and as such is considered readily
combustible if it can be ignited and the reaction spreads over the whole length of the sample in
10 minutes or less.

Layers*, uses a constant temperature hot-plate to heat the dust on one side only. Routine tests use
a 12.7 mm (0.5 inch) thick layer, which might simulate a substantial build-up of dust on the
outside of hot equipment. However, since the ignition temperature normally decreases markedly
with increased dust layer thickness, the method allows layer thickness to be varied according to
the application.

used to determine the minimum ignition energy (MIE) for any given fuel concentration. The
method uses the lowest energy, stored by a capacitor, that when released as a spark will ignite
dust cloud-oxidant mixtures. By testing a range of concentrations, the Lowest Minimum Ignition
Energy (MIE) is determined for the optimum mixture. Observed MIE and MIE values are highly
sensitive to the test method, particularly the spark electrode geometry and characteristics of the
capacitor discharge circuit. Dust ignition energy standard ASTM E 2019 describes test methods
in current use that have been found to yield comparable results; however, it is a “performance
standard” whereby the methodology adopted must produce data within the expected range for a
series of reference dusts.

ASTM E 1491, *Standard Test Method for Minimum Autoignition Temperature of Dust Clouds*, is
used to determine the dust cloud autoignition temperature (AIT). The test involves blowing dust
into a heated furnace set at a predetermined temperature. The dust concentration is
systematically varied to find the lowest temperature at which self-ignition occurs at ambient
pressure, known as the Minimum Autoignition Temperature (MAIT). A visible flame exiting the
furnace provides evidence for ignition. Four different furnaces are described in ASTM E 1491
(0.27-L Godbert-Greenwald Furnace, 0.35-L BAM Oven, 1.2-L Bureau of Mines Furnace and
6.8-L Bureau of Mines Furnace). Each yields somewhat different MAIT data, the largest
deviations occurring at the greatest MAIT values. However, the lower AIT range is of more
practical importance and here the agreement is better (for example 265±25$^\circ$C for sulfur).

ASTM E 1226, *Standard Test Method for Explosibility of Dust Clouds*, is used to determine the
pressure and rate of pressure rise for suspended combustible dusts. The measurement of the explosibility parameters (Pmax and Kst) requires the reproducible generation of a near homogeneous dust cloud inside a containment vessel of known volume. The explosibility parameters Pmax (maximum pressure) and Kst (maximum rate of pressure rise of the worst case concentration times the cube root of the test volume) are obtained from such measurements. The determination of a Pmax and KST for a material first establishes that it is an explosible dust. A bench scale test method in ASTM E 1226 involves a vessel at least 20 liters in volume in which a dust cloud is formed using the discharge of a small cylinder of compressed air. After a prescribed time delay, the highly turbulent dust cloud is ignited using a strong ignition source of known energy. Pressure is monitored versus time by appropriate transducers and expressed as pressure, Pex, and pressure rate of rise, dP/dt. Dust concentration is varied to determine the maxima of both parameters. Particle size and moisture are other variables that must be considered. Particle size should be less than 75 microns ensuring a design that is conservative.

The primary use of the test data Pmax and Kst is for the design of explosion protection systems: venting, suppression, isolation. Vent designs provide a relief area that will limit damage to the process equipment to an acceptable level. The required vent area is calculated using equations from NFPA 68, Standard on Explosion Protection by Deflagration Venting, and requires knowledge of the process – volume, temperature, operating pressure, design strength, vent relief pressure- and of the fuel, Pmax and Kst. Suppression is the active extinguishment of the combustion and again limits the explosion pressure to an acceptable level. Suppression designs require similar process and hazard data in order to determine the hardware requirements such as size, number and location of containers, detection conditions, and the final or reduced explosion pressure. Isolation, the prevention of flame propagation through interconnections, requires the same process and hazard data to determine hardware needs and locations. The extent of testing should depend on what the scenario or evaluation such as explosion venting for a dust collector would require Kst and Pmax.

A.4.6.3 Where there are numerous or a range of products and processes, worse-case can be used with PHA to assess the hazards. Performance-based design allows the user to identify and sample select materials instead of the prescriptive approach were all materials are collected and tested. Where multiple process equipment are present and essentially contain the same material, a single representative sample may be acceptable. While the composition may be constant, attrition and separation based on particle size should be assessed. If and where attrition occurs, samples should be collected from such process equipment from the start to finish and representative of the material with reduced particle size. For example, a belt conveyor may have larger particles on the belt but fine particulate solids along the sides or under or at the bottom of the conveyor. The sampling plan should include samples of the accumulated fines as one sample and a sample from the center of the belt as a second separate sample. Material to be used for the screening tests, and for the determination of material hazard characteristics such as Kst, MIE, Tc, etc., should be collected from the areas or inside equipment presenting the worst case risk.

A.4.6.4.2 Some processes require further evaluation such as grinding. Grinding can result in a broad range of particle size. A representative sample should be tested. Combustible particulate solids include dusts, fibers, fines, chips, chunks, flakes, or mixtures of these. The term combustible particulate solid addresses the attrition of material as it moves within the process equipment. Particle abrasion breaks the material down and produces a mixture of large and small particulates, some of which could be small enough to be classified as dusts. Consequently, the
presence of dusts should be anticipated in the process stream, regardless of the starting particle size of the material.

A.4.6.5. Samples should be collected in a safe manner without introducing an ignition source, dispersing dust or creating or increasing the risk of injury to workers. Clean non-sparking tools should be used—metal shovels may create a spark if it strikes metal and typical plastic scoops may accumulate an electrostatic charge. Anti-static tools and information on anti-static scoops and scraps are available on-line. Anti-static tools/materials may be standard in some industries and not used at all in others. Samples should be collected into new, clean Teflon lined glass jars or HDPE pails and Ziploc bags. SDS and proper labels are required to ship hazardous materials. The samples should be packaged to prevent breaking during transportation. For example, glass jars should be triple protected in two layers of zip lock bags then bubble wrap.

A.4.6.5.1. The more information about a sample collected and tested is useful to manage, monitor stability or track changes in the process and materials where a hazard is present or absent. Changes in the process or materials that require further testing will have a baseline for explaining any difference in physical hazard. Any dust sample collected from on top of a press should be identified as different from a sample collected from inside a vessel or container if the sample is susceptible to chemical changes (i.e., oxidation, hygroscopic) over time.

A.4.6.5.2 There are varying degrees of combustibility based on numerous factors. Additional analyses include identifying the material specific factors that result in increased combustibility or explosibility. Certain material factors, listed below, are known to influence combustibility and the degree of explosibility:

(1) Composition
   a. Pure materials
   b. Mixtures (including diluents or grinding media)
   c. Treatment such as oxidation
   d. Ageing

(2) Form
   a. Particle size
   b. Morphology (angular, acicular, spherical, fiber, irregular, agglomerate)
   c. Distribution

(3) Friability of solids and particle attrition through the process

(4) Particle agglomeration influences including morphology and moisture content

A.4.7 Dusts traditionally have been defined as a material 420 microns or smaller (capable of passing through a U.S. No. 40 standard sieve). Combustible particulates with an effective diameter of less than 420 microns should be deemed to fulfill the criterion of the definition. However, flat platelet-shaped particles, flakes, or particles of fibers with lengths that are large compared to their diameter usually do not pass through a 420 micron sieve yet still pose a
deflagration hazard. Furthermore, many particulates accumulate electrostatic charge in handling, causing them to attract each other, forming agglomerates. Often agglomerates behave as if they were larger particles, yet when they are dispersed they present a significant hazard. Consequently, it can be inferred that any particle that has a surface area to volume ratio greater than that of a 420 micron diameter sphere should also be deemed a combustible dust. The heat of combustion may be used to determine if a material is inert or can pose a hazard.

**A.4.7.1** The following list represents the factors used in determining the deflagration hazard of a dust:

1. Minimum explosible concentration (MEC)
2. Minimum ignition energy (MIE)
3. Particle size distribution
4. Moisture content as received and as tested
5. Maximum explosion pressure at optimum concentration
6. Maximum rate of pressure rise at optimum concentration
7. KSt (normalized rate of pressure rise) as defined in ASTM E 1226, *Test Method for Pressure and Rate of Pressure Rise for Combustible Dusts*
8. Layer ignition temperature (hot plate and heated oven)
9. Dust cloud ignition temperature
10. Limiting oxidant concentration (LOC) to prevent ignition
11. Electrical volume resistivity
12. Charge relaxation time
13. Chargeability
14. Dispersibility (‘dustiness’)

**A.4.8.** Specific fire hazards include self-heating, heat of reaction (i.e., heat of hydration), pyrophoricity, water reactivity, and thermite reactions.

**A.4.9.3** Other stakeholders could also have mission continuity goals that will necessitate more stringent objectives as well as more specific and demanding performance criteria. The protection of property beyond maintaining structural integrity long enough to escape is actually a mission continuity objective. The mission continuity objective encompasses the survival of both real property, such as the building, and the production equipment and inventory beyond the extinguishment of the fire. Traditionally, property protection objectives have addressed the impact of the fire on structural elements of a building as well as the equipment and contents inside a building. Mission continuity is concerned with the ability of a structure to perform its intended functions and with how that affects the structure’s tenants. It often addresses post-fire smoke contamination, cleanup, replacement of damaged equipment or raw materials, and so
forth.

A.4.9.4.1 Adjacent compartments are those sharing a common enclosure surface (wall, ceiling, floor) with the compartment of fire or explosion origin. The intent is to prevent the collapse of the structure during the fire or explosion.

A.4.9.5 Usually a facility or process system is designed using the prescriptive criteria until a prescribed solution is found to be infeasible or impracticable. Then the designer can use the performance-based option to develop a design, addressing the full range of fire and explosion scenarios and the impact on other prescribed design features. Consequently, facilities are usually designed not by using performance-based design methods for all facets of the facility but rather by using a mixture of both design approaches as needed.


A.5.1.4 Relevant aspects that could require a re-evaluation include, but are not limited to, changes to the following:

1. Information about the hazardous characteristics of the materials
2. Information about the performance capabilities of protective systems
3. Heretofore unrecognized hazards

Intentional changes to process materials, technology, equipment, procedures, and facilities are controlled by Section 8.8.

A.5.4 The process hazard analysis conducted according to the requirement in Chapter 6 might be useful in identifying the scenarios for Section 5.4. The fire and explosion scenarios defined in Section 5.4 assume the presence of an ignition source, even those scenarios limited by administrative controls (such as a hot work permit program). It is the responsibility of the design professional to document any scenario that has been excluded on the basis of the absence of an ignition source.

A.5.4.1.1 A compartment is intended to include the area within fire-rated construction.

A.5.4.2.5 For instance some combustible metals can generate hydrogen when in contact with water. See NFPA 484, *Standard for Combustible Metals*, for additional information.

A.5.5.1 The SFPE *Engineering Guide to Performance-Based Fire Protection Analysis and Design of Buildings* outlines a process for evaluating whether trial designs meet the performance criteria.

A.6.1 This chapter provides the minimum requirements for performing a hazard assessment for identifying and analyzing the hazards presented by the presence of combustible particulate solids, for the purpose of identifying relevant management strategies necessary to provide a reasonable degree of protection to life and property.
A.6.2.1 NFPA standards rely on the determination of “where an explosion hazard or deflagration hazard exists”. There are other physical and health hazards to consider such as toxicity, reactivity with water, etc that can be considered when conducting a Process Hazard Analysis. The Process Hazards Analysis should consider the four conditions that are required for a deflagration:

1. A combustible particulate solid of sufficiently small particle size to deflagrate
2. A combustible particulate solid suspended in air to deflagrate (or other oxidizing medium)
3. A combustion particulate solid suspension of sufficiently high concentration to deflagrate
4. A competent igniter applied to the suspension of combustible particulate solids where the concentration is sufficient for flame propagation.

A deflagration leading to an explosion will occur whenever all four criteria occur within a compartment or container at the same time. Since gravity is a concentrating effect and we always assume an ignition source is present unless we can prove one cannot exist, even under conditions of equipment failure, this list reduces to:

1. A combustible particulate solid of sufficiently small particle size to deflagrate
2. A means for suspending the combustible particulate solid in air (or other oxidizing medium)
3. A sufficient concentration can be achieved

Most dust explosions occur as a series of deflagrations leading to a series of explosions in stages. While a single explosion is possible it is the exception rather than the rule. Most injuries are the result of the “secondary” deflagrations rather than the initial event. Most “explosion” events are a series of deflagrations each causing a portion of the process or facility to explode. Primary deflagrations lead to secondary deflagrations, usually fueled by accumulated fugitive dust that has been suspended by:

1. Acoustic impulse waves of the initial, primary, deflagration and
2. Entrainment by deflagration pressure front

The majority of the property damage and personnel injury is due to the fugitive dust accumulations within the building or process compartment. Control, limitation of elimination of accumulated fugitive dust is CRITICAL and the single most important criterion for a safe workplace.

A.6.2.2 The qualified person who is leading or performing the Process Hazard Analysis should be familiar with conducting a Process Hazard Analysis. The qualified person should also be familiar with the hazards of combustible dusts. Typically, a team performs a Process Hazard Analysis. For some processes this team may be a little as two persons, or for larger and more complex processes, the team may require a much more than two persons. This team is made of a variety of persons whose background and expertise may include the following:
(1) Familiarity with the Process
(2) Operations and Maintenance
(3) Process Equipment
(4) Safety Systems
(5) History of operation
(6) The Properties of the Material
(7) Emergency Procedures

The individuals involved in the Process Hazard Analysis could include facility operators, engineers, owners, equipment manufacturers, or consultants.

A.6.2.3 The requirement to review the Process Hazard Analysis should apply even if no changes have been made to the overall process. The Process Hazard Analysis should be maintained for the life of the process.

A.6.3.1(4) The hazard management document for all of the portions of the process or facility compartment determined to be a hazard should include, but not be limited to:

1. Test reports
2. Drawings
3. Sizing calculations

Methods to prevent or mitigate the consequences of the hazards can be accomplished by using the methods permitted in this standard or other industry or commodity-specific NFPA standards. This information outlines the minimum steps of a Process Hazards Analysis.

A.6.3.2.1 The Process Hazards Analysis should be based upon dust test data. Determining what dust to test, what tests are needed, or when it would be acceptable to use values obtained from published sources or databases is not always straightforward. For well-known commodities, published data is usually OK. Generally such data can be considered to be conservative provided that it is obtained from a reliable source such as data found in NFPA documents. A perusal of published data illuminates that there is often a significant spread in values. It is useful, therefore, to compare particle distribution and moisture content for published data with the actual material being handled in the system whenever possible. Doing so would help to ensure that the data is pertinent to the hazard under assessment. When that is not possible the use of the worst case values should be selected. Test data derived from testing the actual material is always the best option. What dust to test? Where to obtain the sample? How to package it for shipment to the lab? All of these questions can affect the data obtained and of course, the accuracy of the Process Hazards Analysis. Should the dust be tested “as-received,” or should it be prepared in accordance with the test protocol? The test protocol for ASTM 1226, *Standard Test Method for Explosibility of Dust Clouds*, for example (the test to obtain $K_{st}$ and $P_{max}$ values), calls for drying the sample such that moisture content is less than 5% by weight, and particle size is 95% sub-200 mesh screen by weight. The thought behind this approach is to obtain test data that is near worst
case and by so doing to ensure conservatism in the design of protection equipment. On the other hand, testing material “as-received” can result in a more realistic appreciation of the true nature of the hazard under assessment. Making the decision about whether to test “as-received” or in accordance with protocol is of considerable importance and should be done in consultation with experts. In general, if the material undergoing tests is friable, testing in accordance with protocol would be indicated. If the material represents the smallest particle distribution to be found in the process, such as from a final dust collector associated with finished product packaging, then testing “as-received” in terms of particle size would be adequate. In most cases drying would generally be desirable unless moisture is carefully controlled in the process, or in cases where the material were such that when over-dried the properties of it undergo change. If material is not available such as for a new system not yet built, then all testing should be done in accordance with protocol. Another situation is for dust samples comprised of many different raw materials. Should the materials be tested individually or should the mix all of parts be tested? The answer to this question depends on the nature of how the materials are handled. In general, the larger the quantity of material handled, the greater the consequence in the event of a deflagration. Not everything needs to be tested in all cases, rather select materials for testing that are handled in sufficient quantity to pose a risk for an unacceptable loss. Samples for testing should be taken directly from process equipment whenever possible. For example, final filter would be a good place to obtain a sample. Raw materials that have not been processed are less representative of materials that have been processed, but using them is unavoidable in some situations. Raw materials should be tested in accordance with the appropriate test protocol in most cases. Some materials are susceptible to degradation between the collection point and the lab. Temperature, humidity, chemical breakdown, mechanical degradation due to vibration, etc. can alter some materials and compromise the reliability of the test-data. A thorough knowledge of the properties of the materials should be taken into consideration before selection of appropriate containers and packaging for shipment. In general, the faster the transit of a sample to the lab the better, but keep in mind that not all materials can be shipped by air. Whenever materials are shipped, documentation such as an MSDS or a complete material description should be transmitted with the sample so the lab knows how to safely handle them.

The Process Hazards Analysis should be based upon, but not limited to the following:

1. Particle Size Distribution
2. Minimum Explosible Concentration (MEC)
3. Minimum Ignition Energy (MIE)
4. Minimum Ignition Temperature (MIT)
5. Maximum Deflagration Pressure, $P_{\text{max}}$
6. Maximum Volume-Normalized Rate of Pressure Increase ($K_{S\ell}$)

These are to be considered the minimum tests required. Other additional tests may be necessary. The test data should be obtained in conformance with ASTM standard test methods or the international equivalent. For example, see ASTM E1515, *Standard test Method for Minimum Explosible Concentration of Combustible Dusts*, E1226, E2019, *Standard Test Method for Minimum Ignition Energy of a Dust Cloud*, etc. For some well-known commodities, published
data might be acceptable to use when performing the Process Hazard Analysis. Generally, such
data can be considered conservative, if it is obtained from a reliable source such as can be found
in NFPA documents. A perusal of published data illuminates that there is often a significant
spread in values. Caution should always be used when using published data.

The following material properties should be addressed by Process Hazards Analysis for the
combustible particulate solids present:

(1) Particle Size. Sieve analysis is a crude and unreliable system of hazard determination.
Its greatest contribution in managing the hazard, is the ease, economy and speed at
which it can be used to discover changes in the process particulate. In any sample of
particulate very rarely are all the particles the same size. Sieve analysis can be used to
determine the fraction that would be generally suspected of being capable of supporting a
deflagration. For a sub-500 micron fraction:

(a) Data presented in terms of the percent passing progressively smaller sieves.

(b) Particles that have high aspect ratios produce distorted, non-conservative results.

(2) Particle Size Distribution. The particle size distribution of a CPS must be known if the
explosion hazard is to be assessed. Particle size implies a specific surface area (SSA) and
affects the numerical measure of other parameters such as MEC, MIE, dP/dtmax, Pmax and
KSt. Particles greater than 500 microns in effective mean particle diameter are generally
not considered deflagrable. Most CPSS include a range of particle sizes in any given
sample. Process Hazards Analysis should anticipate and account for particle attrition and
separation as particulate is handled.

(3) Particle Shape. Due to particle shape and agglomeration, some particulates cannot be
effectively sieved. Particulates with non-spheric or non-cubic shape do not pass through
a sieve as easily as spheric or cubic particles. For this purpose, fibers can behave just as
explosively as spherical particulate. This leads to under-estimation of small particle
population and leads to underassesssment of the hazard. Particulates with aspect ratio
greater than 3:1 should be suspect. When particulates are poured into vessels it is
common for the fine particles to separate from the large creating a deflagration hazard in
the ullage space.

(4) Particle Aging. Some combustible particulate solid materials could undergo changes
in their safety characteristics due to aging. Changes in morphology and chemical
composition for example can occur from the time a sample is collected to the time that it
takes to get that sample into the lab for test. For materials that are known to age care
must be taken in packaging and shipment. The use of vacuum seals, or an inert gas such
as nitrogen may be required to ensure that the tested sample has not changed appreciably
due to aging. The lab should be notified in advance of shipment that the material is
sensitive to change due to age so that they will know how to handle it and store it until it
is tested.

(5) Particle Attrition. The material submitted for testing shall be selected to address the
effects of material attrition as it is moved through the process. Particulates move through
a process they usually break down into smaller particles. Reduction in particle size leads
to an increase in total surface area to mass ratio of the particulate and increases the hazard associated with the unoxidized particulate.

(6) Particle Suspension. Particle suspension maximizes the fuel/air interface. It occurs wherever particulate moves relative to the air or air moves relative to the particulate, such as in pneumatic conveying, pouring, fluidizing, mixing and blending, or particle size reduction.

(7) Particle Agglomeration. Some particulates tend to agglomerate into clumps. Agglomerating particulates can be more hazardous than the test data implies if the particulate was not thoroughly de-agglomerated when testing was conducted. Agglomeration is usually affected by ambient humidity.

(8) Triboelectric Attraction. Particles with a chemistry that allows electro-static charge accumulation will become charged during handling. Charged particles attract oppositely charged particles. Agglomeration causes particulate to exhibit lower explosion metrics during testing. Humidification decreases the triboelectric effect.

(9) Hydrogen Bonding. Hydrophilic particulates attract water molecules that are adsorbed onto the particle surface. Adsorbed water provides hydrogen bonding to adjacent particles, causing them to agglomerate. Agglomeration causes particulate to exhibit lower explosion metrics during testing. Desiccation reduces this agglomerated effect.

(10) Entrainment Fraction. The calculation for a dust dispersion from an accumulated layer must be corrected for the ease of entrainment of the dust. Fuel chemistry and agglomeration/adhesion forces must be considered. The dispersion is generally a function of humidity, temperature and time. Particle shape and morphology and effective particle size must be considered.

(11) Combustible Concentration. When particles are suspended a concentration gradient will develop where concentration varies continuously from high concentration to low concentration. There is a minimum concentration that must exist before a flame front will propagate. This concentration depends on particle size and chemical composition. This concentration is measured in grams/cubic meter (ounces/cubic foot). This concentration is called the Minimum Explosible Concentration (MEC). A dust dispersion can come from a layer of accumulated fugitive dust. The concentration attained depends upon bulk density of dust layer (measured in grams/m³); layer thickness; and the extent of the dust cloud. Combustible Concentration is calculated as: Concentration = (Bulk Density)*((Layer Thickness)/(Dust Cloud Thickness)).

(12) Competent Igniter. Ignition occurs when sufficient energy per unit of time and volume is applied to a deflagrable particulate suspension. Energy per unit of mass is measured as “temperature”. When the temperature of the suspension is increased to the “auto-ignition” temperature combustion begins. Ignitability is usually characterized by measuring the Minimum Ignition Energy (MIE). The ignition source must provide sufficient energy per unit of time (power) to raise the temperature of the particulate to its auto-ignition temperature (AIT).

(13) Dustiness/Dispersibility
A.6.3.3.1 This includes the process systems and ancillary equipment such as dust collection systems. Where multiple compartments present essentially the same hazard a single evaluation might be appropriate.

A.6.3.3.2 Each and every process component should be evaluated, including ducts, conveyors, silos, bunkers, vessels, fans, and other pieces of process equipment. Each point along the process should be described, and hazards at each point should be identified. Remedial measures for each hazard should be identified and documented. The means by which the hazard should be managed is then determined. Usually the relevant industry or commodity-specific NFPA standard will provide options. The process and process equipment will often determine which option is most appropriate. Refer to Annex B for an example of a Process Hazard Analysis.

A.6.3.4.1 Where multiple compartments present essentially the same hazard a single evaluation might be appropriate.

A.6.3.4.2 Each and every facility compartment containing combustible particulate solids should be evaluated. The complete contents of the compartment should be considered, including hidden areas. Each area in the compartment should be described, and hazards at each point should be identified. Remedial measures for each hazard should be identified and documented. The means by which the hazard should be managed is then determined. Usually the relevant industry or commodity-specific NFPA standard will provide options. See Annex C.

A.7.2.1 It is preferable for buildings that handle combustible dust either to be of Type I or II construction, as defined by NFPA 220, Standard on Types of Construction.

A.7.2.2.1 Every effort should be taken to ensure that the presence of a combustible dust atmosphere in the room does not exist.

A.7.2.3.2 Damage-limiting construction should be considered for those sections of enclosed egress paths, based on withstanding building/room overpressure determined according to NFPA 68, Standard on Explosion Protection by Deflagration Venting. The methodology of NFPA 68 uses an evaluation of the quantity of dust accumulation to determine the necessary building/room vent area and resulting overpressure.

A.7.2.4.1 Horizontal surfaces should be minimized to prevent accumulation of dust. Horizontal surfaces that can benefit from a sloped cover include girders, beams, ledges, and equipment tops. Overhead steel I-beams and similar structural shapes can be boxed with concrete or other noncombustible material to eliminate surfaces for dust accumulation. Surfaces should be as smooth as possible to minimize dust accumulations and to facilitate cleaning. One option based on clean design concepts is to construct the building walls so that the structural supports, electrical conduit, etc., are on the exterior side of the building walls therefore the interior building compartment walls are smooth and less likely to collect fugitive dust.

A.7.2.3.2 Complete sealing is difficult to achieve. Spaces above suspended ceilings are one example of a space that is inaccessible to routine housekeeping. Without complete sealing, dust accumulation can still occur and periodic inspection of such spaces is necessary to ensure accumulations do not result in a deflagration hazard area.

A.7.2.4.3.1 A building could be considered as a single combustible dust hazard area, or as a collection of smaller, separated combustible dust hazard areas. When the owner/operator chooses
to consider the building as a single area, then the hazard analysis should consider the entire building floor area and the considerations for mitigation apply to the entire building. Where the combustible dust hazard areas are sufficiently distant to assert separation and the owner/operator chooses to consider each hazard area separately, the hazard analysis should consider each separated area and the considerations for mitigation applied to each area independently. Due consideration should be given to overhead dust accumulations, such as on beams or ductwork, which would negate the use of separation to limit combustible dust hazard areas. If the separation option is chosen, a building floor plan, showing the boundaries considered, should be maintained to support housekeeping plans.

A.7.2.4.3.3 Separation distance is the distance between the outer perimeter of a primary dust accumulation area and the outer perimeter of a second dust accumulation area. Separation distance evaluations should include the area and volume of the primary dust accumulation area as well as the building or room configuration.

A.7.2.4.3.6 The assertion of separation must recognize the dust accumulation on all surfaces in the intervening distance, including floors, beam flanges, piping, ductwork, equipment, suspended ceilings, light fixtures and walls. Process equipment or ductwork containing dust can also provide a connecting conduit for propagation between accumulation areas. In order to prevent flame propagation across the separation distance, the dust accumulation can be very low. The National Grain and Feed Association study [A] has shown that a layer as thin as 1/100 inch is sufficient to propagate flame in a limited expansion connection, such as an exhaust duct or a hallway. In the subject study the flame propagated for at least 80 feet in an 8 ft tall by 8 ft wide gallery.


A.7.2.4.4.2 Detachment distance is the radial distance between nearest points of two unconnected adjacent buildings.

A.7.3.1 A means to determine protection requirements should be based on a risk evaluation, with consideration given to the size of the equipment, consequences of fire or explosion, combustible properties and ignition sensitivity of the material, combustible concentration, and recognized potential ignition sources. See AIChE Center for Chemical Process Safety, Guidelines for Hazard Evaluation Procedures.

A.7.3.2 Annex on general principles to contain dust - Reserved

A.7.3.2 All three (3) of these types of systems commonly utilize air (or inert gases) for the conveying of the combustible dusts from one location to another. However, each of the systems has unique design, function, and operational characteristics that are significantly different from each other. Each of these types of systems, due to these factors, represents a different level of risk that must be considered when used.

Compared to typical dust collection systems and centralized vacuum cleaning systems handling combustible dusts, typical dilute and dense phase pneumatic conveying systems represent a significantly lower deflagration risk. However, that does not mean there is not a deflagration
risk present. Risk analysis should be used to determine the level of risk involved and the correct means to minimize that risk.

A.7.3.2.1.1 The system information and documentation should include the following:

(a) System design specifications.
(b) System installation specifications.
(c) Equipment specifications.
(d) Operational description.
(e) System deflagration protection and specifications, including explosibility information.
(f) System mechanical and electrical drawings.
(g) System controls and specifications.

The design of these systems should be coordinated with the architectural and structural designs of the areas involved.

A.7.3.2.1.2 Pneumatic conveying and dust collection systems are designed for specific conveying requirements. Changing any of those requirements can significantly change the ability of the system to provide the original design performance. An analysis of any proposed changes should be done to assure the system will still be able to perform as required to meet safety and operational requirements.

A.7.3.2.1.3 The design minimum velocity for each of these systems differs significantly. Refer to the specific sections to follow on the type of system for that information. For guidance on designing a proper dust collection system, refer to ACGIH, *Industrial Ventilation: A Manual for Recommended Practice*. For guidance on the acquisition, operation, and maintenance of dust collection systems, refer to ACGIH, *Industrial Ventilation: A Manual of Recommended Practice for Operations and Maintenance*.

A.7.3.2.1.4 The requirements in A.7.3.2.1.4 are applicable to dilute phase pneumatic conveying systems. Dense phase systems require a separate analysis.

A.7.3.2.1.4.2 Some chemical and plastic dusts release residual flammable vapors such as residual solvents, monomers, or resin additives. These vapors can be released from the material during handling or storage. Design of the system should be based on a minimum airflow sufficient to keep the concentration of the particular flammable vapor in the airstream below 25 percent of the LFL of the vapor.

A.7.3.2.2. There is a wide variety in the types of pneumatic conveying systems used for the transfer of combustible particulates from one or more locations to a single or multiple locations. These types include, but are not limited to, dilute, dense, and semi-dense phase with varying levels of vacuum (negative pressure) or positive pressure used in each case.

The current historical data and operational characteristics of these systems combine to offer the user an alternative that may provide a safer alternative to other, more risk inherent, methods of conveying the combustible particulate solid. Properties of the particulate solid, beyond just the
explosibility parameters, should be considered in design and feasibility of the use of pneumatic conveying for a particular application and material.

A.7.3.2.2.1 Properties can include the following:

(1) Bulk Density
(2) Data on the range of particulate size
(3) Concentration in conveying air/gas stream
(4) The potential for reaction between the transported particulate and the extinguishing media used to protect the process equipment systems.
(5) Conductivity of the particulate
(6) Other physical and chemical properties that affect the fire protection of the process and equipment systems.

A.7.3.2.2 Rotary valves and diverter valves are not addressed within the ASME Boiler and Pressure Vessel Code or ASME B.31.3, Process Piping, so they would not be required to comply with those codes.

A.7.3.2.3 The minimum velocity to convey materials pneumatically varies considerably due to the material characteristics, conveying rates, conveying distances, type of system used, and other factors. If the velocity falls below the minimum requirement plugging and other upset conditions will likely occur leading to an unsafe operating condition. Typically, the minimum conveying velocities are established by testing or existing data from the pneumatic conveying system designer and/or vendor.

Dense phase and semi-dense phase systems will operate at material velocities well below that of dilute phase conveying systems. However, each of these systems still requires minimum operational conditions to assure successful transfer of the material without accumulations in the piping or tubing.

The system should include sufficient monitoring devices to allow constant monitoring of the system performance and to provide alarms and/or automatic shutdown should an unsafe condition occur.

A.7.3.2.3.1 It is preferable to locate the filter receivers outside, however, this is often not feasible. Therefore, since deflagration hazards do exist, it is typically necessary to provide the proper protection for deflagration in the filter receiver (AMS) and propagation through the system.

A.7.3.2.3.2 Dust collection systems for combustible dusts represent a significant increase in deflagration risk compared to most pneumatic conveying systems. This is due to the inherent design and operational characteristics of dust collection systems. A properly designed system is critical to minimizing that risk. For guidance on determining proper dust collection system design refer to ACGIH, Industrial Ventilation: A Manual of Recommended Practice.

A.7.3.2.3.1 Proper dust collection design requires that a minimum air volume flow be maintained.
for each dust collection source point (hood). This value must be determined as part of the design process. This value should be documented to allow for field-testing to determine if the system is providing that flow and operating properly.

This design also requires that the hood be constructed to assure that a continuous airflow is provided at all times.

The ACGIH, *Industrial Ventilation: A Manual of Recommended Practice* has extensive information on the design basis for dust collection hoods and the necessary minimum air volumes and velocities to assure the containment, capture (i.e. collection), and control of the aerated dusts being generated.

A.7.3.2.3.2 Proper dust collection design requires that a minimum air volume flow be maintained for each dust collection source point (e.g. hood). This value must be determined as part of the design process. This value should be documented to allow for field-testing to determine if the system is providing that flow and operating properly.

A.7.3.2.3.3 Proper system design requires that airflows in the various branch lines be balanced to assure minimum air volume flow at each dust source collection point. When a branch line is disconnected, blanked off, or otherwise modified it changes the airflows in all the other branches of the system. This can lead to an imbalance of air flows that result in flows below the minimum required to keep the dust from accumulating in the ducts.

Use of manual slide or “blast” gates is not recommended. Use of such gates can lead to uncontrolled modification of the flow volumes both for a single line and the system as a whole. The results often lead to improper balance of the system airflows and material accumulations in the ducts. Proper design methods inherently assure minimum airflows and duct velocities without the use of manual slide or “blast” gates.

A.7.3.2.3.5 Installation of branch lines for additional dust sources to an existing dust collection system will result in lower air volumes and duct velocities for the existing portions of the system. Without providing for additional system performance this may result in a system performing below the minimum required for keeping the ducts free from material accumulations.

A.7.3.2.3.7 Per the ACGIH, *Industrial Ventilation: A Manual of Recommended Practice for Design* the duct air velocity can range from a minimum of 3,500 fpm (17.8 m/s) to significantly higher levels. However, that document is for all dusts including non-combustible dusts. 4,000 fpm (20.3 m/s) is recommended as a minimum value for the conveying of combustible dusts. Also, there are some combustible dusts which have material characteristics (e.g. tackiness, cohesive, adhesive, particle shape and size, particle density) that may require significantly higher duct velocities to minimize the possibility of accumulations in the ducts.

As with all pneumatic conveying systems, a very light coating of dust may occur on the interior duct surfaces even with proper conveying velocities. The risk is the accumulation of concentrations of the combustible dust that can provide sufficient fuel to propagate a deflagration. Maintaining proper conveying velocities at all times minimizes this possibility.

A.7.3.2.3.8 Proper design per the ACGIH, *Industrial Ventilation: A Manual of Recommended Practice for Operations and Maintenance* assures the system will initially perform as required. However, without proper maintenance the system will fail to provide even minimum
performance levels. By initiating a preventive maintenance program and using continuous system performance monitoring equipment (e.g. differential pressure gauges, amperage meters for fan drive motor (directly related to mass flow through the system), etc.) the system can provide for the needed performance on a long-term basis.

A.7.3.2.3.8 Combustible dusts vary considerably in their characteristics and the type of equipment necessary to separate them from the conveying air or gas stream. While the typical bag or cartridge dust collector (AMS) can be used with most combustible dusts, an exception would be most metal dusts, which may require a scrubber or wet collector. Refer to NFPA 484, Standard on Combustible Metals, for metal dust collection.

A.7.3.2.10 The majority of dust collection systems use centrifugal fans for inducing the air flow through the system. Various models are available that will provide the performance characteristics required. Care must be taken to consider the worst-case situation, when the filters are nearly blinded or the scrubber is at maximum differential, as well as the situation where the system is new during start-up.

A.7.3.2.4 Centralized Vacuum Cleaning Systems represent a significant deflagration risk due to the fact it is designed to both collect and convey combustible dusts, and that tramp metals and other foreign materials, which could create an ignition source, can enter the system through the vacuum cleaning process. However, through proper design and protection of the system against deflagration this system can provide for the removal of combustible dusts from plant areas where dust accumulations represent a risk to personnel and property. In addition, the dust removed through the vacuum cleaning process will now be located in an area where it can be properly handled with minimal risk.

A.7.3.2.4.1 It is recommended that no more than two (2) simultaneous operators (hose vacuuming stations) be allowed on any one line to the AMS (a.k.a. filter receiver). This is to assure that adequate conveying velocity can be maintained with just a single operator on the same line. Multiple lines to the AMS can be used to allow for more than two (2) simultaneous operators on the whole system (with no more than two(2) simultaneous operators allowed on each line).

The minimum conveying velocity will vary with the combustible dusts being conveyed. Typically, the minimum conveying velocities should be the same as the minimum required for pneumatic conveying of the same material.

A.7.3.2.4.2 It is recommended that 1.5” (38.1 mm) and/or 2.0” (50.8 mm) I.D. hoses be used for housekeeping purposes. It is also recommended that 25 ft (7.6 m) maximum hose length be used. In most systems the pressure losses (i.e. energy losses) through the hose represents more than 50% of the overall system differential pressure requirements. Shorter hose lengths can be used to improve system performance.

1.5” (38.1 mm) I.D. hoses are most commonly used for cleaning around equipment and for lighter duty requirements. 2” (50.8 mm) I.D. hoses are used for larger dust accumulations and for cleaning large open areas.

A.7.3.2.4.3 Ignition sensitive guidance to be provided.

A.7.3.2.4.4 The creation of static electrical charges is a risk factor that can be minimized through
the use of conductive vacuum cleaning tools and static dissipative and grounded hoses. This is a higher risk factor when low MIE combustible dusts are being vacuumed. Metal dusts represent a significantly increased risk when vacuum cleaning and require additional considerations as stated in the NFPA 484, *Standard for Combustible Metals*.

A.7.4.2 Model Programs Annex Reserved

A.7.4.2.1.1 Items that should be included in the housekeeping procedure include:

1. A risk analysis that considers the specific characteristics of the dust being cleaned (particle size, moisture content, MEC, MIE) and other safety risks introduced by the cleaning methods used.
2. Personal safety procedures, including fall protection when working at heights.
3. Personal protective equipment (PPE), including flame-resistant garments in accordance with the hazard analysis required by NFPA 2113, *Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire*.
4. Cleaning sequence.
5. Cleaning methods to be used.
6. Equipment, including lifts, vacuum systems, attachments, etc.
7. Cleaning frequency.

A.7.4.2.1.3 Cleaning procedures can be industry specific.

A.7.4.2.2.1 If a large quantity of material is spilled in an unclassified area, the bulk material should be collected by sweeping, shoveling, or with a portable vacuum cleaner listed as suitable for Class II locations. Vacuum cleaners meeting the requirements in 7.4.3.1 can be used to clean up residual material after the bulk of the spill has been collected.

A.7.4.2.2.2 Portable vacuum units are susceptible to additions risks that are not present in centralized vacuum cleaning systems. When electric drive motors are used the fan and motor are often directly exposed to the combustible dust and represent an ignition source. Using vacuum blowers and drives designed to minimize that risk is critical. In addition it is not possible to provide deflagration protection with these devices. Thus, it is necessary to minimize the risks involved through design and construction of the device.

It is also possible to use compressed air as a vacuum source (venturi) which inherently has no moving parts or direct ignition source. Wet separators are also available for high risk materials and applications.

A.7.4.2.2.2(6) Liquids or wet material can weaken paper filter elements causing them to fail, which can allow combustible dust to reach the fan and motor.

A.7.4.2.2.3 The Committee is not aware of vendors providing equipment listed for Class III electrically classified (hazardous) locations. A common practice is to use equipment listed for Class II in areas classified as Class III.
A.7.4.2.3 With manual cleaning, such as using a scoop and brush, one would want to avoid generating a dust cloud.

A.7.4.2.4 Use of high pressure water can generate dust clouds and care should be taken when using this methods. Use of water wash-down for some metal dusts can result in hydrogen generation. Refer to NFPA 484, *Standard for Combustible Metals*, for restrictions on the use of water wash-down.

A.7.4.2.6.2 All of the listed precautions might not be required for limited use of compressed air for cleaning minor accumulations of dust from machines or other surfaces between shifts. A risk assessment should be conducted to determine which precautions are required for the specific conditions under which compressed air is being used.

A.7.4.6.1 Surfaces that dust can accumulate can include walls, floors, and horizontal surfaces, such as equipment, ducts, pipes, hoods, ledges, beams, and above suspended ceilings and other concealed surfaces such as the interior of electrical enclosures.

Factory Mutual recommends that surfaces should be cleaned frequently enough to prevent hazardous accumulations (FM Data Sheet 7-76, “Operations and Maintenance,” 2.3.5). Housekeeping for fugitive dusts is most important where the operational intent is that the dust accumulations are not normally present in the occupancy and the building has no deflagration protection features, such as damage limiting/explosion venting construction or classified electrical equipment, and additional personal protection from dust deflagration hazards is also not provided. Factors that should be considered in establishing the housekeeping frequency include:

- Variability of fugitive dust emissions.
- Impact of process changes and non-routine activities.
- Variability of accumulations on different surfaces within the room (walls, floors, overheads).

A.7.4.6.3 One example of a transient release of dust may be a temporary loss of containment due to a failure of a seal in process equipment or conveying systems. Table A.7.4.2.2 provides an example of an unscheduled housekeeping procedure to limit the time that a local spill or transient releases of dust is allowed to remain before cleaning the local area to less than the threshold dust accumulation. The “level accumulation” of combustible dust should be established in the housekeeping program based on the risk of flash-fires and secondary explosions from the Process Hazard Analysis.

<table>
<thead>
<tr>
<th>Level Accumulation</th>
<th>Longest Time to Complete Un-scheduled Local Cleaning of Floor-Accessible Surfaces</th>
<th>Longest Time to Complete Un-scheduled Local Cleaning of Remote Surfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 Accumulation</td>
<td>8 hours</td>
<td>24 hours</td>
</tr>
<tr>
<td>Level 2 Accumulation</td>
<td>4 hours</td>
<td>12 hours</td>
</tr>
</tbody>
</table>
TABLE A.7.4.2.3 Unscheduled Housekeeping

A.7.4.7.1 Typically, the housekeeping effectiveness is verified on an annual basis or after a significant change in the operation. If transient releases are becoming more frequent, the housekeeping effectiveness and equipment integrity should be verified.

A.7.5.2 A means to determine protection requirements should be based on a risk evaluation, with consideration given to the size of the equipment, consequences of fire or explosion, combustible properties and ignition sensitivity of the material, combustible concentration, and recognized potential ignition sources. See AIChE Center for Chemical Process Safety, Guidelines for Hazard Evaluation Procedures.

A.7.5.2.1 Hot work activities include the following:

(1) Cutting and welding

(2) Other maintenance, modification, or repair activities involving the application of an open flame or the generation of hot sparks.

A.7.5.3.2 The hot work area specified in NFPA 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hotwork, is 11 m (35 ft).

A.7.5.4.2 Consensus standard hot surface dust layer ignition temperature tests include ASTM E 2021, Standard Test Method for Hot-Surface Ignition Temperature of Dust Layers, and IEC 61241-2-1, “Electrical Apparatus for Use in the Presence of Combustible Dust - Methods for Determining the Minimum Ignition Temperatures of Dust.” The dust layer thickness used in these tests is nominally 1.27 cm (0.5 inch). Thicker dust layers produce lower hot surface ignition temperatures.

A.7.5.4.3 Examples of standard dust layer hot air ignition temperature tests include the Bureau of Mines Dust Layer Ignition Test described in Bureau of Mines Report RI 5624, and the Aerated Powder Test developed by Gibson et al and described in Abbot’s Prevention of Fires and Explosions in Dryers, published by the Institution of Chemical Engineers.

Most dryers and ovens are examples of equipment with internal surfaces heated by hot air. Rotating drum dryers and spray dryers are probably more suited to the dust layer air ignition temperature test, whereas fluidized bed dryers are more suited to the aerated powder ignition temperature test. Where the internal surface temperature is not known, the hot air temperature can be conservatively used.

A.7.5.5.2 Such equipment can include, but not limited to the following:

(1) Bucket elevator head and boot areas

(2) Particulate size-reduction equipment

(3) Blenders

(4) Belt-driven fans where combustible dust is present
In addition to monitoring bearing temperatures directly, precursors to bearing or shaft overheating can also provide early warnings of bearing or shaft deterioration. These precursors include excessive shaft vibration or speed reduction.

A.7.5.5 The risk assessment should include the potential for propagation of an explosion from an unmonitored unit.

A.7.5.6.1 The best method to eliminate the need for electrically classified areas is to prevent the release of dust from equipment. The next best method to eliminate the need for electrically classified areas is the removal the dust, by developing proper housekeeping procedures to clean up dust. If you cannot prevent the release of dust from equipment, or clean up the dust, then that area might be an electrically classified area. NFPA 499, Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas, can be used as guidance to supplement the criteria in NFPA 70, National Electric Code, Article 500.5. This guidance depends on a determination of whether the dusts in a particular area are combustible, the ignitability properties of the dust, and the nature of possible dust cloud formation and dust layer accumulations within and outside the electrical equipment near these dusts. There is limited guidance in identifying Class III locations. NFPA 499 is a good source for the guidance the identification of Class III areas.

A.7.5.6.1.1 Local signage or floor indications should be considered. Having local floor signage provides the everyday operators and anyone else who would be in the facility with the awareness of the electrically classified areas. Knowledge of electrically classified areas, gives anyone over the lifetime of the facility the awareness of immediate hazards within the facility.

A.7.5.6.4 NFPA® 70B, Recommended Practice for Electrical Equipment Maintenance, contains recommendations on the development of an effective electrical equipment maintenance program. NFPA 70, National Electrical Code, Article 502.15 contains descriptions of seals for electrical enclosures and fittings. The description includes a requirement that sealing fittings be accessible.

A.7.5.7.1.1 See NFPA 77, Recommended Practice on Static Electricity, for equipment component conductivity specifications and measurement methods.

A.7.5.7.1.2(e) The potential for propagating brush discharges exists where nonconductive materials with breakdown voltages exceeding 4 kV are exposed to processes that generate strong surface charges such as pneumatic conveying. Such discharges do not occur where the breakdown voltage is less than 4 kV.

A.7.5.7.1.4.2 Propagating brush discharges, which are generally considered to be the most energetic type of electrostatic discharge, do not produce discharge energies in excess of 2 J.

A.7.5.7.2.1 The limit on particulate discharge rates is due to the concern about possible generation of charge accumulation during rapid transport, and the subsequent potential for a bulking brush discharge.

A.7.5.7.2.2 The maximum electrostatic discharge energy from a bulking brush discharge energy is about 20 mJ (Britton, 1999).

A.7.5.7.3 NFPA 77, Recommended Practice on Static Electricity, provides guidance of examples
on how to ground personnel.

A.7.5.7.3.2 Identify source of 10 mJ. Typical, MIE of dusts.

A.7.5.7.4.2 The properties and electrostatic ignition hazard of Type A, B, C, and D FIBCs are described in NFPA 654, *Standard for the Prevention of Fires and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids*, paragraph 9.3.3 and references cited therein.

A.7.5.8.1 Maintenance and repair activities that can release of lift combustible dust include banging or shaking dust laden equipment components, blowing off dust accumulations from the surface of equipment, and inadvertently spilling combustible powder from a container. An example of a production activity that can generate a dust cloud is transporting an open drum of particulate past an operating fan. The dust clouds generated in these activities can be entrained into the airflow feeding a burner flame or pilot flame within nearby equipment.

A.7.5.9.2 Diesel-powered front-end loaders suitable for use in hazardous locations have not been commercially available.

A.7.5.10.1 See A.7.5.3.2 Data in Abbott’s Prevention of Fires and Explosions in Dryers indicate that 90% of 200 powders tested have aerated powder exotherm onset temperatures of 300 C or higher.

A.7.5.10.2 See A.7.5.3.2 Data in Abbott’s Prevention of Fires and Explosions in Dryers indicate that 90% of 200 powders tested have aerated powder exotherm onset temperatures of 150 C or higher.

A.7.5.11.1 Particulate materials that are notorious self-heaters during extended bulk storage conditions include, but are not limited to, sawdust, sub-bituminous coal, activated carbon and charcoal, and bagasse. Tabulations of materials prone to self-heating can be found in the following references: P.C. Bowes, *Self-heating: evaluating and controlling the hazards*, Elsevier, 1984; DOE Handbook Primer on Spontaneous Heating and Pyrophoricity, DOE-HDBK-1081-94, 1994; and V. Babrauskas, *Ignition Handbook*, FSP, SFPE, 2003. Test methods to assess the propensity for self-heating, critical storage pile sizes, and time to self-heating are also described in the Bowes and Babrauskas references. Methods self-heating detection include temperature monitors within the pile or silo and carbon dioxide monitors in the silo.

A.7.5.12.1 In the case of size reduction equipment with continuous screened outlets, high speeds that can generate friction and impact sparks are considered to be tip speeds in excess of 10 m/s. In the case of blenders and other completely enclosed equipment processing material in batches, high speeds are considered to be blade tip speeds in excess of 1 m/s.

A.7.5.12.3 See A.7.5.12.1 for high-speed criteria.

A.7.6.1.1 A specific evaluation of the work environment to determine the requirement for the wearing of flame-resistant garments should be based on the potential hazards that workers are exposed to as part of their work duties.

A.7.6.1.3.2 While this document is mainly concerned with the hazards associated with combustible dusts, many facilities that have combustible dusts also have personnel exposed to
electrical arc. It is important to distinguish between the different PPE requirements between NFPA 2112, *Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire*, and NFPA 70E, *Standard for Electrical Safety in the Workplace ®*, for the different exposure hazards.

**A.7.6.1.6** Portions of this list taken from paragraph 4.3 of NFPA 2113, *Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire*.

**A.7.6.1.8** At a minimum, the policy should address who is responsible for laundering, inspecting, repairing and retiring garments. See also section 6.1 from NFPA 2113, *Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire*.

**A.7.6.2.2** See also section 5.1 from NFPA 2113, *Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire*.

**A.7.7.2** Use of liquid suppression methods for dust control involves the use of fine, atomized, or “fogging” liquid sprays in order to “suppress” or otherwise limit the emission of combustible dusts. By using this atomized or “fogging” spray of liquid, often just water, the dust can be controlled and prevented from accumulating in the surrounding areas. This method is also often used in place of standard dust collection for both economical and operational reasons.

**A.7.8.2** A means to determine protection requirements should be based on a risk evaluation, with consideration given to the size of the equipment, consequences of fire or explosion, combustible properties and ignition sensitivity of the material, combustible concentration, and recognized potential ignition sources. See AIChE Center for Chemical Process Safety, *Guidelines for Hazard Evaluation Procedures*.

**A.7.9.1.2.2** Manual firefighting poses an unacceptable risk to facility personnel and emergency responders. The evaluation of the risk to facility personnel and firefighters should be made based on discussions and review of the hazard assessment described in Chapter 6. Such a system(s) is (are) needed to meet the objectives stated in Section 4.9.

**A.7.9.1.2.3** The potential effectiveness of manual firefighting should be assessed by experienced firefighting personnel after reviewing the hazard assessment documentation developed per Chapter 6 requirements.

**A.7.9.2.1** Pneumatic conveying systems that move combustible particulate solids can be classified as water compatible, water incompatible, or water reactive. Inasmuch as water is universally the most effective, most available, and most economical extinguishing medium, it is helpful to categorize combustible particulate solids in relation to the applicability of water as the agent of choice. For details on use of water as an extinguishing agent, see NFPA 654, *Standard for the Prevention of Fire and Dust Explosions from Manufacturing, Processing, and Handling of Combustible Particulate Solids*, Annex F.

**A.7.9.2.4** In the case of automatic suppression systems, low momentum applications can be achieved with by using small water drops or extinguishing powders, and by avoiding accumulations of combustible particulate in the immediate vicinity of the discharge nozzle. In
the case of dry pipe automatic sprinkler systems, it is particularly important to prevent fugitive combustible dust accumulations on or near the dry pipe because the initial discharge of compressed air can produce a suspended dust cloud and the potential for a flash fire or explosion.

In the case of manual application of extinguishing agents, paragraph 7.9.3.2 provides additional guidance on avoiding dust cloud formation during agent application.

A.7.9.3.1 Refer to NFPA 484, Standard for Combustible Metals, for specific requirements regarding combustible metals.

A.7.9.3.2 Extreme care should be employed in the use of portable fire extinguishers in facilities where combustible dusts are present. The rapid flow of the extinguishing agent across or against accumulations of dust can produce a dust cloud. When a dust cloud is produced, there is always a deflagration hazard. In the case of a dust cloud produced as a result of fire fighting, the ignition of the dust cloud and a resulting deflagration are virtually certain. Consequently, when portable fire extinguishers are used in areas that contain accumulated combustible dusts, the extinguishing agent should be applied in a manner that does not disturb or disperse accumulated dust. Generally, fire extinguishers are designed to maximize the delivery rate of the extinguishing agent to the fire. Special techniques of fire extinguisher use should be employed to prevent this inherent design characteristic of the fire extinguisher from producing an unintended deflagration hazard.

A.7.9.4.2.1 A nozzle listed or approved for use on Class C fires produces a fog discharge pattern that is less likely, than a straight stream nozzle, to suspend combustible dust, which could otherwise produce a dust explosion potential.

A.7.9.4.2.2 Fire responders should be cautioned when using straight stream nozzles in the vicinity of combustible dust accumulations that dust clouds can be formed and can be ignited by any residual smoldering or fire.

A.7.9.5.1 A risk evaluation should consider the presence of combustibles both in the equipment and in the area around the process. Considerations should include the combustibility of the building construction, the equipment, the quantity and combustibility of process materials, the combustibility of packaging materials, open containers of flammable liquids, and the presence of dusts. Automatic sprinkler protection in air-material separators, silos, and bucket elevators should be considered.

A.7.9.5.2 Sprinkler systems in buildings or portions of buildings where combustible metals are produced, handled, or stored pose a serious risk for explosion. When water is applied to burning combustible metals, hydrogen gas is generated. When confined in an enclosed space, dangerous levels of hydrogen gas can collect and result in the potential for a hydrogen explosion. The metal will likely spread and spew burning material.

A.8.2.1 The operating procedures should address both the normal operating conditions as well as the safe operating limits. Where possible, the basis for establishing the limits and the consequences of exceeding the limits should also be described. The operating procedures should address all aspects of the operation, including (as applicable):

1. Normal startup
2. Continuous operation
3. Normal shutdown
4. Emergency shutdown
5. Restart after normal or emergency shutdown
6. Anticipated process upset conditions
7. System idling

For manual operations, the procedures and practices should describe techniques, procedural steps, and equipment that are intended to minimize or eliminate hazards.

Operating procedures and practices should be reviewed on a periodic basis, typically annually, to ensure that they are current and accurate.

**A.8.2.2** See NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*. Consideration for extending the duration of the fire watch may be warranted based on characteristics of the material, equipment configuration, and conditions. For example, the PRB Coal Users’ Group practice for hot work suggests fire watches may be warranted for two to twelve hours following the completion of hot work due to the exothermic chemical reaction of sub-bituminous coals.

**A.8.3.1** Process interlocks and protection systems should be inspected, calibrated and tested in the manner in which they are intended to operate, with written records maintained for review. In this context, “test” implies a nondestructive means of verifying that the system will operate as intended. For active explosion protection systems, this may involve the disconnection of final elements (i.e. suppression discharge devices or fast-acting valve actuators) and the use of a simulated signal to verify the correct operation of the detection and control system. Testing may also include slow-stroke activation of fast-acting valves to verify unrestricted travel. Some devices, such as explosion vent panels, suppression discharge devices and some fast-acting valve actuators, cannot be functionally “tested” in a nondestructive manner, and so only periodic, preventive, and predictive inspection, maintenance, and replacement (if necessary) are applied.

Inspection and maintenance requirements for explosion vents and other explosion protection systems are found in NFPA 68, *Standard for Explosion Protection by Deflagration Venting*, and NFPA 69, *Standard on Explosion Prevention Systems*, respectively.

**A.8.3.4** See Section 8.9 for information regarding document retention

**A.8.4.1** Safety of a process depends on the employees who operate it and the knowledge and understanding they have of the process. It is important to maintain an effective and ongoing training program for all employees involved. Operator response and action to correct adverse conditions, as indicated by instrumentation or other means, are only as good as the frequency and thoroughness of training provided.

**A.8.4.2** All plant personnel, including management, supervisors, operating personnel, housekeeping and maintenance personnel should receive general awareness training for combustible dust hazards, including locations where the hazards may exist on site, appropriate measures to minimize hazards, and response to emergencies.

**A.8.4.2.1** Safe work habits are developed and do not occur naturally. The training program should provide enough background information regarding the hazards of the materials and the process so that the employees can understand why it is important to follow the prescribed...
procedures. Training should address:

- The hazards of their working environment, and procedures in case of emergencies, including fires, explosions, and hazardous materials releases.
- Operating, inspection, testing, and maintenance procedures applicable to their assigned work.
- Normal process procedures as well as emergency procedures and changes to procedures.
- Emergency response plans, including safe and proper evacuation of their work area and the permissible methods for fighting incipient fires in their work area.
- The necessity for proper functioning of related fire and explosion protection systems.
- Safe handling, use, storage, and disposal of hazardous materials used in the employees' work areas.
- The location and operation of fire protection equipment, manual pull stations and alarms, emergency phones, first-aid supplies, and safety equipment.

Equipment operation, safe startup and shutdown, and response to upset conditions.

A.8.5.2 Qualified contractors should have proper credentials, which include applicable American Society of Mechanical Engineers (ASME) stamps, professional licenses, and so forth.

A.8.5.3 It is suggested that annual meetings be conducted with regular contractors to review the facility's safe work practices and policies. Some points to cover include to whom the contractors would report at the facility, who at the facility can authorize hot work or fire protection impairments, smoking and nonsmoking areas. The owner/operator does not necessarily need to provide the training to the contractor.

A.8.6.1 All plant personnel, including management, supervisors, and maintenance and operating personnel, should be trained to participate in plans for controlling plant emergencies.

The emergency plan should contain the following elements:

1. A signal or alarm system
2. Identification of means of egress
3. Minimization of effects on operating personnel and the community
4. Minimization of property and equipment losses
5. Interdepartmental and interplant cooperation
6. Cooperation of outside agencies
(7) The release of accurate information to the public

Emergency drills should be performed annually by plant personnel. Malfunctions of the process should be simulated and emergency actions undertaken. Disaster drills that simulate a major catastrophic situation should be undertaken periodically with the cooperation and participation of public fire, police, and other local community emergency units and nearby cooperating plants.

Specialized training for public fire department(s) and industrial fire brigades may be warranted due to facility specific hazards where the methods to control and extinguish a fire may be outside of their normal arena of traditional fire fighting.

A.8.7 In order to thoroughly assess the risks, analyze the incident and take any corrective steps necessary, investigations should be promptly conducted based on the nature of the incident and in coordination with the authority having jurisdiction (as applicable).

The investigation should include root cause analysis and should include a review of existing control measures and underlying systemic factors. Appropriate corrective action should be taken to prevent recurrence and to assess and monitor the effectiveness of actions taken.

Such investigations should be carried out by trained persons (internal and or external) and include participation of workers. All investigations should conclude with a report on the action taken to prevent recurrence.

Investigation reports should be reviewed with all affected personnel (including contract employees where applicable) whose job tasks are relevant to the incident findings and with the health and safety committee to make any appropriate recommendations. Any recommendations from the safety and health committee should be communicated to the appropriate persons for corrective action, included in the management review and considered for continual improvement activities.

A system should be established to promptly address and resolve the incident report findings and recommendations.

Corrective actions resulting from investigations should be implemented in all areas where there is a risk of similar incidents, and subsequently checked in order to avoid repetition of injuries and incidents which gave rise to the investigation.

Reports produced by external investigation agencies, should be acted upon in the same manner as internal investigations.

Incident investigation reports should be retained for five years, and be made available to affected employees.

A.8.8.1 It is essential to have thorough written documentation, as the slightest changes to procedures, processes, and/or equipment, including those from suppliers, can have a dramatic impact on the overall hazard analysis. Change includes something as benign as process materials sourcing from a different manufacturer, the same raw material manufacturer using new methods to produce the product, or changes in formulation. These changes from a supplier’s end can impact the characteristics of the processes and/or materials. Individuals involved should include those involved in the process, maintenance personal, engineering, purchasing, and all others as
deemed necessary.

A.8.8.3 While implementation of the management of change procedure is not required for replacement in kind, it is critical that only qualified personnel are the ones who determine if the replacement is “in kind”. These qualified personnel should be intimately familiar with the items listed in Section 8.8.2, as well as the broad scope of hazards associated with the particular process.

Replacement “in kind” for raw materials. Care must be taken when substituting raw materials. There have been cases where a seemingly equivalent material substitution resulted in a large change in the process hazard. Not all safety properties of a material are characterized in, for example, an MSDS. Chemical composition might be identical, but quite different static ignition hazards due to bulk resistivity and charge relaxation rate can appreciably increase the hazard. Flowability differences can affect the hazard probability too. Differences in natural raw materials are generally less of a concern than manufactured materials in this regard.

A.8.9 The creation and retention of documentation is necessary in order to implement and periodically evaluate the effectiveness of the management systems presented in this standard. Documentation in any form (e.g., electronic) should remain legible and be readily identifiable and accessible. The documentation should be protected against damage, deterioration, or loss, and retained for the applicable period specified in this standard.

A.8.9.1(5) Process and technology information includes documents such as design drawings, design codes and standards used as the basis for both the process and the equipment, equipment manufacturers’ operating and maintenance manuals, standard operating procedures, and safety systems.

A.8.9.1(8) Contractor records typically include information such as the contract documentation with scope of work and necessary insurance coverage, the contractor’s safety programs, records demonstrating the contractor’s safety performance, qualifications and certifications necessary for the work to be done, periodic evaluations of the contractor’s work performance, and records demonstrating that the employees of the contractor have been trained to safely perform the assigned work.

A.8.9.1(9) A periodic review of the management systems presented in this standard is an important element for maintaining their ongoing effectiveness. The interval between reviews may be different for different management systems, but each management system should be reviewed at least once every 3 years. The effectiveness of a given management system can be determined by the extent to which the management system is performing as intended. The periodic review also can be used to identify opportunities for improvement.

The periodic reviews should be conducted by individuals independent of the management system being examined. This does not mean, necessarily, that the review must be conducted by individuals external to the owner/operators organization, such as an outside consultant.

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Annex B Process Hazard Analysis - Example
1. Purpose. The purpose of a process hazards analysis (PHA) is to identify hazards in the process and document how those hazards are being managed. The hazards addressed by this standard are the fire and deflagration hazards of combustible dusts. There might be other hazards associated with a process such as industrial hygiene that are not covered in this annex. However, the process of analysis outlined in this annex could be applied to other hazards.

2. Overview.

2.1 A PHA is a detailed analysis and documentation of the process and the facility housing the process.

2.2 Each part of the process system is considered for potential deflagration hazard.

2.2.1 Where the hazard is managed the means by which it is being managed is documented.

2.2.2 Where the hazard is not being managed possible means by which it can be managed should be identified as well as any critical data or parameters that must be quantified before a management method can be applied.

2.3 Each building compartment, room or identifiable space should be considered for potential deflagration hazard.

2.3.1 Where the hazard is managed the means by which it is being managed is documented.

2.3.2 Where the hazard is not being managed possible means by which it can be managed should be identified as well as any critical data or parameters that must be quantified before a management method can be applied.

2.4 The potential for a dust deflagration should be based upon the potential for all four (4) necessary and sufficient conditions for a deflagration to exist at the point of consideration concurrently.

2.4.1 The conditions for a deflagration are:
- A particulate of sufficiently small dimension to propagate a deflagration flame front
- A means of suspending or dispersing the particulate in air or other oxidizing atmosphere
- Sufficient quantity of particulate to achieve the Minimum Explosible Concentration
- Competent source of ignition

2.4.2 The analysis should be deterministic in nature, not probabilistic. If a deflagration is possible the results should be managed in such a way that the objectives of the standard are met.

3. Sample Process Hazards Analysis

3.1 Refer to Figure B3.1

**Wood Chip to Wood Granule Process System**

![Diagram of Wood Chip to Wood Granule Process System]

*Figure B3.1: An Example Process*

3.2 This process receives wood chips via rail car and over the road trailer truck. The wood chips come from hogging (grinding) operations at other facilities. The chips are unloaded and conveyed pneumatically to a storage silo. From the storage silo the chips are conveyed via screw conveyor to a size reduction mill. The mill discharges particulate to a transport fan which sends the particulate to a set of screens. The material that is sufficiently fine passes through the screens and proceeds via the product screw to some other location. The particles that exceed the size specification are sent back through the mill.
3.3 Dust collection is provided for this process. The dust collection system receives the exhaust from the cyclone, ullage space of the silo, out-feed screw conveyor, screens and the product screw conveyor. The cleaned air is returned to the building interior.

3.4 Each and every process component should be evaluated, including ducts, conveyors, silos, bunkers, vessels, fans, and other pieces of process equipment. Each point along the process should be described, and hazards at each point should be identified. Remedial measures for each hazard should be identified and documented. The means by which the hazard should be managed is then determined. Usually the relevant occupancy standard will provide options. The process and process equipment will often determine which option is most appropriate.

3.5 Each point is the process is identified and considered a “compartment” in which a deflagration could occur.
- Each duct
- Each conveyor
- Each silo, bunker, or other vessel
- Each fan
- Each piece of process equipment

Figure B3.5 Each process component and compartment is numbered or otherwise
identified and labeled.

3.5.1 Location 1: Off-load Duct to Off-load Fan

3.5.1.1 Is the particulate deflagrable(explosible)? The ability to propagate a deflagration flame front is the artifact of material chemistry – how much heat is released per unit of mass when it burns – and particle size. What are the deflagration metrics for this material? Has the material been tested for MEC, MIE, K_{St} and P_{max}? Depending upon the material other data might be necessary.

Currently, ASTM E 1226 includes a screening test to determine if the particulate is capable of propagating a deflagration. However, often the average particle size is used as a first order estimate. Some standards use a nominal average particle size of 500 microns as the dividing line. Wood hogs generally have screens that produce particulates between 0.25 and 1.00 inch in largest particle dimension. This is substantially greater than 500 micron. While the particulate is all mixed together it is probably not deflagrable (explosible). So, for this example the answer is NO. But if the particulate is allowed to separate on the basis of size the “fines” content will probably change the conclusion.

While sieve analysis cannot be relied upon as the sole hazard identification means it is useful for informing the analysis. There isn’t yet reported research that serves as a basis for establishing a percentage of fine particulate versus coarse particulate sufficient to propagate a flame front.

3.5.1.2 Is the particulate suspended in air? Since a fan is used to suck this material through a duct the answer is YES.

3.5.1.3 Is there sufficient concentration to propagate a flame front? We don’t know without a sieve analysis of the process stream. If the dust concentration exceeds the MEC of the dust then there is the potential for flame propagation. However, large particles are quenching surfaces and inhibit flame propagation. In the mixture used in this example it is not likely.

3.5.1.4 Are there competent igniters available? Yes. The material could have been ignited as it was loaded into the railcar or truck trailer. (This has happened!) Tramp metal could be present in the particulate that can strike sparks as it hits the wall of the duct.
3.5.1.5 What hazard management is in place? Is there metal detection, spark detection, bonding and grounding or other hazard management means in place?

3.5.2 2: Off-load Fan

3.5.2.1 Is the particulate deflagrable(explosible)? This the same material as in section 3.5.1.1.

3.5.2.2 Is the particulate suspended in air? Yes, same as 3.5.1.2.

3.5.2.3 Is there sufficient concentration to propagate a flame front? Maybe, same as 3.5.1.3.

3.5.2.4 Are there competent igniters available? Yes. In addition to the ones identified in 3.5.1.4 the fan introduces a number of ignition mechanisms.

3.5.2.5 What hazard management is in place? This is the same as in 3.5.1.5. It is difficult to apply hazard management to a material conveyance fan. Usually hazard management is applied downstream from the fan.

3.5.3 3: Duct from Fan to Cyclone

3.5.3.1 Is the particulate deflagrable(explosible)? This the same material as in section 3.5.1.1. However, the fan will cause particle attrition, increasing the relative concentration of fine particulate in the mixture. How much is not known unless a sieve analysis comparing material before and after the man is conducted.

3.5.3.2 Is the particulate suspended in air? Yes, same as 3.5.1.2.

3.5.3.3 Is there sufficient concentration to propagate a flame front? Maybe, same as 3.5.1.3, with the caveat that fan produced particle attrition will increase the fines content.

3.5.3.4 Are there competent igniters available? Yes. In addition to those from the in-feed duct there are those from the fan. Often a spark detection and extinguishment system is used to detect and quench sparks and burning material.
before it gets to a location where these could serve as an ignition source for a
dust deflagration.

3.5.3.5 What hazard management is in place? Is there spark detection and
extinguishment? Is there metal detection?

3.5.4 4: Cyclone

Cyclones are designed to use particulate inertia to separate the particulate from
the conveyance air. Deflagrations can occur in cyclones. Cyclones
intentionally concentrate particulate near the perimeter of the cyclone. Cyclones
also cause the large particles to separate from the fine material. Both of these
factors increase the likelihood that a portion of the volume within the cyclone
will have conditions sufficient for a deflagration. See Figure B 3.5.4.

![Figure B 3.5.4: The Operating Cyclone in Cross-Section](image-url)
3.5.4.1 Is the particulate deflagrable (explosible)? If there are any fines in the process particulate they will be separated, at least partially, from the larger particulates and concentrated by the cyclone. Since the fan creates fines and there is particle attrition as particulate goes rattling up the duct there is only one rational conclusion; YES.

3.5.4.2 Is the particulate suspended in air? YES.

3.5.4.3 Is there sufficient concentration to propagate a flame front? Probably and that translates to a YES. This depends upon the quantity of fine, deflagrable (explosible) particulate per unit of mass of total particulate moved and the volume of air to move it. Calculations should be performed to determine if there is sufficient fine material per unit of air volume under the range of operating conditions achieve a concentration of deflagrable particulate in excess of the MEC and render the cyclone an explosion hazard.

3.5.4.4 Are there competent igniters available? YES. All of the ignition sources identified in the earlier portions of the system will be sending the ignited particulate to the cyclone. Therefore, there is no alternative but to consider the cyclone an explosion hazard – all four necessary criteria for a deflagration are satisfied in the cyclone.

3.5.4.5 What hazard management is in place? The cyclone should be equipped with deflagration hazard management. This usually takes the form of venting and isolation, but might also take the form of deflagration suppression and isolation. It is possible that the rotary air-lock at the base of the cyclone is sufficient to serve as an isolation device.

If the system is shut-down and there is burning material in the hopper section (base) of the cyclone how is that managed. Most explosions result from deflagrations that are initiated by on-going fires. Is there any fire detection in place? What is the plan if a fire is detected? (Dumping burning material into a silo is NOT an option!)

3.5.5 5: Storage Silo

Every storage vessel is a particle size separator. When a mixture of material is dumped into a silo, bin, bunker, etc. the large particulate falls rapidly to the bottom of the vessel while the fines are lifted up by the air being displaced by the large particulate. This creates a cloud of fine dust in the ullage space, above
the settled material. If any burning material or matter at a temperature above the auto-ignition temperature of the fine dust passes through this cloud a deflagration is likely to result.

![Deflagrable Dust Cloud](image)

**Figure B3.5.5: A Silo Serves as a Particle Size Separator and Becomes an Explosion Hazard**

3.5.5.1 Is the particulate deflagrable(explosible)? YES. The fines have separated from the coarse material and is suspended in a cloud in the ullage space.

3.5.5.2 Is the particulate suspended in air? YES. The large particulate falls faster than the fines due to its lower Reynolds Number. The large particulate displaces air where it accumulates in the silo producing an upward air current that keeps the fine particulate suspended. The more material that is introduced into the silo the greater the concentration of dust in that cloud.

3.5.5.3 Is there sufficient concentration to propagate a flame front? Eventually, YES. The large particulate displaces air where it accumulates in the silo producing an
upward air current that keeps the fine particulate suspended. The more material that is introduced into the silo the greater the concentration of dust in that cloud.

3.5.5.4 Are there competent igniters available? YES. All of the ignition sources identified in the earlier portions of the system will be sending the ignited particulate through the cyclone and on to the silo. The rotary air-lock as the base of the cyclone hopper section can also be an igniter in some cases. Therefore, there is no alternative but to consider the silo an explosion hazard – all four necessary criteria for a deflagration are satisfied in the cyclone.

3.5.5.5 What hazard management is in place? The silo should be equipped with deflagration hazard management. This usually takes the form of venting and isolation but might also take the form of deflagration suppression and isolation. It is possible that the rotary air-lock at the base of the cyclone is sufficient to serve as an isolation device. It is also likely that the mass of material in the bottom of the silo will serve as isolation.

Annex C Accumulated Fugitive Dust

[Diagram showingaccumulated fugitive dust thresholds and their implications for deflagration hazards]
Figure C-1: Comparison of Accumulated Fugitive Dust Thicknesses

Accumulated Fugitive Dust

- The single most important factor in propagating a deflagration within a building.
- Dust layers trigger critical hazard management decisions
- See NFPA 499
- Electrical Equipment for Hazardous Occupancies
- All electrical equipment must be “listed” for use in the occupancy based upon the Class, Division and Group classification.
- When all electrical equipment in the occupancy is listed for use in that occupancy the electrical system is not deemed to be a likely igniter.
- The extent of the electrically classified area is controlled by the rate of dust release and the frequency of clean-up.

Process Building Compartments

- Where the management of the hazard is dependent upon routine cleaning, that cleaning program should be outlined in the PHA.
- Where the management of the hazard is dependent upon routine cleaning, that cleaning program should be outlined in the PHA.
- Explosion Hazards
- Dust explosion hazards exist where ever combustible particulate solids are handled or produced.
- There is no alternative to pro-actively managing the hazard.
- Is there accumulated fugitive dust? If so – how much and where is it?
- What is the MEC, MIE and Ksc of the particulate in the duct?
- Does the building compartment pose a deflagration hazard?
- Does it pose an explosion hazard?
- Does it pose a fire hazard?
- The majority of the property damage and personnel injury is due to the fugitive dust accumulations within the building or process compartment.

Control, limitation or elimination of accumulated fugitive dust is CRITICAL and the single most important criterion for a safe workplace.

Annex D Informational References

D.1 Referenced Publications.

The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

D.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


**D.1.2 Other Publications.**

**D.1.2.1 ACGIH Publication.** American Conference of Governmental Industrial Hygienists, 1330 Kemper Meadow Drive, Cincinnati, OH 45240-1634.


**D.1.2.2 AIChE Publications.** American Institute of Chemical Engineers, Three Park Avenue, New York, NY 10016-5991.

D.1.2.3  **ASME International Publications.** American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.


D.1.2.4  **ASTM Publications.** ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.


D.1.2.5  **IChemE Publications.** Institution of Chemical Engineers, Davis Building, 165-171 Railway Terrace, Rugby, Warwickshire, CV21 3HQ, England.


D.1.2.6  **IEC Publications.** International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland.


D.1.2.8  **Other Publications.**


FM Data Sheet 7-76, “Prevention and Mitigation of Combustible Dust Explosions and Fire,” January 2012.


**D.1.3 References for Extracts in Informational Sections.**


MEMORANDUM

To: Linda Fuller

From: Chris Farrell, Staff Liaison, Public Fire Protection

Re: Cycle Request for NFPA 951, *Guide to Building and Utilizing Digital Information*

The Technical Committee on Data Exchange for the Fire Service was balloted on the release of the *Guide to Building and Utilizing Digital Information*, the ballot results are enclosed. The Committee is requesting that NFPA 951 be entered into the Fall 2015 revision cycle.

Thank You
MEMORANDUM

TO: NFPA Technical Committee on Data Exchange for the Fire Service

FROM: Christopher Farrell, Staff Liaison

DATE: September 19, 2012

SUBJECT: NFPA 951 Draft Release TC Final Ballot Results

The Final Results of the NFPA 951 (Guide to Data Building and Utilizing Digital Information) Draft Release Letter Ballot are as follows:

24 Members Eligible to Vote
9 Not Returned (Bailey, Blankinship, Brooks, LaVecchia, Schmidt, Shoemaker, Smalley, Thies, Varney)
15 Affirmative on All (R. Corona, M. Weins – Affirmative with Comment)
0 Negative
0 Abstentions

An affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:

\[ \frac{24 \text{ eligible}}{2} + 1 = 13 \]

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.
Technical Committee on Data Exchange for the Fire Service
Letter Ballot to Release the Draft for NFPA 951
Guide to Building & Utilizing Digital Information

Please record me as voting:

___ AFFIRMATIVE    ___ NEGATIVE*    ___ ABSTAINING*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a negative or abstaining vote.

SEE ATTACHED

________________________
Signature

________________________
Name (Please Print)

9.17.2012
Date

Please return your ballots not later than Tuesday, September 18, 2012.

RETURN TO:
Yvonne Smith
Project Administrator
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
ysmith@nfpa.org  Fax: 617-984-7056
Comment for the Record

The document, NFPA 951, “Guide to Data Development and Exchange for Fire Service” was reviewed and determined that its content is meaningful and informative. Below are suggestions that need consideration prior to entertaining a Request for Comment (RFC) from the public.

Please mark the record that I am voting in the affirmative with comment.

SUGGESTIONS AND COMMENTS

4.3.

... It is critical that an agency’s relevant functions should be incorporated into the technology planning process and all other functions be marked for revision or deletion. The revision or deletion of processes should be made to all agency documents so as validate and support the new technological efforts.

4.4.1.2

... and Memorandum of Agreement (MOA) versus Memorandum of Understanding (MOU). MOU implies contract versus a MOA which implies structured agreement.

5.5.3 Audit/Review include Freedom of Information Act (FOIA)

5.7.1.2

... fire service when captured within 30 feet (10 meters) of true location....
Technical Committee on Data Exchange for the Fire Service

Letter Ballot to Release the Draft for NFPA 281
Guide to Building & Utilizing Digital Information

Please record me as voting:

X AFFIRMATIVE ___ NEGATIVE ___ ABSTAINING

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a negative or abstaining vote

Recommend Clean-10 to Formatting Review Board

To: AFPA, C.

______________________________
Richard Weaver

Signature

NAME: WEVERS

Print Name

Date: 11/17/12

Please return your ballots no later than Tuesday, September 18, 2012.

RETURN TO:

Terrie Smith

Project Administrator

NFPA, 1 Batterymarch Park, Quincy, MA 02169-9131

(617) 679-3900, Fax: 617-679-7256
NFPA 950 coupled with this "guide" provides an organization the tools for implementation and operation of complex and mission critical data and dispatch systems. This guide is to aid you and provide a pathway to achieve success, i.e. provide advice and counsel for you and the key element for technology improvements. Wide ranging changes are currently unfolding in our technology environment; it is not an easy change process unless certain elements are established prior to and during implementation and use. This guide developed by practitioners experienced in this environment and supported by a network of accomplished and successful individuals in the emergency response technology program field. It is developed and intended to support your efforts and create pathways for success. Well established in our industry is the utilization of the standards making process (NPFA 950) and that effort has been undertaken and is being created as part of this effort.

This guide provides references and resources for fire service personnel to help identify applications of and uses for data to improve the organization’s ability to perform fire prevention, damage mitigation, emergency response, and recovery from emergency incidents.

Utilization of this standard and its associated guide provides your organization the framework for success and continued improvement. The Guide and Standard coupled with real life experiences will continue to strengthen the melding of technology within our public safety mission.

Chapter 1. Administration

1.1 Scope.

1.1.1 The intent of this document is to provide guidance in the development of an “integrated information management system” which facilitates information sharing. The resulting system shall be designed to support a communications pathway for all relevant components of the national preparedness and response framework.

1.1.2 * This document provides information for the development of consistent methods, processes, and tools to capture, utilize, and share data within scalable information systems. This framework supports and sets the stage for effective data exchange at all operational levels and components.

1.1.2.1 As an example, time and location are identified as critical components. Specific format for time and location are established in the standard. The guide provides explanation to the AHJ as to why you need this specific format for time and location and how to use it within your operational environment.
1.1.3 The intent of this guide is to provide a framework and environment consistent with NFPA Standard 950 which results in an integrated information management system for Computer Aided Dispatch (CAD), Record Management Systems (RMS), and other associated data systems in common use by fire departments.
1.2. Purpose.

The purpose of this guide is to help public safety users envision, plan and build an operable, scalable and integrated information management system.

1.2.1. A standard approach is essential to manage, use and exchange data. This guide assists fire department administration and support personnel in establishing a vision for information management within their organization.

1.2.2. Technology planning is an essential step in creating an integrated information management environment. NFPA 950 mandates a methodology for a step by step process for technology planning. NFPA 951 recommends a framework for the governance and oversight needed to establish an effective planning process based on NFPA 950.

1.2.3. To create an integrated information management system, the AHJ must understand the specific requirements for the interoperable use of the data. NFPA 950 sets forth the overarching technical standards these requirements must satisfy. The information in this document assists the agency in creating a flexible and scalable system which supports data sharing.

1.2.4. Adhering to these standards supports the wide variety of applications required by the fire service. This guide provides references and resources for fire service personnel to help identify applications of and uses for data to improve the organization’s ability to perform fire prevention, damage mitigation, emergency response, and recovery from emergency incidents.

1.2.5. This document is a reference tool and job aid providing practical guidance and specific steps forward.

1.3 Application.

1.3.1 This guide was designed to be used by fire and emergency service organizations to develop an information structure and associated requirements and workflows common to fire protection delivery and management for emergency response and administrative use.

1.3.2 This guide when implemented also creates an environment whereby fire and emergency service organizations will be able to identify best practices, internal and external to the agency, to ensure data operability in mutual and automatic aid environments.

1.3.3 The purpose of this guide is to describe for all levels of the organization the mechanisms for establishing a standards based information management environment, which is an essential element for optimal functioning of a fire department. Effective information management is a key to be utilized in keeping firefighters safe, improving outcomes and satisfying performance metrics. An integrated information technology strategy which adheres to the specifications of NFPA 950 will accomplish these goals by achieving the following objectives:
• Establish and maintain accurate and up-to-date understanding of operations and the events that affect them
• Collect, organize, exchange and discover through research relevant and authoritative information
• Proactively support community fire planning needs and activities
• Exchange information to establish data streams into and out of the field
• Integrate data from multiple internal and external sources
• Enable a higher level of collaborative decision making with other stakeholder partners
• Maximize value from technology investments

1.3.4 To achieve an NFPA950 compliant data environment senior executive leadership must support the decision to implement the framework principles described in this guide. For many in the fire and emergency services, managing information technology is a new endeavor. Therefore, this Guide is written to enhance knowledge of fundamental information management principles in the context of the work we do in the fire and emergency services. It is likewise intended to enhance the knowledge of all members of the organization, as well as related entities, which is essential for successful implementation. This allows leadership the framework for implementing the department’s technology plan in the context of a shared vision.

1.3.5 * NFPA 950 is a standard which identifies the critical building blocks of a fire department information management system. The standard provides a common framework for all departments regardless of size, shape and technological resource availability. Embracing this framework will provide the foundation as you begin to assess your particular landscape, analyze your specific technology requirements and develop a plan which fits your unique environment. These are the pieces of the puzzle you will need to begin or complete the building of your system.

Framework for a comprehensive integrated information management system

The above diagram provides a framework for how an organization wide strategy for information management can support the entire organization. A wide range of players within an organization contribute data, perform analysis and exchange important field intelligence. Utilization of these key elements provides the framework for organizations and their members to perform their...
mission effectively and will enhance the overall safety environment. These different functions within a fire and emergency service organization also have different requirements for data and applications. The integrated information management platform illustrated above will support all of these key elements and the ability to leverage their respective expertise, perspectives and skills within this data environment.

The diagram illustrates the concept behind the Guide and the Standard. It addresses the four fundamental ways information is used to support the goals of a public safety agency. These categories are listed below. Additional information for each category are detailed in Chapter 4 and in Annex 1.3.5.

- Planning and Analysis
- Data Management
- Field Mobility
- Situational awareness

Chapter 2  Referenced documents - these are only those documents referenced in the text (Chapters 4...n)

4.3.1 Strategic Planning: reference NFPA 1201: Standard for Providing Emergency Services to the Public, 2004 Edition

Chapter 3  Definitions

Text - ASCII stands for American Standard Code for Information Interchange. Computers can only understand numbers, so an ASCII code is the numerical representation of a character such as 'a' or '@' or an action of some sort. ASCII was developed a long time ago and now the non-printing characters are rarely used for their original purpose. Below is the ASCII character table and this includes descriptions of the first 32 non-printing characters. ASCII was actually designed for use with teletypes and so the descriptions are somewhat obscure. If someone says they want your CV however in ASCII format, all this means is they want 'plain' text with no formatting such as tabs, bold or underscoring - the raw format that any computer can understand. This is usually so they can easily import the file into their own applications without issues. Notepad.exe creates ASCII text, or in MS Word you can save a file as 'text only'
(From www.asciitable.com)

Integrated information management system. The management of multiple and often disparate data sources and software systems to create new information sets.
Chapter 4: Process

4.1 General

The goal of NFPA Standard 950 is to create integrated information management systems. The purpose of this section is to describe the process of developing an information system to acquire, manage use and share information as it pertains to fire and emergency service functions. Section One provided the “why” and Section Four provides the “how”.

Each of the steps outlined below are requisite to successful implementation of NFPA 950.

4.2 Technology Strategic Visioning

A strategic visioning process helps to clarify where you, your employees, political leadership and other stakeholders see your organization in the future in terms of its fundamental objective and/or strategic direction. To be meaningful and relevant a vision must be realistic and believable. A strategic vision must inspire and motivate.

4.3* Technology Strategic Planning

Once you have a vision the next step is how to implement the vision. Technology Strategic Planning is the tool that should end with objectives and a roadmap of ways to achieve your organization’s vision. See annex A-4.3 for resources describe strategic planning, and will go into much greater depth. This section will cover the fundamental steps in the strategic planning process.

This section begins by establishing a Strategic Visioning construct as an underpinning to drive your technology strategy.

A properly written strategic plan will provide your organization with the necessary guidance to develop resources needed to satisfy your vision. An effective strategic plan should be all encompassing and constructed only after a deliberative process as suggested in Annex A.4.3 Therefore, by definition getting this right is a journey, not a destination.

Critical to the strategic planning process will be learning how to incorporate technology planning into the fabric of your organization’s culture/core functions. Technology planning must be developed with a clear and common understanding of the workflow goals (functions) which support your agency’s vision and based on established industry “best practices”.

NFPA 950 describes and prescribes the workflows that accomplish functions of the fire service. In addition, the Standard provides a framework for the information system and their associated workflows. It is critical that an agency’s relevant functions should be incorporated into the technology planning process. Fundamental to this process is the notion that technology planning is integral in supporting your overall strategic plan/vision.
4.4 Technology Needs Assessment

This section focuses on the needs assessment which is an integral part of the planning processes and as such provides guidelines which will help you through the process of planning for an information management system to fit your department’s unique needs, culture and budget. There are many approaches to developing a plan for your information system. Regardless of what approach you use, adhering to these planning guidelines will avoid developing single point solutions that operate as silos and fail.

Within the prescribed planning process is a discovery process. During discovery you determine what resources already exist in your community to help you build your integrated information management system. As you analyze your existing infrastructure and prioritize your needs it is important to match where possible align existing capacity with high priority needs, i.e. take advantage of the low hanging fruit.

4.4.1 Guiding Principles

4.4.1.1 Meeting Mission Requirements and End User Needs

The mission of Fire and Emergency Service Organizations is to protect lives and property. Each Agency will have its own vision of how to fulfill its mission and these should be articulated in the strategic plan as described above.

Once this mission is clearly understood and articulated in the organization’s policy and planning documents, the technology planning committee will identify the workflows and associated applications which technology can support. The next step is to prioritize which of these will be included in the technology plan based on mission priorities, cost benefit timelines and funding availability. Regardless of how the planning committee evaluates these tradeoffs, it is the mission requirement which must drive the technology – not the other way around.

Information systems for the fire and emergency service organization provide support for two broad categories of users:

- Administrative.
  - Finance: eg., accounting, (purchasing and billing), budgeting, payroll
  - Personnel: eg., timekeeping, human resources, hiring
  - Internal documentation: eg., Apparatus and equipment records, facility records, supply records, standard operating guidelines and procedures.
  - Office communications: eg., email, memorandums, bulletin boards, correspondence, journals.

- Planning and Operations
The chart below provides some common examples of functions supported by a fire department information system.

<table>
<thead>
<tr>
<th>Planning</th>
<th>Preparedness</th>
<th>Response</th>
<th>Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capability Assessment</td>
<td>Pre Incident Planning</td>
<td>CAD, AVL, and Routing</td>
<td>Damage Assessment</td>
</tr>
<tr>
<td>Vulnerability/Risk Assessment</td>
<td>Resource Deployment</td>
<td>In-Vehicle Applications</td>
<td>Debris Removal</td>
</tr>
<tr>
<td>Inspections</td>
<td>Targeted Mitigation</td>
<td>Mobile/Field Intelligence</td>
<td>Infrastructure Restoration</td>
</tr>
<tr>
<td></td>
<td>Training and Exercises</td>
<td>Search and Rescue</td>
<td>Economic and Community Recovery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evacuation/Shelter Mass Care</td>
<td>Environmental Stabilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Public Warning and Notification</td>
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<tr>
<td></td>
<td></td>
<td>Command and Control</td>
<td>Public Information</td>
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<td></td>
<td></td>
<td>Incident Resource Management</td>
<td>Analysis and Management of Recovery efforts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multidisciplinary Coordination</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operations Dashboard</td>
<td></td>
</tr>
</tbody>
</table>

Following are brief descriptions of some workflows which can be effectively supported by technology. All of these should be considered to the extent they help you accomplish your vision.

### 4.4.1.1. 1 Planning

Planning is a multi-faceted process that ranges from risk prevention to budgeting—across all of the programs in the fire service. The proper application of technology provides a set of tools that can enhance the planning process. Effective data management leads to meaningful information for enhanced decision making. It is essential for all aspects of management planning. In particular, it is critical for decision making before, during and after emergency response.

### 4.4.1.1. 2 Capability Assessment

Capability Assessment is a core method for evaluating the stakeholder’s ability to react to potential all-hazards incidents. This assessment needs to realistically identify potential risks, and also identify the strengths and weaknesses of the stakeholder’s ability to respond. The data and
analysis required to assess capability can be efficiently managed using various technology components.

4.4.1.1. 1.3 Vulnerability and Risk Assessment:

Vulnerability and Risk Assessment is a core method for evaluating the stakeholder’s liability. This assessment identifies potential loss and subsequent impacts to all stakeholders. Technology provides an increased capacity to assess vulnerability and risk and how they can be efficiently managed.

4.4.1.1. 1.4 Inspections

Inspections efforts produce substantial amounts of data. Technology can be used to more efficiently collect, update and manage this data. Technology can also be leveraged to distribute this important information to multiple stakeholders thus increasing the efficiency of process and systems. Properly implemented, technology can increase safety and focus limited resources to fill the greatest needs.

4.4.1.1. 1.5 Preparedness

Preparedness is a continuous cycle of planning, managing, training, equipping, exercising, evaluating, and improving activities. Preparedness ensures effective coordination and the enhancement of capabilities of concerned organizations to prevent, protect against, respond to, recover from and mitigate the effects of all-hazard incidents. The proper application of technology can help efficiently manage the implementation of your preparedness efforts. Technology can be a tool to provide timely, critical information to stakeholders.

4.4.1.1. 1.6 Pre-incident planning

A pre-incident planning process involves responder familiarization to specific site information. This information is documented for use when responding personnel who may or may be familiar with the specific site location. Typical site information might contain access points, automatic systems controls, enunciator panel locations, and travel routes through the building. Technology can help streamline the acquisition and management this data. This data can become an important source of information during initial response.

4.4.1.1. 1.7 Resource Deployment

With proper data management and analysis, technology can help to direct agencies to provide appropriate resources at the appropriate levels. Resource planning and deployment is a dynamic
process and requires continuing reoccurring analysis and implementation. Technology can help facilitate and enhance this process.

4.4.1.1.8 Program Management/Targeted Mitigation/Special Projects

Program management, targeted mitigation and special projects include specific programs and projects identified during the planning analysis process that can increase the level of preparedness. This can include special projects such as accreditation, the identification of equipment failure trends or incident patterns. Technology, including spatial technology, can help identify programs and projects in the planning process, and aid in the execution implementation and management of various programs and targeted projects.

4.4.1.1.9 Training and Exercises

Training develops needed skill sets to perform a function. The exercise is a validation of skill development. Technology can support training and exercise activities. Additionally, as technological tools are implemented in your agency, much of the success of these tools will depend on proper training. Training and exercises help ensure that staff has the skills to access the appropriate information from the appropriate technology when it is needed.

4.4.1.1.10 Response

The emergence of appropriately designed technology support for tactical response can enhance fire fighter safety on the fire ground from helping to manage the daily operational requirements of call load and staffing to multi-jurisdictional disaster response. The functions and tools identified are representative of the ways a well designed technology infrastructure can support the agency response and provide situational awareness. The following categories represent ways departments are beginning to leverage the unique features of a robust and well designed Information Management Platform.

4.4.1.1.11 CAD, AVL, and Routing

When an emergency occurs, any delay of dispatching the appropriate responding companies and resources can make a dramatic difference in the outcome of the incident. Dispatch centers often leverage their agency’s investment in GIS and pre-planning data to improve their response. From the moment an emergency call is received, a single CAD or a multi-functional system to display, access visualize and analyze resource status information with accurate GIS data and AVL can use existing or pre-determined response levels and current resource locations
to dispatch the appropriate resources, routing to the incident, expedite response, and AVL to track resources from dispatch to incident closure.

4.4.1.1.12 In-vehicle applications
In-vehicle applications help personnel get to the scene and provide important scene information to officers conducting emergency operations. This can range from a simple pre-loaded set of tools and data to a sophisticated system with live data feeds from remote systems. This can include information from pre-incident planning data bases with data on access and egress, water source, exposures, and hazards as well as real time automatic vehicle location (AVL) and data exchanges with other systems.

4.4.1.1.13 Mobile /Field Intel
Mobile PCs, computer tablets, and handheld devices with GPS and wireless technology allow first responders to send and receive geographic information and incident updates. As the role of fire and emergency medical services expand, the importance of GIS is becoming widely recognized. First responders must go to the incident, size up the incident, and implement the response. In turn these field units use mobile technology to provide on-scene intelligence to the command staff regarding the status of the incident.

4.4.1.1.14* Search and Rescue
Search and Rescue is the discipline – and art – of finding the lost (search) and bringing them back to safety (rescue). Geospatial information is an integral part of planning and running a search and rescue (SAR) operation. On every search operation, time is critical to saving lives. GIS-driven technology, tools and workflow are vital to speed up the planning cycle of a search and get teams out the door more quickly to look for the lost. GIS analysis and display tools are used to develop a search plan and assign resources, collect and visualize clues across the search area, and analyze probability for optimizing search operations. Many of the datasets used across the planning, preparedness, response, and recovery phases serve a critical role in SAR operations.

4.4.1.1.15 Evacuation/Shelter/Mass Care
Geographic information can be used to determine shelter locations and optimum routing for affected populations to access the appropriate shelter location. GIS analysis can also support the visualization of information required for maintenance of shelter location adequacy, supply inventories, external power requirements, etc.

4.4.1.1.16 Public Warning and Notification
GIS is used to provide warnings and notifications to the public of pending emergencies or existing, unfolding emergencies based upon the location of the emergency or areas to be impacted by the emergency. This information is also shared with federal, state and local agencies and responding personnel.
Technology can be used to push out information to social media in the form of status updates that are received in a much faster response than traditional press releases. Providing accurate and timely information directly to the public establishes/reinforces the credibility of the Fire Service.

4.4.1.1.17 Command and Control

The Incident Commander requires accurate and timely information to perform the command mission. Depending on the complexity and size of the incident, the information and data requirements may vary. Having access to GIS data, imagery, school locations, parking lots, adjacent exposures, and hydrant locations provides an accurate picture of the event and supports critical command decisions.

4.4.1.1.18* Incident/Resource Management

GIS plays an important role in the incident command system (ICS) which is structured to organize personnel and resources to manage an emergency. GIS map products required within the ICS process include Planning Map; Situation Status; Briefing Map; Transportation Map; Facilities Map; Public Information Map; Incident Progression; Incident Prediction Map; Personnel/asset tracking and staging; logistics, planning division and EOC/DOC Management are all supported with these procedures and policies.

4.4.1.1.19* Multidisciplinary Coordination

Leadership in today’s complex environment requires effective data sharing and analytics to support collaborative decision making. GIS provides an ideal platform for enhancing situational awareness and supporting collaborative decision making for events requiring multi-agency and multi-jurisdictional coordination. Ensuring a strong national GIS framework designed to support daily operational requirements of the fire service is critical to the success of the National Response Framework (NRF) and NIMS. Accordingly, national policies to Situational Programs encouraging data fusion centers, robust spatial analysis, and increased situational awareness for integrated preparedness are important elements of these policies.

4.4.1.1.20 Operations Dashboard: Situation Status (SitStat) and Resource Status (ReStat)

Command officers track the status of emergency resources. Using live feeds such as weather, traffic, sensors and incident reporting, accurate assessments of priorities and readiness levels support decision making to meet operational objectives.

4.4.1.1.21 Recovery

The aim of the recovery phase is to restore the affected area to its previous state. The focus and time scale of recovery differ from response; recovery efforts are concerned with issues and decisions that must be made after immediate needs are addressed and often extend for weeks or months following the incident, and often impacts reimbursement. Recovery efforts are primarily
concerned with actions that involve rebuilding destroyed property, re-employment, and the repair of other essential infrastructure. Recovering from a disaster is usually a gradual process. Safety is a primary issue, as are mental and physical well-being. GIS data can provide assistance in the recovery process, and knowing how to access it makes the process faster and less stressful. This section offers some general advice on how information can be used after disaster strikes in order to restore normalcy.

4.4.1.1.22 Damage Assessment and Debris Removal
GIS-enabled mobile applications allow field workers to code debris, parcels with descriptive attributes such as the type and degree of damage, time and location. The data can be analyzed, queried and visualized to assess specific problems and area trends. Reports and photographs of damage and debris can be linked to the specific geographic sites. GIS on mobile devices expedite the difficult damage assessment and debris removal problems. Pre-incident imagery and GIS data can be critical for reimbursement during the recovery phase.

4.4.1.1.23 Infrastructure Restoration
Overall damage costs and priorities for reconstruction efforts can be assessed and analyzed by GIS based on appropriate local criteria. Progress can be monitored by specific location of reconstruction efforts both for long term and short term needs. Assess overall critical infrastructure damage, determine short term actions for:

- First aid and health
- Additional shelter needs
- Optimum locations for public assistance
- Alternate transportation routes for continued operations

4.4.1.1.24 Economic and Community Recovery
Identify locations of business and supplies necessary to support reconstruction. Plan for alternate locations for government operations if government facilities are damaged, as well as temporary housing for displaced residents.

4.4.1.1.25 Environmental Stabilization
If an incident or response activities result in a disturbed environment that could be degraded through exposure to the elements, those disturbances must be mitigated and the environmental must be stabilized in order to reduce future damage. Mobile devices are often used to catalog needed rehabilitation/stabilization activities, while GIS software provides for visualization, prioritization, and progress tracking. Spatially enabled models provide impact analysis to determine the activities necessary to reduce the risk of future damage.

4.4.1.1.26 Public Information
Information can be published in the form of maps to facilitate transparency, encourage communications and engage the public. Access to accurate information about the status of an incident, shelters and access to supplies and services can be managed, maintained, reported on and published in an enterprise data base. Notification of ability to return, return
routes, damage assessments, and reporting requirements (e.g. FEMA, insurance…) can also be provided.

4.4.1.1.27 Analysis and Management of Recovery Efforts
GIS is a core component of enterprise environments which support customizable Executive Dashboards which provide a snapshot of the incident status on key metrics of importance to executive management. Good data management enables the integration of multiple sources of data and analysis. The dashboard integrates incident locations, tracking, sensors, video, traffic, hospital status, weather and other dynamic data with GIS data (imagery, elevations, streets, critical infrastructure, etc.)

Incidents can be queried based on incident type, cause, time, units assigned or other variables contained in the attribute data. GIS searches the data tables, gathers the data that matches the spatial request, and displays it on the map. Incident analysis can be done quickly, displayed logically, and understood easily.

4.4.1.2. Governance and Policy

4.4.1.2.1 Establishing a governance structure to oversee the strategic technology planning process is critical to building a successful fire emergency service organization information system. This structure includes an organizational chart, which includes a chain of command (incident command model):
- a workflow diagram and subsequent interactions
- job descriptions (responsibilities-span of control)
- access
- control
- exchange of data
Determining this governance structure can be done using internal resources or you may wish to solicit outside expertise to guide the process.

The form of governance that will be most effective for your purposes depends on many factors such as department size, resources, level of cooperation among stakeholders, existing system dynamics, level of regional coordination and training. There is no one universal model that works for everyone. The governance structure you select must enable technology development participant support, stakeholder representation and involvement (users), coupled with complete management commitment.

The governance model should evolve as your capability matures, and should be as scalable as the system, resources and demand require. This may be different for different sizes of systems. They can be as simple or as complex as needed ranging from an informal agreement with local community groups, to large quasi-governmental entities with formal Joint Power Agreements (JPA) and Memorandums of Understanding (MOU) among AHJ’s and across regions and states.
A needs assessment based on technology goals will guide governance and scale of oversight from a single source implementation process through a multiple source solution supported and coordinated by a project management team. Subsequent need assessments could be required for each element of an enterprise system.

4.4.1.2.2 Of chief concern is the concept of “system access”; the authority having jurisdiction (governing entity) must establish clear policies concerning technology and data access. Policies should be as restrictive or flexible as necessary to protect the data and technology for its mission as described in Chapter 5 of this Guide.

4.4.1.2.2.1 Where and when systems merge, the authorities having jurisdiction must have clearly defined and aligned access policies as described in NFPA 950 Chapter 5.

4.4.1.2.2 Operational policies should address:
- Procurement (infrastructure and software)
- Maintenance (infrastructure and software)
- Security (5.2.1.2)
  - security levels (User access)
  - security system health
  - internal use/misuse access policy
  - protection of sensitive information
- Levels of IT support (when and who)
- Illegal or prohibited activities
- User Application Guidelines (including policy for standardized training)

4.4.1.2.3 Data policies should address:
- Integrity (4.3.1)
- Security (4.3.1)
- Accuracy of data (4.3.1)
- Data validation and verification of data exchange (4.3.2)
- Data timeliness (4.3.3)
- Ensure spatial component included with data (4.3.4)
- Ensure metadata provided for all data (4.3.5)
- Quality Assurance and Control (5.2.1.1)
- Data exchange and compatibility (5.3)
- Shared data access policy (5.2.1.4.3)

4.4.1.3. Interoperable and Scalable

To maximize the investment of financial and personnel resources, it is imperative that you understand the basics of building solutions that are interoperable and scalable.

4.4.1.3.1 Interoperability
In general, interoperability refers to the ability of emergency responders to work seamlessly with other systems or products without any special effort. Emergency responders—emergency medical services (EMS), fire-rescue personnel, and law enforcement officers—need to share vital data or voice information across disciplines and jurisdictions to respond effectively to day-to-day operations, incidents, and large-scale emergencies.

Data must have common elements which are recognizable/exchangeable by all system users, enabling standardized analytical methods and decision making which lead to comprehensive situational awareness. Data collected and exchanged in a form/format compliant with NFPA 950 criteria can be more easily analyzed or exchanged between users. Non-compliant data may not be easily integrated with future data applications resulting in a loss of functionality.

Five critical success elements that must be addressed to achieve an interoperable data solution:

- Governance
- Technology Planning
- Policies
- Process/Application Development
- Training and Exercises

4.4.1.3.2* Scalability

A technology plan in order to be successful must incorporate the concept of scalability. Scalability implies that the system design will accommodate expansion when requirements evolve, technology advances and/or funding becomes available. Historically it has proven most effective to build your system in manageable phases. The system needs to be able to expand as components become manageable and still leverage existing data. Adherence to the requirements in NFPA 950 will allow migration of valuable data as your system evolves.

4.4.1.4. Planning and Implementation of NFPA 950: An Overview of Implementing Technology and Technical Standards for the Fire Service

The single most important factor in successfully implementing technology within ANY organization is proper project planning and management. Technical projects seldom fail due to technology, rather their failure results from lack of consensus, poor budget planning, communication failure, and similar maladies. Many technical solutions are attempted without a clear understanding of how the “end-game” or final product should work and are implemented in vacuum that fails to consider the full realm of potential users. We suggest, in the strongest of terms, that implementation of technology within the fire service, and more specifically in adherence to NFPA 950, commence with a thorough and well-guided needs assessment process. ALL technical solutions must be standards-based and interoperable. Overall, a needs assessment process should proceed according to the following roadmap:

1. Identify the problem.
2. Identify all parties “touched” by the problem.
3. Convene a group to guide the needs assessment process.
4. Conduct start-up educational sessions.
   a. Interview all potential participants and users.
   b. Synthesize results to create the optimal solution.
   c. Draft an implementation plan.
   d. Train. Train again.
   e. Put the solution in play.
   f. Maintain and improve.

4.4.1.4.1 Identify the Problem

Problems often appear obvious and their technical solutions seem inherently simple. For example, a department may dispatch companies to incidents using computer aided dispatch (CAD), use a separate system to track responding or available companies (automated vehicle location, AVL), and individual companies may use GPS for navigation – none of which work in an interoperable manner. Systems integration in this scenario is highly desirable and, as all three systems share spatial technologies as a common base, this goal should be easy to relatively easy to accomplish. The temptation to contract a vendor to supply a new, integrated solution or to patch together existing technical solutions is high. However, a deeper analysis of the problem quickly reveals a myriad of challenges: numerous levels of users and managers at multiple levels and across many organizational entities are likely involved in the problem and any resultant technical solution. Complexity increases exponentially if interoperability with neighboring departments and jurisdictions is required. Lines of authority for planning, managing, and financing a solution quickly become blurred. By carefully defining the problem and the desired outcome before commencing any action, managers may avoid many failure points.

The needs assessment process works best by identifying the initial problem and then using group-think to fully scope the issues at hand and creates the requirements which define the solution. Needs assessment findings should result in a clear problem statement, a listing of concerned parties, and a senior/executive level mandate for a solution, all of which are backed by a consistent set of documents generated by a thorough understanding of the problem. The outcome of a needs assessment is a set of standardized documents that describe what it is that has to be created. For example, a directive that justifies the creation of a system. The resulting system must standards based and interoperable.

We strongly recommend that departments recognize the appropriate role of technology and standards in creating solutions. Technology must be used to improve efficiency – whether through improved response times, reduced staffing requirements, improved emergency response outcomes, or other measurable result. Implemented technologies must be interoperable within the larger context of fire service operations and management as achieved through the use of standards such as NFPA 950. Technology should NEVER be implemented for technology’s sake (the “gee-whiz” factor).

Finally, the problem statement and the need for finding a solution should be issued as a department directive or mandate from the most senior executive level (eg., Chief of Department or higher). This provides clear, empowering guidance to seek a solution to the problem and ensures management buy-in to the solutions process. Failure to do so may result in conflicting
guidance, potential “turf wars”, and a fragmented or compartmentalized solution that minimizes return on investment.

4.4.1.4.2 Identify the Parties Involved

The needs assessment process is completed through a group empowered by a single convening authority. The group should represent the broadest possible base of potential stakeholders and include system users, managers, creators, and subject matter experts. This approach not only guarantees a diversity of ideas, but facilitates buy-in at all levels and promotes a high standard of quality throughout the development process which mitigates “not invented here” syndrome and creates a sense of ownership among all stakeholders.

Successful needs assessments are as inclusive as possible at the outset. It is best to invite not only obvious stakeholder representation such as firefighters, dispatchers, and IT support personnel but include other potential contributors or collaborators to maximize return on investment. Additional participants should include potential data contributors (tax assessor’s office for parcel or structure data), non-traditional users that may be called upon during times of extreme need (emergency management personnel), and needed subject matter experts. The resulting solution may benefit not only an individual fire department but the larger community thereby significantly increasing return on investment and/or identify additional funding contributors.

4.4.1.4.3 Convene a Committee to Guide the Needs Assessment Process

The department directive and listing of stakeholders and participants provides the basis for a committee that will guide the needs assessment process and development of a subsequent implementation plan. The departmental directive shall provide the basis for a charter document that establishes operational policy for the committee – rules of order, reporting processes, meeting frequency, areas of responsibility, etc. The listing of stakeholders determines the size and constituency of the committee. Committee composition should be weighted appropriately and based upon the degree of final stakeholder involvement.

4.4.1.4.4 Conduct Startup Educational Sessions

Initial needs assessment committee meetings should serve to further revise the problem scope and educate participants about potential solutions. A determined effort should seek out case studies that document how similar problems were resolved using a standards-based approach in other places. When permissible, committee members should experience solutions first hand. These case studies and experiences guide the development of an educational session about the problem and potential range of solutions for presentation to the larger stakeholder audience by their representative committee members. Again, this approach facilitates maximum buy-in and establishes a high-level of competence and awareness among stakeholder organizations.

Education sessions represent an important opportunity for bi-directional information flow. Prudent committee members will capture comments from the stakeholder audience.

Educational sequencing as recommended in this guide for technology efforts
a. Interview all potential participants and users.
b. Synthesize results to create the optimal solution.
c. Draft an implementation plan.
d. Train. Train again.
e. Put the solution in play.
f. Maintain and improve.

4.4.1.5 * Technology Planning:

- 4.4.1.5.1 Needs Assessment
  - Is completed by a group through a single convening authority.
    - A diversity of ideas.
    - Ensuring buy-in
    - Quality assurance
  - Determine who the users are. (What challenges are faced by potential users that can be solved or eased by technology.)
    - Document Work Flow processes (determine how things work now.)
    - Determine the level of technical competences of users.
    - Identify what a final product as applied to the desired outcome looks like.
  - Identify the problem
    - Look at work flow process of target audience and identifying where technology will serve as a force multiplier or improved efficiency.
  - What is the desired outcome.
    - A technological system of some sort that meets the requirements established by the needs assessment process and the NFPA 950.
  - A list of applications to be developed
    - These are not software applications to be purchased.
    - This is a listing of how they are going to use technology to solve a problem. Example, one application maybe computerized pre-plans.
  - Type of functionality required
    - These apply to what functionality is required within each application to accomplish the goal. Example, would be a map that depicts the occupancies with preplan information.
  - Data requirements
    - Data designs that meets NFPA 950.
    - Identify what data are needed to support each application and there inherent functions.
    - Note to Talbot: add data independence
  - Data maintenance procedures.
Where we identify who, what, when, where, and how each data element will be created and maintained. (This includes who financially supports these activities.)

- How is it going to be managed.
  - Fiscal (Who and how are they funding it.)
  - Accountability (Who manages the people and hardware, etc.)
  - Pitfalls.
    - Common Mistakes:
      - Use the data to drive the needs assessment process.
        Peoples needs drive the needs assessment process.

4.4.1.5.2 How To conduct A Needs Assessment
- Conduct a startup seminar that seeks to educate potential system users about the problem and the full range solutions.
- Interview each potential user and document their job as it relates to the stated problem.
- Obtain buy-in from each person interviewed.
- Document the need assessment interview and subsequent planning process in a standardized way.
  - Capture each application and its frequency of use or its importance.
  - Identify data required for each application.
  - Document workflow
  - Document dataflow
  - Summarize each application with respect to each bullet above.
  - Prioritize

4.4.1.5.3 Develop a Implementation Plan
- A implementation plan should have the following elements and which include the stated purpose as well as timelines and budgets required to make the following actions possible:
  - The results of the need assessment
    - A systematic look at how entities within an organization view and use data.
    - Enhanced communication among users of like data types
    - Provides a basis for future learning.
  - Develop a theoretical framework
    - Authoring how the ideal system works in non-technical terms.
  - Survey of Available Data
    - All source (internally and externally) review of existing data that may serve the application.
  - Survey of GIS Hardware and Software
    - This is an evaluation of potential hardware and software (which should be NFPA 951 compliant) elements and combinations required to execute the application.
  - Detailed Database Planning and Design
Translation of the theoretical model (how the ideal system works in non-technical terms) into the logical model (technical terms) that is used in technical terms by the application.

- GIS Application Development
  - Applications should be developed to use standardized data formats and exist independent of the data sourced. Data independence in accordance with “NFPA 951”

- Database Construction
  - The assemblage of all required data elements into a single database.

- Pilot Study/Benchmark Test
  - Trial run that is high profile.

- Review/modify the original plan

- Begin training.

- Acquisition of GIS Hardware and Software
  - Make the purchases. NOTE: hardware and software are not purchased until late in the overall process. This prevents unneeded depreciation of software or hardware.

- GIS System Integration
  - Release the new system “Go Live” with it touching other live systems. Moving from demonstration to production.

- GIS Use and Maintenance

Chapter 5. Data Administration

5.1 Internal and External Data

Once you have a clear vision, strategy and technology plan developed to guide the implementation of your system, this plan will guide the actual administration of your data environment. Section 5 frames the elements necessary for successful data administration. Developing policies and guidelines for the effective administration of an information system should be based upon and is a function of your system architecture. Management of issues associated with data administration such as integration, security, replication, modification to, import and translation processes and updates should be included in the policy as per Sections 5.1 and 5.2 of the standard.

The approach the committee has chosen recognizes a distinction between internal and external data. This distinction is based upon the extent to which the data has been manipulated and integrated into the agency’s information environment. The committee recognizes that these distinctions will vary depending on the specific system architecture and environment, local and regional policies governing data, and the choices of the strategic planning committee. While the approach will vary based on these things, the strategic planning process should generate consensus on this distinction, and should be addressed directly in the policies governing data administration.
For the purposes of this document, external data is defined as Data acquired from and/or maintained by an outside source. Once data is integrated and maintained within internal information systems, it becomes internal data and should follow the internal data criteria as per Section 5.2 in NFPA 950. While the same criteria should apply to validating internal and external data, policy definitions that affect the distinction between the data types should include specific language regarding the limitations and associated risks of using external data sources.

5.1.1 Data is a fundamental key in the success of your ability to meet the functional requirements of your agency. Planning, Mitigation, Response and Recovery all depend on the accurate collection, maintenance and dissemination of data. Chapter 4 discusses Technology Planning and identifies what information you need to support the functions and requirements of the fire service. After reviewing and analyzing your technology and data needs, it often becomes clear that additional data is needed. Additional data sets must be identified or new sources of data may be needed in order to provide the information and reports that are needed to adequately perform your job. This information will be used to develop your data requirements for the new system.

5.1.2 Data can be stored in many formats and many places. In order to make use of the information, the data needs to be structured and compiled in a consistent and well thought out and documented manner. Digital data is typically stored in a database or tabular structure. This structure is defined by the user, and in order for it to be valuable and shared with other users the data needs to be consistently represented in a standard format. In order to accomplish this goal, you need to consider all aspects of data from the acquisition, storage, use management and exchange both internally and externally.

5.2 Management/Organization – There should be an overall data management plan for how the data is to be used, shared and exchanged. This will require a thoughtful focused assessment of what information is collected, how it is used, and what is desired for your department as well as other departments. Objectives will be to minimize data redundancy, data entry errors, and create interoperability. Standardized reporting is needed for state and local agencies, internal analysis, as well as constituents that you serve.

Data management is similar to designing a blueprint for building a house. Before you start building, you need to specify what materials will be used, how things will be put together, with a plan for how the systems will interoperate. Managing data is very similar, and structures need to be in place to support the desired functions and needs. A poorly designed data structure may inhibit you from achieving your goals, and will require constant redesign and restructuring of the data.

5.3* Data Models and Data Dictionaries.

Some of the tools available for building and managing data include data models and data dictionaries. The data model should serve as the foundation of the database. A data model describes how data is represented, stored and accessed. Data models define the
specific data elements and their relationships. A database schema is based on the model, and defines the objects that are included in the database. The data dictionary specifies the details of the objects in the database. The data dictionary contains information about the database such as the attributes and the format. The data dictionary is a useful tool when data is shared. Because the data dictionary standardized the data elements, application developers and database managers can share the information more easily.

See Appendix 5.2 for more detailed information on data models.

5.4* Data Sources and Acquisition

Acquiring data requires you to consider how the data is going to be used. Issues of accuracy, format, licensing, maintenance and security are areas that need careful consideration. There are many sources and methods that can be leveraged to obtain or create data. These may include sources within your own agency, from other agencies, commercial data providers or data that you develop.

Requirements for data acquisition should be defined by the specific uses and its associated applications.

5.4.1 Existing Data. Chances are that much of the data needed to support your agencies data requirements already exists in some format. The challenge becomes in knowing where to look for it.

5.4.2 Intra-Agency Data. Your first step in determining data sources and acquisition should be to investigate what data is developed and available to you from your local agencies. Many local governments have invested in extensive data gathering and collection and may already have many data elements that will be useful to supporting your functions as a fire agency. Because much of the data that is used in the fire service is spatial in nature, determining if your local agency utilizes Geographic Information System (GIS) technology is a key question to answer. If there are local GIS resources available, contact the GIS manager or lead person. They will help you document and determine what geographic data may be available to you. Establishing a strong relationship with your Information and Geographic Information professionals will be key as you establish, implement and maintain your technological and data infrastructure.

Examples: police, tax assessor, public works.

5.4.3 Free or Open Source Data. There are many sources of data that are publicly and freely available. This data comes at varying degrees of accuracy and in many formats. As with any data, you will need to verify that it meets the requirements to support the functions you are using it for.

Examples: USGS, Geography Network, etc.

5.4.4 Other Agency Data. Other sources of data can come from other governmental or quasi-governmental agencies. These might include County, State or Federal governmental agencies, Associations of Government and Regional Authorities. Additional data may be available from Water, Wastewater or other Utility districts. If your internal structure has GIS professional staff, they will be a good resource for what data other agencies have and may make available.
for your use. They may already have agreements with these other agencies for the use of their data.  

**5.4.5 Commercially Available Data.** Another source for many types of data is through commercial data vendors. Many companies collect, compile and maintain a wide array of information. This data can be purchased or licensed for your use.  

**5.4.6 New Data.** In each case, care must be taken to ensure that the accuracy and resolution is identified and consistent among sources, and is adequate for the designated purpose.  

**5.4.6.1 Manually Generated Data.** There are numerous methods for creating data to populate databases or GIS. These include: Manual digitizing or data entry, document or map scanning and conversion of existing digital data.  

**5.4.6.2 Data collection.** Data can be generated new from sources such as raw GPS data, remotely sensed data such as aerial photography, or by compiling sets of data from various sources, like spreadsheets to create a new dataset.  

**5.4.6.3 Derived data.** New data can be created from existing information in systems such as CAD, RMS and AVL. New data is generated from the output of these kinds of applications. Derived data also includes the results of analysis such as drive time polygons and risk layers.  

**5.5 Security**  

**5.5.1 Permissions (Access & Sharing)**  
Some of the data collected may be subject to limitations related to distribution, public dissemination, or disposition of the information. An example of this could include information related to critical infrastructure, which may be needed by the Fire or Emergency Services. Access to the information may be limited to certain personnel, on a “need to know” basis. The ability to access information may also be limited for certain types of data.  

One major consideration that should be factored into security policies is the ability for information to be accessed by the public through the Freedom of Information Act and other data security Federal state and local regulations, laws and ordinances. Data can be categorized as For Official Use Only, For Internal Use Only, categorized for select individuals who meet specific criteria, or even classified at various levels with appropriate legal penalties for dissemination. Access can be limited based on previously established rules, which may vary by agency and by department. These information sharing rules should be documented in writing and periodically reviewed. It is important to note that there are various ways to share information (or limit information sharing) including allowing access only to selected fields, sharing only data that meets specified criteria, or data that falls inside or outside of predefined ranges, as well as sharing in a read-only format. Data can
pushed (all or selected fields) out one time or at periodic intervals, or pulled from either individual sources or a central data warehouse that is populated by contributing agencies.

Once the information is gathered, similar rules may apply to who the information can be shared with. These rules may be the same for all agencies, or individually customized as needed.

5.5.2 Security Limitations
Once it has been established that there are limitations to the sharing of information, security requirements must be put in place. Information can be secured by physical parameters (locked, digital keycard, security token) or software parameters such as passwords and biometrics. Ideally, a two factor authentication is recommended using something you know (i.e. password) and something you have (i.e. digital security token.

Once data has reached the end of its useful life, much of the data will become obsolete on its own. All open source/readily obtainable information can likely be disposed of in the easiest manner, however, many fields may retain sensitive information, and will need to be disposed of by approved methods. Information can be archived, destroyed, or returned to the source. In addition, the ability to share information with other agencies (or even internally) may be limited. Distribution must be made only within approved circles.

5.5.3 Audit/Review include FOIA
Once the security and distribution rules have been established, it is important to review these policies periodically to ensure that they are being followed and that they are still appropriate.

5.6 Maintenance
5.6.1 Quality Assurance and Quality Control
The importance of quality data cannot be overstressed. Good data is critical to the analysis and reporting phase, which is the very reason for collecting data. Where specific accuracy criteria exists, it should be stated so that errors are known and bound. Data resolution should be identified, since the accuracy can only be as good as the resolution of the data. The quality control function will include sampling of data to determine if it is within the required specifications. Report sampling shall also be performed to ensure that report calculations and other data manipulations are correct. The quality assurance process includes validating the process of collecting the data and optimizing the process both from a data collection standpoint as well as a data accuracy perspective, making sure that data is not corrupted, truncated, or transposed in the process of collecting information.

5.6.2 Metadata (models and schema)
Metadata describes the data that is being collected, providing further details about the information. Good Metadata simplifies the maintenance process by
documenting the information that is collected and stored, as well as describing how it is used. Metadata would include a description of the database schema, providing information on the structure and content of the data being collected. Metadata would include such characteristics as the name, size, data type, as well as field lengths, hierarchical information, and information about the data source.

5.6.3 Update intervals/methods (per data element/type)
An up-to-date accurate address model can be used by many agencies to support many of their business functions. Successful data model implementations should include a plan and process to have contributing agencies regularly use and update the data.

The update process will define parameters such as how often the information is updated, how to handle conflicts, and archival instructions. Updates may vary by data type, to include partial updates (such as an individual layer rather than the entire database). Update frequency may vary with the type of data. Some fields may be updated as new information becomes available, other fields may be updated on a monthly/quarterly or other periodic schedule.

5.6.4 Purge and Retention
As new information is updated, or as existing information becomes dated, a process is needed to define how long the data is stored and what to do with old data. Is the data purged, archived or kept on the system? How are conflicts handled as new data is obtained? What is the medium for retention (disk, tape, on-line storage…)? In addition, there may be security constraints on the old information such that a simple deletion may not be adequate, and additional processes or procedures may be needed (i.e. return information to supplying agency, purge via approved methodologies, or just archive old data and maintain for a specified period of time.

5.7 Data Exchange

5.7.1 Spatial Data

5.7.1.1 Spatial Data Component
A spatial data component gives a relative or absolute location to a piece of data. It can be an address or a geographic coordinate such as Lat/Long or USNG. This becomes a framing mechanism which allows the user of that data to establish where it is in relationship to the surface of the earth.
5.7.1.2* Accuracy and Precision

Data collection devices and data services identify accuracy and precision levels in their specifications. Accuracy is defined as the relative difference between the actual and measured location. Precision is defined as the repeatability of measurement within a given tolerance.

It is important to be aware of the specifications and limitations of the device in use.

The overwhelming majority of data required for use within the fire service when captured within 10 meters of true location is of sufficient accuracy for meeting the requirements of 950. See appendix for more additional references.

5.7.1.3 Geographic Coordinate system

A geographic coordinate system (which by definition is unprojected) represents the surface of the earth in three dimensional (round) geometry, such as degrees, minutes and seconds. A projected coordinate system, such as State Plane or Universal Transverse Mercator (UTM) converts three-dimensional units into two dimensional (flat) or planar units such as X,Y pair.

Using an un-projected Geographic Coordinate System, like longitude and latitude, facilitates the exchange of spatial data between different software platforms, agencies and systems.

5.7.1.4* Symbology

Symbols are used to represent and quickly communicate information about various features. Having a standard symbol set simplifies the use of exchanged spatial data. An attribute must exist for symbol class which depicts the geographic feature or resource type and capability using an appropriate symbol established by the Federal Geographic Data Committee Homeland Security Working Group and the United State Geological Survey Topographic Mapping Standard for Symbology. Other specialized symbology shall be clearly defined and agreed upon as part of the technology planning process established in Section 4 of this Guide.

5.7.1.5 Labeling

Labels are used to identify and quickly communicate information about various features. Having label attributes already available in the dataset simplifies the use of exchanged spatial data. If the dataset lacks the attributes needed for labels, the user will have to create or calculate them in order to produce meaningful maps quickly.
For example, to display the coordinates of a helicopter landing zone on a map, the Lat/Long coordinates need to be recorded as attributes. If they are not an attribute, they need to be calculated before they can be labeled.

The minimum attributes required for spatial data to be exchanged are listed in NFPA 950 5.3.1

5.7.1.5* United States National Grid (USNG) is the national standard coordinate system established by the Federal Geographic Data Committee and was recognized by FEMA in 2001. It is NFIRS compliant, and is a useful supplement to all addressing needs.

5.7.2 Non-Spatial data
ASCII standard is an accepted format for exchanging text data. Other commonly accepted non-spatial file formats, such as JPG and WAV files, can be readily exchanged and used in their native formats. Using these industry accepted standards facilitates the exchange of non-spatial data between different software platforms, agencies and systems.

The formats required for non-spatial data to be exchanged are listed in NFPA 950 5.3.2

These standards have been identified for their universal acceptance and use.

5.7.3. TCP/IP Internet Protocol (IP)
TCP/IP standard is an accepted protocol for transmitting and receiving data. It is the most common and incorporates acknowledgment of data transfers. Using these industry accepted standards facilitates the transfer and exchange of data.
Chapter 6: Data Sharing and Exchange

6.1.1 Introduction.

This chapter sets forth the technical specifications and business rules all fire departments should follow in creating an interoperable data sharing and exchange environment. The technical specifications for acquisition, display, and management are set forth in the previous chapters.

This chapter includes a description of the fundamental data components that need to be exchangeable and specifies the format for each of those data components.

This in no way limits the AHJ from creating local policies with additional requirements, but for data exchange to be compliant, all components must, at a minimum, be in the formats specified within NFPA 950.
6.2. Addresses

This standard follows the protocols established by the Federal Geographic Data Committee and maintained by the U.S. Census Bureau.

This format is most often and easily recognized by geocoding engines. It is readily accepted and recognized by responders and the general public.

Addressing in many jurisdictions has traditionally evolved from non-standards based conventions which do not follow these standards. This often creates challenges for agencies attempting to comply with nationally recognized standards such as NFPA 950. Several approaches exist to resolve these discrepancies. The jurisdiction should adopt a strategy which best fits the data and resource environment within which they operate.

The most direct and short term method for becoming compliant with NFPA 950 is to supplement the street address with a geographic coordinate (per NFPA 950, USNG or Lat/Long). While this will not make your address data NFPA compliant, it will allow you to deliver services on time in the right place without a significant change to your jurisdiction’s naming conventions.

Over time the agency can move towards becoming compliant through various conversion and translation methods. Recommendations and references regarding these options are in the appendix. The committee recommends these options to help you solve system shortcomings in the near term to support your operational success. This will allow you to become increasingly compliant over time without impeding short term operational success.
6.3. Date
This standard follows the most commonly recognized protocol currently in use in the United States. The committee recognizes that other date schemas are available and preferred by some agencies. This format is widely recognized by civilian and governmental agencies.

6.4. Time
It is recommended that the time stamp be recorded based on the incipient incident record time reference.

   6.4.1 Decimal time is a universal standard format which allows for numeric computations.

   6.4.2 Time shall be referenced to the local time zone and UTC. The committee acknowledges that storing the date twice is redundant, but recognizes the inconsistency of time zone applications across regional boundaries.

   6.4.3 Time calibration is a critical component of all incident record keeping because of the legal implications associated with incident response. As such, calibration provides a legal framework for incident records.

6.5. Incident typing information

   6.5.1 The NFPA 950 standard recognizes the standard format for incident typing as based on the National Fire Incident Reporting System (NFIRS) and the National EMS Information System (NEMSIS) currently required by most U.S. states and territories. This framework establishes a transferrable data set and as such meets the intent of 950.

As such, this standard does not imply the use of any particular software for recording incident data. This component of the standards refers only to the typing standards within these frameworks.

   6.5.2 The “plus 1” append provides the local jurisdiction with an opportunity to amend data for local use. This gives jurisdictions the ability to review subsets of data for incident analysis.

6.6. Text

   6.6.1. ASCII is a universally accepted text standard. As such, compliance with this protocol will enable ready transfer of text data using all of the standard data exchange methods specified herein.

6.7. *CAD, RMS, CAD/CAD, CAD/RMS and RMS/RMS exchange
6.7.1. Design and construction of CAD/CAD, CAD/RMS and RMS/RMS interfaces and applications shall comply with all technical elements set forth in Chapters 4, 5 and 6 of this standard.

The intent of this language is to emphasize the importance of a seamless flow of data among data subsystems. This will enable appropriate utilization of data assets throughout the organization, and into the entire public safety ecosystem. This environment will enhance data accuracy and drive the ability to leverage data resources for data driven decisions, comprehensive situational awareness, and essential communications to all stakeholders in the community. In short, unlocking data assets from proprietary systems and structures will provide the data environment which can support effective management.

The integration of all department systems, including but not limited to CAD and RMS, must be considered at the design level. This standard specifically calls out CAD and RMS systems because these are the dominant nomenclature for computer applications currently in use to perform these functions at the time of this writing. However, this standard is written with the full understanding of a rapidly changing landscape. The implicit intention of the committee in the writing of 950 was to set forth a standard which applies any information system designed to aid in the analysis, visualization, distribution of data intended to support the fire department mission. This guidance is intended to be device and software agnostic and focuses only on the data structure and support systems required to satisfy workflow requirements.

Specific to incident response, this establishes the data framework required to support this essential mission element.

When an emergency occurs, digital data becomes an important backdrop to the entire sequence of events. From the moment a 911 call is received, an accurate incident location is the one attribute that ties together and sifts through all the other information available to support a successful outcome. When that location is stored in a modern, standards-based, enterprise GIS, it provides the foundation to everything else that follows:

- Call takers can confirm the accurate location of the incident.
- Station personnel can quickly reference the location on a large paper wall map on their way out the door.
- Digital route maps with standard symbology can augment the driver's mental image.
- Accurate hazard and hydrant locations support the scene size-up scenario forming in the company officer's mind.
- Preplan layouts in scalable formats provide lifesaving detail for search operations and attack strategies.

Information available at the right time to the right person can, make the difference between life and death. Call location, initial incident description, routes, locations of responding vehicles, water sources, exposures, hazards, access and egress—all are crucial, all are about geography, and all need to be right.
When fire personnel are dispatched, effective response results in arriving at the scene quickly with adequate resources and information to mount a safe and effective attack. GIS provides first responders a mission-critical tool for rapid response, enhanced fire fighter safety, and better decision support during an emergency.

None of this is possible without access to accurate and current data derived through planning activities which occur prior to the event. These planning activities are not limited to emergency response, but must also incorporate administration and prevention functions. Planning is a multi-faceted process that extends across all functions and programs within a fire department.

As described in Chapters 4 and 5 of this document, planning must include a focused needs assessment and should be an ongoing process. Effective data management throughout the planning process leads to meaningful information for enhanced decision making. Accordingly, an organization’s information management must reflect the organization’s ability to support the planning process. Access to current accurate, consistent data assets will create an environment for continual improvement process.

These elements/components of data availability are all centrally and fundamentally what this standard is about. Most current fire and ems data systems can support these requirements for data interoperability, but when these requirements are specified on the back end of existing systems, it becomes costly to implement and frequently the results are substandard.

The sooner the requirements are established upfront with a good plan and good requirements the more comprehensive and effective the results will be. These requirements must be applied to all systems, from planning through operations, establishing standards based strategy for information management, use and exchange across all systems.

Manage your planning process in a more integrated way to leverage the overall department strategic vision and plan as referenced within the body of this document in Chapters 4 and 5.

Prescriptive direction for accomplishing these strategies as set forth in Chapters 4-6 and are critical to effectively use the data exchange environment describe above. Examples of specific system requirements based on these concepts are provided in appendix…

Annex

General.

A1.1.1 Define “integrated information management system” – The Committee believes that in order for the data exchange concept to become a reality that all components must be integrated into a comprehensive information management system. All system components in this context
include computer hardware, software, and procedures designed to support the capture, management, manipulation, analysis and display of information.

This integration is the key element the Committee used in the development of the Standard and the Guide. By using this approach the Committee believes the environment allows for improvements and development of comprehensive, integrated data and management systems that leads to improved incident and organizational decision making.

A1.1.2a Data sharing at all operational levels and components refers to the vertical and horizontal integration data exchange. This enables the organization to share information seamlessly throughout.

A-1.1.2b Users seeking to implement NFPA 950 must be aware of the multi-faceted aspect of information systems. Constituent components include the personnel used to staff such systems and the training involved to make them efficient, the hardware and software systems chosen, the well documented processes which must be followed to achieve repeatable results, and the data stored or analyzed. While the scope of this document, NFPA 951, is to provide guidance and best practices about data capture, storage, manipulation/query, retrieval, and presentation, our focus is on doing such in an interoperable fashion.

A1.3.5 Planning and Analysis

Comprehensive situational awareness is only truly possible when an effective information management strategy helps fire department personnel combine appropriate data and analysis to answer the right questions. By performing these analytics, expanded sets of information become available to support all functions of the agency.

Characteristics of systems which support effective planning and analysis include:

- A system that supports the transformation of current and historic data into actionable information
  - Integration of information from disparate systems
  - Capture and reuse tradecraft (analytical models)
- Support community risk and vulnerability analysis
  - Augment firefighter safety
  - Community characteristics (physical & social)
  - Protection priorities (critical infrastructure)
  - At risk communities / neighborhoods
- Support pre-planning & response analysis
  - Resource optimization (staffing, location allocation)
  - Response analysis (routing, service areas)
  - Demand for service (Incident density maps)
- Support ROI Analysis
  - Strategic / Capital planning
• Share actionable information and knowledge
  • Command center
  • In field
  • Partner organizations

Benefits of such a system include:

• Improved understanding of the community and its landscape
• Ability to prioritize & mitigate risk
• Improved ability to preserve life and property, and reduce the consequences of emergencies
• Improved understanding of agency capacity and performance
• Quicker & more informed response
• Ability to develop a well informed incident action plan
• Improved level of service
• Improved coordination
• Informed citizens

Data Management

To accomplish these kinds of analytics, a fire department needs good information. Collecting, maintaining and accessing data is central to providing a data environment to support the full range of system requirements.

Characteristics of systems which support effective data management include:

• a system that supports the management of relevant and authoritative content
  • Leverages a common information model
  • Access to online content
  • Supports sharing across roles and jurisdictions
• Supports the ability to organize and discover information using a mission/role-based context
  • Mission (plan, respond, recover)
  • Stakeholders (internal & external)
  • Workflow focused
  • Support for metadata
• Supports access and exchange of information through multiple mediums
  • Intelligent Maps
  • Apps
  • Services (GP, locator, . . .)
• Provides the ability to collect information from multiple sources
  • Supports multiple platforms (desktop, mobile, web)
  • Supports integration with other information systems (web services)
  • Has the ability to capture information in real-time (mobile, web, other info systems)
Benefits of such a system include:

- Improved access to relevant information
- Improved protection prevention response and recovery
- Informed and consistent decisions
- Improved organizational efficiencies
- Reduced risk
- Positive public perception

Field Mobility

Increasingly data is supported on multiple devices for many different forms of field support. As any first responder knows, safe and effective tactical response actually begins well before an emergency ever happens through years of training, planning and information gathering.

Characteristics of systems which support effective field mobility include:

- Supports the effective exchange of information to and from the field
  - Integrated as part of overall system
  - Supports multiple mobile devices
  - Works in a connected or disconnected environment
- Supports effective and safe response
  - Supports fire ground accountability
  - Supports and accurate and up-to-date COP
  - Supports effective resource allocation
- Supports access to relevant information
  - Pre-plans
  - Routing
  - Hydrants / Water Sources
  - Community Assets / Hazards (Utility Networks)
  - Photo / Floor Plans
- Supports timely and accurate exchange of information and knowledge
  - Command center
  - In field collaboration
  - Mutual aid partners

Benefits of such a system include:

- Event assessment is quicker and more complete, ensuring timely and effective response
- Improved decision-making
- Better able to track, manage and prioritize field operations & resources
- More effective communication from and to the field
- Improved firefighter safety
- Improved public service
Situational awareness

Characteristics of systems which support effective situational awareness include:

- Enables an up-to-date and accurate comprehensive view of operations
  - Supports multiple platforms
  - Supports sharing across roles and jurisdictions
- Supports the ability to collect, organize exchange and analyze authoritative information
  - Can be leveraged before, during and after emergency incidents
  - Supports the ability to collect and leverage field observations
- Presents knowledge in an easy to understand role-based interface
  - Workflow driven
  - Question & answer oriented
  - Map-centric
  - Location aware
- Provides access to authoritative information
  - Basemaps
  - Operational information
- Is accessible anywhere – anytime
  - Command center
  - Mobile – in-vehicle or personal device

Benefits of such a system include:

- Improved ability to manage and monitor operations
- Improved decision-making
- Reduced risk
- Ability to measure organizational performance
- Improved internal and external communications
- Effective and efficient use of resources and investments
- Safe and satisfied constituents

Designing and building a standards based integrated information management system will provide numerous benefits to the agency. As well, designing and building standards based integrated information management system will provide numerous benefits to partner organizations with shared goals and objectives. These include jurisdictional, regional, state and federal public sector partners as well as private sector and community group organizations with a shared interest in reducing risk and improving safety.

Implementing such a vision will provide the agency with more information, more sources of data to draw from, and supplemental sources to aid in the decision making process. Shared and exchanged data enables smooth flow as the incident escalates. Data accuracy also becomes
critically important in this process, because inaccurate or incomplete information can lead to poor decisions. These decisions can have an impact on first responder safety and the public.

A-4.3 The basics needs assessment process required for adequate design and performance, are best found in the following references.


A. 4.4.1.1 For additional information on how information technology and GIS are used in the fire service see


A-4.4.1.4

Guidance with respect to specific hardware and software performance requirements and expectations may be found at the link below:


Investment in personnel trained to use information systems, especially those with a geospatial context represent by far the largest investment of time and resources. The National Geospatial Advisory Committee provides sound advice for workforce development in support of efforts such as those proposed herein:


4.4.1.1.1.14* The MapSARGroup has developed a set of protocols for using GIS to support Wilderness Search and rescue operations. These protocols can be extended to other types of SAR events as well. Access to group resources is open and available at no charge. To request an invitation to join the group website go to: http://www.mapsar.net/

A-4.4.1.1.1.18 For information on GIS use within ICS, see the National Wildfire Coordinating Group GIS Standard Operating Procedures on Incidents:

A-4.4.1.1.1.19 For information on GIS use within coordination centers, see the National Alliance for Public Safety GIS Geospatial Standard Operating Guidance for Multi-Agency Coordination Centers:

4.4.1.3.2 For scaling across the digital and paper environments see:

A-4.4.1.5 The Capability and Readiness Assessment Tool Prototype prepared by the National Association for Public Safety GIS (http://www.napsgfoundation.org/) provides a video and general guidance about the inclusion of geospatial information for fire service information management and use. This tool is available from:

http://carat.napsgfoundation.org/index.cfm

A-5.3 Data Models:

Managing and integrating disparate data streams is at the core of NFPA 950. Environmental Systems Resource Institute (ESRI) provides a solid geospatial data model in the work below.

Data model describes the thematic layers used in the application (for example, hamburger stands, roads, and counties); their spatial representation (for example, point, line, or polygon); their attributes; their integrity rules and relationships (for example, counties must nest within states); their cartographic portrayal; and their metadata requirements.

The goal of Data Models is to provide a practical template for implementing GIS projects. Common data models are key to making better decisions based on available geographic information and are designed to provide immediate and long-term benefits to people working on real GIS projects while supporting existing standards.

Organizations representing the fire and emergency services have partnered with Esri to develop a national GIS data model to support regular and disaster-related operations at the local level. This effort will complement and extend existing national geospatial data models. The leadership team for the project includes representatives from the Metropolitan Fire Chief and Volunteer Fire Sections of the International Association of Fire Chiefs (IAFC), The National Association of State Fire Marshals, The National Alliance for Public Safety GIS (NA-PSG), and GIS specialists
from the public and private sectors. The US DOT Pipeline and Hazardous Materials Safety Administration (PHMSA) provided initial leadership and project support.

The purpose of this project is to develop a national model for managing geospatial data related to fire operations at the local level. The results of that initial research have been incorporated into public safety section of the Esri Local Government Information Model

A-5.4 Geospatial data can be found through a number of local, regional, and federal sources, or may be created by a fire service agency. External sources include internet map services (web services) and internet portals. For guidance on assembling local datasets, Fire Mapping: Building and Maintaining Datasets in ArcGIS describes a process and sources for finding, assembling, and maintaining geospatial data.


A-5.7.1.2 For more info on precision and accuracy issues see: http://www.saigis.com/geo315/wk2/errorsinGIS.pdf

A-5.7.1.4 There are several standard symbology sets that have been developed for emergency response and the fire service:


NWCG ICS Symbology http://gis.nwcg.gov/gstop_symbol.html

NAPSG Symbology Working Group https://sites.google.com/a/publicsafetygis.org/napsgcollaborate/pre-planning-working-group-3


A-5.7.1.5.1 The official USNG website is www.fgdc.gov/usng

A.5.7.2 To standardize the exchange of data two established protocols are specified as: XML for the transfer of non spatial data elements; and GML for the transfer of geospatial data elements.

Annex B: Informational References
B.1

A description of geospatial terms may be found in A to Z GIS: An Illustrated Dictionary of Geographic Information Systems:

B.2

Other helpful websites:

- **ESRI Data models** – Downloadable data models, white papers, posters

- **Standards for interoperability**
  - [http://www.opengeospatial.org/standards](http://www.opengeospatial.org/standards)

- **Geospatial Intelligence Standards (GEOINT, NCGIS)**
  - [http://www1.nga.mil/ProductsServices/geointstandards/Pages/default.aspx](http://www1.nga.mil/ProductsServices/geointstandards/Pages/default.aspx)

- **USGS National Geospatial Program**

- **Federal Geographic Data Committee**

- **Subcommittee for Cadastral Data**
  - [http://www.nationalcad.org/](http://www.nationalcad.org/)

- **North Carolina Parcel Data Draft Guideline (PDF)**

- **International Organization for Standards (ISO) TC 211 Geographic Information/Geomatics**

- **PDF describing the ISO Technical Committee 211 and its scope of work**
Item 12-10-17
September 28, 2012

To:
Mr. James Pauley, Chair
NFPA Standards Council

From:
Chair William Peterson
NFPA Correlating Committee on Fire Fighter Professional Qualifications (PQU-AAC)
Chair Greg Noll
NFPA Technical Committee on Hazardous Materials Response Personnel (HCZ-AAA)

Re:

Mr. Pauley:

The Technical Committee on Hazardous Materials Response Personnel has been preparing a preliminary draft of the document. Recently, the TC was balloted to release the document to the Correlating Committee. The ballot results are available.

Additionally, the Correlating Committee on Professional Qualifications was balloted to release the document to the Standards Council. The ballot results are available.

Your approval to release the draft will give opportunity for public input.

Thank you in advance for the Standards Council’s consideration.

Respectfully,

Tom McGowan
Staff Liaison
MEMORANDUM

TO: NFPA Technical Committee on Hazardous Materials Response Personnel

FROM: Stacey Van Zandt

DATE: September 10, 2012

SUBJECT: NFPA 1072 Draft Release TC Final Ballot Results

The Final Results of the NFPA 1072 (Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications) Draft Release Letter Ballot are as follows:

32 Members Eligible to Vote
3 Not Returned (Baxter, D’Onofrio, and Sprifke)
29 Affirmative on All (T. Miller and R. Raksnis – affirmative with comment)
0 Negative
0 Abstentions

An affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:

\[ \frac{32 \text{ eligible}}{2} = 16 + 1 = 17 \]

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.
Technical Committee on Hazardous Materials Response Personnel


Approve the preliminary draft of NFPA 1072.

X AFFIRMATIVE  _____ NEGATIVE*  _____ ABSTAINING*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a negative or abstaining vote.

I strongly believe that the draft document has met the scope and intent of the TEC’s charge to our Task Group.

______________________________
Signature

THOMAS D. MILLER
Name (Please Print) PRINCIPAL, NFPA REP.

______________________________
Date

Please return your ballots not later than Friday, September 7, 2012.

RETURN TO:
Stacey Van Zandt, Project Administrator
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
svanzandt@nfpa.org or FAX: (617-984-7056)
Technical Committee on Hazardous Materials Response Personnel


Approve the preliminary draft of NFPA 1072.

X AFFIRMATIVE  _____ NEGATIVE*  _____ ABSTAINING*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a negative or abstaining vote.

Administrative Notes:

Section 3.3.6 (page 9): Please remove “The Chemical Transportation Emergency Response Center” from definition of CHEMTREC. All other parts of definition should remain. Our name is no longer an acronym. We should simply be referred to as CHEMTREC.

Section C.1.2.1(page 66): Remove “(formerly Chemical Manufacturers Association)” as this name has long since been removed. Also new address (effective 2010) for American Chemistry Council is 700 Second St., NE, Washington, DC 20002

[Signature]

Rick Raksnis
Name (Please Print)

September 7, 2012
Date

Please return your ballots not later than Friday, September 7, 2012.

RETURN TO:
Stacey Van Zandt, Project Administrator
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
svanzandt@nfpa.org or FAX: (617-984-7056)
MEMORANDUM

TO: NFPA Correlating Committee on Professional Qualifications

FROM: Stacey Van Zandt

DATE: October 1, 2012

SUBJECT: NFPA 1072 Draft Release CC Final Ballot Results

The Final CC Results of the NFPA 1072 (Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications) Draft Release Letter Ballot are as follows:

8 Members Eligible to Vote
0 Not returned
8 Affirmative on All
0 Negative
0 Abstentions

An affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:

\[ \frac{8 \text{ eligible}}{2} = 4 + 1 = 5 \]

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.
Standard for
Professional Qualifications
20XX Edition

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This edition of NFPA 1072, Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications, was prepared by the Technical Committee on Hazardous Materials Response Personnel and acted on by NFPA at its (month) Association Technical Meeting held (date). It was issued by the Standards Council on (date), with an effective date of (date), and supersedes all previous editions.

This edition of NFPA 1072 was approved as an American National Standard on (date).

Origin and Development of NFPA 1072

To be completed after Second Draft

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CRA-USA Inc., VA [SE]
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**Richard J. Raksnis**, CHEMTREC, VA [SE]

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**Fred C. Terryn**, U.S. Department of the Air Force, FL [U]

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**Kenneth W. Uzeloc**, Calgary Fire Department, Canada [E]

Rep. Canadian Association of Fire Chiefs

**Dennis L. Wilson**, Dallas Police Department/Bomb Squad, TX [C]

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(Alt. to K. W. Johnson)

**James E. Podolske, Jr.**, U.S. Department of the Air Force, FL [U]
(Alt. to F. C. Terryn)

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(Alt. to T. D. Miller)

**Barry R. Weissman**, Weissman Consultants, NJ [SE]
(Alt. to W. R. Coffey)

**Nonvoting**

**Joseph J. Leonard**, U.S. Coast Guard, TX [E]


**Erik S. Glassman**, Oak Ridge Associated Universities, VA [E]

**Thomas McGowan, NFPA Staff Liaison**

*This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.*

**NOTE:** Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

**Committee Scope:** This Committee shall have primary responsibility for documents on the requirements for professional qualifications, professional competence, training, procedures, and equipment for emergency responders to hazardous materials/weapons of mass destruction incidents.
Chapter 1 Administration

1.1 **Scope.** This standard identifies the minimum job performance requirements (JPRs) for hazardous materials/weapons of mass destruction emergency response personnel.

1.2* **Purpose.** The purpose of this standard is to specify the minimum job performance requirements for service as hazardous materials/weapons of mass destruction emergency response personnel.

1.2.1 This standard shall define five levels for hazardous materials/weapon of mass destruction emergency response personnel including awareness, operations, mission-specific operations, technician and incident commander.

1.2.2 The intent of the standard shall be to ensure that personnel serving at the awareness, operations, mission-specific, technician and incident commander level for hazardous materials/WMD are qualified.

1.2.3* This standard shall not address organization/management responsibility.

1.2.4 It is not the intent of this standard to restrict any jurisdiction from exceeding or combining these minimum requirements. [1026, 2009]
1.2.5* Job performance requirements for each level are the tasks an individual must be able to perform in order to carry out the job duties. They are not intended to measure a level of knowledge. Together, the duties and job performance requirements define the parameters of the tasks of hazardous materials/WMD emergency response personnel for a specific level.

1.2.6* Hazardous materials/WMD emergency response personnel at all levels shall remain current with all requirements and applicable standards as determined by the authority having jurisdiction (AHJ).

1.3 Application. The application of this standard is to specify how and to what the requirements within the document shall apply to hazardous materials/WMD emergency response personnel.

1.3.1 The JPRs shall be accomplished in accordance with the requirements of the authority having jurisdiction (AHJ) and NFPA 1500, Standard on Fire Department Occupational Safety and Health Program and NFPA 472, Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents or NFPA 473, Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents.

1.3.2* It shall not be required that the JPRs be mastered in the order in which they appear. The AHJ shall establish instructional priority and the training program content to prepare individuals to meet the JPRs of this standard.

1.3.3* Performance of each requirement of this standard shall be evaluated by individuals approved by the AHJ.

1.3.4 The job performance requirements for each level shall be completed in accordance with recognized practices and procedures or as defined by law or by the authority having jurisdiction.

1.3.5 A person assigned the duties at the Awareness level for hazardous materials/WMD incidents shall meet all of the requirements defined in Chapter 4 prior to being qualified.

1.3.6 A person assigned the duties at the Operations level for hazardous materials/WMD incidents shall meet all of the requirements defined in Chapter 5 prior to being qualified.

1.3.7 A person assigned the duties of specific Mission-Specific Operations level for hazardous materials/WMD incidents shall meet the specific requirements defined in Chapter 6 prior to being qualified.

1.3.8 A person assigned the duties at the Technician level for hazardous materials/WMD incidents shall meet all of the requirements defined in Chapter 7 prior to being qualified.

1.3.9 A person assigned the duties for Incident Commander for hazardous materials/WMD incidents shall meet all of the requirements defined in Chapter 8 prior to being qualified.

1.3.10 The AHJ shall provide personal protective clothing and the equipment necessary to conduct assignments at hazardous materials/WMD incidents.

1.3.11 Prior to training to meet the requirements of Chapter 4, 5, 6, 7, and 8 the candidate shall meet the following requirements:

1) Educational requirements established by AHJ
2) Age requirements established by the AHJ
3) Medial requirements as developed and validated by AHJ and in compliance with applicable legal requirements
4) Job related physical performance requirements as developed and validated by the AHJ

1.3.12 Wherever in this standard the terms, rules, regulations, policies, procedures, supplies, apparatus, or equipment are referred to, it is implied that they are those of the AHJ.

1.4 Units. In this standard, values for measurement are followed by an equivalent in SI units, but only the first stated value shall be regarded as the requirement. Equivalent values in SI units shall not be considered as the requirement, as these values can be approximate. (See Table 1.4.)

****INSERT TABLE HERE****

Chapter 2 Referenced Publications

2.1 General.
The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.
NFPA 1026, . . . .

2.3 Other Publications.
2.3.1 U.S. Government Publications.
Title 18, U.S. Code, Section 2332a, “Use of Weapons of Mass Destruction.”

2.3.2 Other Publications.

2.4 References for Extracts in Mandatory Sections. (Reserved)
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* 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.
3.2.4 Shall. Indicates a mandatory requirement.
3.2.5 Should. Indicates a recommendation or that which is advised but not required.
3.2.6 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* Allied Professional. That person who possesses the knowledge, skills, and technical competence to provide assistance in the selection, implementation, and evaluation of mission-specific tasks at a hazardous materials weapons of mass destruction (WMD) incident. [472, 2013]
3.3.2 Analyze. The process of identifying a hazardous materials/weapons of mass destruction (WMD) problem and determining likely behavior and harm within the training and capabilities of the emergency responder. [472, 2013]
3.3.3 Area of Specialization.
3.3.3.1 Individual Area of Specialization. The qualifications or functions of a specific job(s) associated with chemicals and/or containers used within an organization. [472, 2013]
3.3.3.2 Organization's Area of Specialization. Any chemicals or containers used by the specialist employee's employer. [472, 2013]
3.3.4 Awareness Level Personnel. (29 CFR 1910.120: First Responder at the Awareness Level) Personnel who, in the course of their normal duties, could encounter an emergency involving hazardous materials/weapons of mass destruction (WMD) and who are expected to recognize the presence of the hazardous materials/weapons of mass destruction (WMD), protect themselves,
call for trained personnel, and secure the scene. *(See Annex X).* [472, 2013]

### 3.3.5 CANUTEC

The Canadian Transport Emergency Center, operated by Transport Canada, which provides emergency response information and assistance on a 24-hour basis for responders to hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

### 3.3.6 CHEMTREC

The Chemical Transportation Emergency Response Center, a public service of the American Chemistry Council, which provides emergency response information and assistance on a 24-hour basis for responders to hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

### 3.3.7 Competence

Possessing knowledge, skills, and judgment needed to perform indicated objectives. [472, 2013]

### 3.3.8 Confined Space

An area large enough and so configured that a member can bodily enter and perform assigned work but which has limited or restricted means for entry and exit and is not designed for continuous human occupancy. [472, 2013]

### 3.3.9 Confinement

Those procedures taken to keep a material, once released, in a defined or local area. [472, 2013]

### 3.3.10 Container

A receptacle used for storing or transporting material of any kind. [472, 2013]

### 3.3.11 Containment

The actions taken to keep a material in its container (e.g., stop a release of the material or reduce the amount being released). [472, 2013]

### 3.3.12 Contaminant

A hazardous material, or the hazardous component of a weapon of mass destruction (WMD), that physically remains on or in people, animals, the environment, or equipment, thereby creating a continuing risk of direct injury or a risk of exposure. [472, 2013]

### 3.3.13 Contamination

The process of transferring a hazardous material, or the hazardous component of a weapon of mass destruction (WMD), from its source to people, animals, the environment, or equipment, that can act as a carrier. [472, 2013]

### 3.3.13.1 Cross Contamination

The process by which a contaminant is carried out of the hot zone and contaminates people, animals, the environment, or equipment. [472, 2013]

### 3.3.14 Control

The procedures, techniques, and methods used in the mitigation of hazardous material/weapons of mass destruction (WMD) incidents, including containment, extinguishment, and confinement. [472, 2013]

### 3.3.15 Control Zones

The areas at hazardous materials/weapons of mass destruction incidents within an established/a controlled perimeter that are designated based upon safety and the degree of hazard. [472, 2013]

#### 3.3.15.1 Cold Zone

The control zone of hazardous materials/weapons of mass destruction incidents that contains the incident command post and such other support functions as are deemed necessary to control the incident. [472, 2013]

#### 3.3.15.2 Decontamination Corridor

The area usually located within the warm zone where decontamination is performed. [472, 2013]

#### 3.3.15.3 Hot Zone

The control zone immediately surrounding hazardous materials/weapons of mass destruction (WMD) incidents, which extends far enough to prevent adverse effects of hazards to personnel outside the zone. [472, 2013]

#### 3.3.15.4 Warm Zone

The control zone at hazardous materials/weapons of mass destruction (WMD) incidents where personnel and equipment decontamination and hot zone support takes
3.3.16 **Coordination.** The process used to get people, who could represent different agencies, to work together integrally and harmoniously in a common action or effort. [472, 2013]

3.3.17* **Decontamination.** The physical and/or chemical process of reducing and preventing the spread of contaminants from people, animals, the environment, or equipment involved at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.3.17.1* **Emergency Decontamination.** The physical process of immediately reducing contamination of individuals in potentially life-threatening situations with or without the formal establishment of a decontamination corridor. [472, 2013]

3.3.17.2* **Gross Decontamination.** The phase of the decontamination process during which the amount of surface contaminants is significantly reduced. [472, 2013]

3.3.17.3* **Mass Decontamination.** The physical process of reducing or removing surface contaminants from large numbers of victims in potentially life-threatening situations in the fastest time possible. [472, 2013]

3.3.17.4* **Technical Decontamination.** The planned and systematic process of reducing contamination to a level that is as low as reasonably achievable. [472, 2013]

3.3.18 **Degradation.** (1) A chemical action involving the molecular breakdown of a protective clothing material or equipment due to contact with a chemical. (2) The molecular breakdown of the spilled or released material to render it less hazardous during control operations. [472, 2013]

3.3.19* **Demonstrate.** To show by actual performance. [472, 2013]

3.3.20 **Describe.** To explain verbally or in writing using standard terms recognized by the hazardous materials/weapons of mass destruction (WMD) response community. [472, 2013]

3.3.21 **Dispersal Device.** Any weapon or combination of mechanical, electrical or pressurized components that is designed, intended or used to cause death or serious bodily injury through the release, dissemination or impact of toxic or poisonous chemicals or their precursors, biological agent, toxin or vector or radioactive material. [472, 2013]

3.3.22 **Emergency Response Guidebook (ERG).** A reference book, written in plain language, to guide emergency responders in their initial actions at the incident scene. [472, 2013]

3.3.23 **Endangered Area.** The actual or potential area of exposure associated with the release of a hazardous material/weapon of mass destruction (WMD). [472, 2013]

3.3.24 **Evaluate.** The process of assessing or judging the effectiveness of a response operation or course of action within the training and capabilities of the emergency responder. [472, 2013]

3.3.25 **Example.** An illustration of a problem serving to show the application of a rule, principle, or method (e.g., past incidents, simulated incidents, parameters, pictures, and diagrams). [472, 2013]

3.3.26* **Exposure.** The process by which people, animals, the environment, and equipment are subjected to or come in contact with a hazardous material/weapon of mass destruction (WMD). [472, 2013]

3.3.XX **Extinguishment.**

3.3.27* **Fissile Material.** Material whose atoms are capable of nuclear fission (capable of being split). [472, 2013]

3.3.28 **Hazard/Hazardous.** Capable of posing an unreasonable risk to health, safety, or the
environment; capable of causing harm. [472, 2013]

3.3.29* **Hazardous Material.** A substance (either matter — solid, liquid, or gas — or energy) that when released is capable of creating harm to people, the environment, and property, including weapons of mass destruction (WMD) as defined in 18 U.S. Code, Section 2332a, as well as any other criminal use of hazardous materials, such as illicit labs, environmental crimes, or industrial sabotage. [472, 2013]

3.3.30* **Hazardous Materials Branch/Group.** The function within an overall incident management system that deals with the mitigation and control of the hazardous materials/weapons of mass destruction (WMD) portion of an incident. [472, 2013]

3.3.31* **Hazardous Materials Officer.** (NIMS: Hazardous Materials Branch Director/Group Supervisor.) The person who is responsible for directing and coordinating all operations involving hazardous materials/weapons of mass destruction (WMD) as assigned by the incident commander. [472, 2013]

3.3.32* **Hazardous Materials Response Team (HMRT).** An organized group of trained response personnel operating under an emergency response plan and applicable standard operating procedures who perform hazardous material technician level skills at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.3.33* **Hazardous Materials Safety Officer.** (NIMS: Assistant Safety Officer — Hazardous Material.) The person who works within an incident management system (IMS) (specifically, the hazardous materials branch/group) to ensure that recognized hazardous materials/WMD safe practices are followed at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.3.34* **Hazardous Materials Technician.** Person who responds to hazardous materials/weapons of mass destruction (WMD) incidents using a risk-based response process by which they analyze a problem involving hazardous materials/weapons of mass destruction (WMD), select applicable decontamination procedures, and control a release using specialized protective clothing and control equipment. [472, 2013]

3.3.34.1* **Hazardous Materials Technician with a Cargo Tank Specialty.** Person who provides technical support pertaining to cargo tanks, provides oversight for product removal and movement of damaged cargo tanks, and acts as a liaison between the hazardous materials technician and other outside resources. [472, 2013]

3.3.34.2 **Hazardous Materials Technician with a Marine Tank and Non-tank Vessel Specialty.** Person who provides technical support pertaining to marine tank and non-tank vessels, provides oversight for product removal and movement of damaged marine tank and non-tank vessels, and acts as a liaison between the hazardous materials technician and other outside resources. [472, 2013]

3.3.34.3* **Hazardous Materials Technician with an Intermodal Tank Specialty.** Person who provides technical support pertaining to intermodal tanks, provides oversight for product removal and movement of damaged intermodal tanks, and acts as a liaison between the hazardous materials technician and other outside resources. [472, 2013]

3.3.34.4* **Hazardous Materials Technician with a Tank Car Specialty.** Person who provides technical support pertaining to tank cars, provides oversight for product removal and movement of damaged tank cars, and acts as a liaison between the hazardous materials technician and other outside resources. [472, 2013]
3.3.34.5 Hazardous Materials Technician with a Flammable Liquids Bulk Storage Specialty. Person who, in incidents involving bulk flammable liquid storage tanks and related facilities, provides support to the hazardous materials technician and other personnel, provides strategic and tactical recommendations to the on-scene incident commander, provides oversight for fire control and product removal operations, and acts as a liaison between technicians, response personnel, and outside resources. [472, 2013]

3.3.34.6 Hazardous Materials Technician with a Flammable Gases Bulk Storage Specialty. Person who, in incidents involving flammable gas bulk storage tanks, provide support to the hazardous materials technician and other personnel, provide strategic and tactical recommendations to the on-scene incident commander, provide oversight for fire control and product removal operations, and act as a liaison between technicians, fire-fighting personnel, and other resources. [472, 2013]

3.3.34.7 Hazardous Materials Technician with a Radioactive Materials Specialty. Person who provides support to the hazardous materials technician and other personnel, uses radiation detection instruments, manages the control of radiation exposure, conducts hazards assessment, and acts as a liaison between hazardous materials technicians at incidents involving radioactive materials. [472, 2013]

3.3.35 Identify. To select or indicate verbally or in writing using standard terms to establish the fact of an item being the same as the one described. [472, 2013]

3.3.36 Incident. An emergency involving the release or potential release of hazardous materials/weapons of mass destruction (WMD). [472, 2013]

3.3.37* Incident Commander (IC). The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources. [472, 2013]

3.3.38 Incident Command System. A management system designed to enable effective and efficient on-scene incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure. [472, 2013]

3.3.39* Incident Management System (IMS). A plan that defines the roles and responsibilities to be assumed by personnel and the operating procedures to be used in the management and direction of emergency operations to include the incident command system, multi-agency coordination system, training, and management of resources. [472, 2013]

3.3.40 Match. To provide with a counterpart. [472, 2013]

3.3.41* Material Safety Data Sheet (MSDS). A form, provided by manufacturers and compounders (blenders) of chemicals, containing information about chemical composition, physical and chemical properties, health and safety hazards, emergency response, and waste disposal of the material. [472, 2013]

3.3.42 Monitoring Equipment. Instruments and devices used to identify and quantify contaminants. [472, 2013]

3.3.43 Objective. A goal that is achieved through the attainment of a skill, knowledge, or both, that can be observed or measured. [472, 2013]

3.3.44* Packaging. Any container that holds a material (hazardous or nonhazardous). [472, 2013]
3.3.44.1* Bulk Packaging. Any packaging, including transport vehicles, having a liquid capacity of more than 119 gal (450 L), a solids capacity of more than 882 lb (400 kg), or a compressed gas water capacity of more than 1001 lb (454 kg). [472, 2013]

3.3.44.2 Nonbulk Packaging. Any packaging having a liquid capacity of 119 gal (450 L) or less, a solids capacity of 882 lb (400 kg) or less, or a compressed gas water capacity of 1001 lb (454 kg) or less. [472, 2013]

3.3.44.3* Radioactive Materials Packaging. Any packaging for radioactive materials including excepted packaging, industrial packaging, Type A, Type B, and Type C packaging. [472, 2013]

3.3.45 Penetration. The movement of a material through a suit's closures, such as zippers, buttonholes, seams, flaps, or other design features of chemical-protective clothing, and through punctures, cuts, and tears. [472, 2013]

3.3.46 Permeation. A chemical action involving the movement of chemicals, on a molecular level, through intact material. [472, 2013]

3.3.47* Personal Protective Equipment. The equipment provided to shield or isolate a person from the chemical, physical, and thermal hazards that can be encountered at hazardous materials/weapon of mass destruction (WMD) incidents. [472, 2013]

3.3.48 Plan. [472, 2013]

3.3.48.1* Emergency Response Plan. A plan developed by the authority having jurisdiction, with the cooperation of all participating agencies and organizations, that details specific actions to be performed by all personnel who are expected to respond during an emergency. [472, 2013]

3.3.48.2* Incident Action Plan. An oral or written plan approved by the incident commander containing general objectives reflecting the overall strategy for managing an incident. [472, 2013]

3.3.48.3 Site Safety and Control Plan. A site safety and control plan should be completed and approved by the hazardous materials officer, the hazardous materials safety officer, and the incident commander for inclusion in the incident action plan. The plan must be briefed to personnel operating within the hot zone by the hazardous materials safety officer or the hazardous materials officer prior to entry mission initiation. The initial site safety and control plan for the first operational period can be written or oral. The plan should be documented as soon as resources allow. [472, 2013]

3.3.49* Planned Response. The incident action plan, with the site safety and control plan, consistent with the emergency response plan and/or standard operating procedures for a specific hazardous material/weapon of mass destruction (WMD) incident. [472, 2013]

3.3.XX Policies and Procedures.

3.3.50 Predict. The process of estimating or forecasting the future behavior of a hazardous materials/weapons of mass destruction (WMD) container and/or its contents within the training and capabilities of the emergency responder. [472, 2013]

3.3.51* Protective Clothing. Equipment designed to protect the wearer from heat and/or from hazardous materials, or from the hazardous component of a weapon of mass destruction contacting the skin or eyes. [472, 2013]

(1) Structural fire-fighting protective clothing

(2) High temperature–protective clothing
(3) Chemical-protective clothing

3.3.51.1* Chemical-Protective Clothing. Items made from chemical-resistive materials, such as clothing, hood, boots, and gloves, that are designed and configured to protect the wearer's torso, head, arms, legs, hands, and feet from hazardous materials. [472, 2013]

3.3.51.1.1* Liquid Splash–Protective Clothing. The garment portion of a chemical-protective clothing ensemble that is designed and configured to protect the wearer against chemical liquid splashes but not against chemical vapors or gases. [472, 2013]

3.3.51.1.2* Vapor-Protective Clothing. The garment portion of a chemical-protective clothing ensemble that is designed and configured to protect the wearer against chemical vapors or gases. [472, 2013]

3.3.51.2* High Temperature–Protective Clothing. Protective clothing designed to protect the wearer for short-term high temperature exposures. [472, 2013]

3.3.51.3* Structural Fire-Fighting Protective Clothing. The fire resistant protective clothing normally worn by fire fighters during structural fire-fighting operations, which includes a helmet, coat, pants, boots, gloves, PASS device, and a fire resistant hood to cover parts of the head and neck not protected by the helmet and respirator facepiece. [472, 2013]

3.3.XX Public Safety Sampling

3.3.52 Qualified. Having knowledge of the installation, construction, or operation of apparatus and the hazards involved. [472, 2013]

3.3.53* Respiratory Protection. Equipment designed to protect the wearer from the inhalation of contaminants. [472, 2013]

3.3.54* Response. That portion of incident management in which personnel are involved in controlling hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.3.55 Risk-Based Response Process. Systematic process by which responders analyze a problem involving hazardous materials/weapons of mass destruction (WMD), assess the hazards, evaluate the potential consequences, and determine appropriate response actions based upon facts, science, and the circumstances of the incident. [472, 2013]

3.3.56 Safely. To perform the assigned tasks without injury to self or others, to the environment, or to property. [472, 2013]

3.3.57 Scenario. A sequence or synopsis of actual or imagined events used in the field or classroom to provide information necessary to meet student competencies; can be based upon threat assessment. [472, 2013]

3.3.58 SETIQ. The Emergency Transportation System for the Chemical Industry in Mexico. [472, 2013]

3.3.XX Size-Up. A mental process used to evaluate the influencing factors at an incident prior to committing resources to a course of action. [1670, 2009]

3.3.60 Stabilization. The point in an incident when the adverse behavior of the hazardous material, or the hazardous component of a weapon of mass destruction (WMD), is controlled. [472, 2013]

3.3.61* Termination. That portion of incident management after the cessation of tactical operations in which personnel are involved in documenting safety procedures, site operations, hazards faced, and lessons learned from the incident. [472, 2013]
3.3.62* UN/NA Identification Number. The four-digit number assigned to a hazardous material/weapon of mass destruction (WMD), which is used to identify and cross-reference products in the transportation mode. [472, 2013]

3.3.63* Weapon of Mass Destruction (WMD). (1) Any destructive device, such as any explosive, incendiary, or poison gas bomb, grenade, rocket having a propellant charge of more than four ounces, missile having an explosive or incendiary charge of more than one quarter ounce (7 grams), mine, or device similar to the above; (2) any weapon involving toxic or poisonous chemicals; (3) any weapon involving a disease organism; or (4) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life. [472, 2013]

3.3.63.1* Radiological Weapons of Mass Destruction [472, 2013]

3.3.63.1.1* Radiation Exposure Device (RED) — an RED, used interchangeably with the term “radiological exposure device” or “radiation emitting device”, consists of radioactive material, either as a sealed source or as material within some type of container, or a radiation-generating device, such as an X-ray device, that directly exposes people to ionizing radiation. [472, 2013]

3.3.63.1.2* Radiation Dispersal Device (RDD) — an RDD, also as referred to as a “dirty bomb”, is a device designed to spread radioactive material through a detonation of conventional explosives or other (non-nuclear) means. [472, 2013]

3.3.63.1.3* Improvised Nuclear Device (IND) — an IND is an illicit nuclear weapon that is bought, stolen, or otherwise obtained from a nuclear State (that is, a national government with nuclear weapons), or a weapon fabricated from fissile material that is capable of producing a nuclear explosion. [472, 2013]

3.4 Operations Level Responders Definitions. [472, 2013]

3.4.1 Agent-Specific Competencies. The knowledge, skills, and judgment needed by operations level responders who have completed the operations level competencies and who are designated by the authority having jurisdiction to respond to releases or potential releases of a specific group of WMD agents. [472, 2013]

3.4.2 Core Competencies. The knowledge, skills, and judgment needed by operations level responders who respond to releases or potential releases of hazardous materials/weapons of mass destruction (WMD). [472, 2013]

3.4.3 Mission-Specific Competencies. The knowledge, skills, and judgment needed by operations level responders who have completed the operations level competencies and who are designated by the authority having jurisdiction to perform mission specific tasks, such as decontamination, victim/hostage rescue and recovery, evidence preservation, and sampling.

3.4.4* Operations Level Responders. Persons who respond to hazardous materials/weapons of mass destruction (WMD) incidents for the purpose of implementing or supporting actions to protect nearby persons, the environment, or property from the effects of the release. [472, 2013]

3.4.5 Operations Level Responders Assigned to Perform Air Monitoring and Sampling. Persons, competent at the operations level, who are assigned to implement air monitoring and sampling operations at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.4.6 Operations Level Responders Assigned to Perform Evidence Preservation and Sampling. Persons, competent at the operations level, who are assigned to preserve forensic evidence, take samples, and/or seize evidence at hazardous materials/weapons of mass destruction (WMD) incidents.
destruction (WMD) incidents involving potential violations of criminal statutes or governmental regulations. [472, 2013]

3.4.7 Operations Level Responders Assigned to Disablement/Disruption of Improvised Explosives Devices (IED), Improvised WMD Dispersal Devices, and Operations at Improvised Explosive Laboratories. Persons, competent at the operations level, who are assigned to interrupt the functioning of improvised explosive devices (IED) and improvised WMD dispersal devices and to conduct operations at improvised explosive laboratories. [472, 2013]

3.4.8 Operations Level Responders Assigned to Perform Mass Decontamination During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. Persons, competent at the operations level, who are assigned to implement mass decontamination operations at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.4.9 Operations Level Responders Assigned to Perform Product Control. Persons, competent at the operations level, who are assigned to implement product control measures at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.4.10 Operations Level Responders Assigned to Perform Technical Decontamination During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. Persons, competent at the operations level, who are assigned to implement technical decontamination operations at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.4.11 Operations Level Responders Assigned to Perform Victim Rescue/Recovery During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. Persons, competent at the operations level, who are assigned to rescue and/or recover exposed and contaminated victims at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

3.4.12 Operations Level Responders Assigned to Respond to Illicit Laboratory Incidents. Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving potential violations of criminal statutes specific to the illegal manufacture of methamphetamines, other drugs, or weapons of mass destruction (WMD), are assigned to secure the scene, identify the laboratory/process, and preserve evidence. [472, 2013]

3.4.13 Operations Level Responders Assigned Responsibilities for Biological Response. Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving biological materials, are assigned to support the hazardous materials technician and other personnel, provide strategic and tactical recommendations to the on-scene incident commander, serve in a technical specialist capacity to provide technical oversight for operations, and act as a liaison between the hazardous materials technician, response personnel, and other outside resources regarding biological issues. [472, 2013]

3.4.14 Operations Level Responders Assigned Responsibilities for Chemical Response. Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving chemical materials, are assigned to support the hazardous materials technician and other personnel, provide strategic and tactical recommendations to the on-scene incident commander, serve in a technical specialist capacity to provide technical oversight for operations, and act as a liaison between the hazardous material technician, response personnel, and other outside resources regarding chemical issues. [472,
3.4.15 Operations Level Responders Assigned Responsibilities for Radioactive Material Response. Persons, competent at the operations level, who, at hazardous materials/weapons of mass destruction (WMD) incidents involving radioactive materials, are assigned to support the hazardous materials technician and other personnel, provide strategic and tactical recommendations to the on-scene incident commander, serve in a technical specialist capacity to provide technical oversight for operations, and act as a liaison between the hazardous material technician, response personnel, and other outside resources regarding radioactive material issues. [472, 2013]

3.4.16 Operations Level Responders Assigned to Use Personal Protective Equipment During Hazardous Materials/Weapons of Mass Destruction (WMD) Incidents. Persons, competent at the operations level, who are assigned to use of personal protective equipment at hazardous materials/weapons of mass destruction (WMD) incidents. [472, 2013]

Chapter 4 Awareness

Awareness Level Personnel. Persons who, in the course of their normal duties, could encounter an emergency involving hazardous materials/weapons of mass destruction (WMD) and who are expected to recognize the presence of the hazardous materials/WMD, protect themselves, call for trained personnel, and secure the scene.

4.1 General.

For qualification at the Awareness level at a hazardous materials/WMD incident, the candidate shall meet the general knowledge requirements (*), the general skill requirements (*), and the job performance requirements (JPRs) defined in Sections (*) through (*).

- Recognition and Identification (see 4.2).
- Initial protective actions (see 4.3).
- Scene control actions (see 4.4).
- Notification (see 4.5).

4.1.1 General Knowledge Requirements. (Reserved)

4.1.2 General Skills Requirements. (Reserved)

4.2 Recognition and Identification.

Recognize indicators identify the materials and hazards involved in a hazardous materials/WMD incident, given a hazardous materials/ WMD incident, an assignment, and resources including the Emergency Response Guidebook or equivalent guide, safety data sheets, shipper/manufacturer papers, and contacts, so that a hazardous materials/WMD incident,

(A)* Requisite Knowledge. What hazardous materials/WMD are the risks associated with various hazardous materials/ WMD, indicators of the presence of hazardous materials/WMD including occupancy and locations including fixed facilities and transportation, container shapes, placards and labels, markings and colors, shipping documents and safety data sheets, and sensory clues, and information available from resources including the Emergency Response Guidebook
or equivalent guide, safety data sheets, hazard class information, shipper/manufacturer papers, and contacts.

(B) Requisite Skills. Recognizing clues indicating the presence of hazardous materials and identifying hazardous materials and their potential hazards using resources including the Emergency Response Guidebook or equivalent guide, safety data sheets, shipper/manufacturer papers, and contacts.

4.3 Initial Protective Actions.

Initiate protective actions for people, property and the environment at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, and applicable policies, procedures, tools, and equipment provided by the AHJ, so that the incident is isolated and secured, safety procedures are followed, hazards are avoided or minimized, and people, property and the environment are not exposed to further harm.

(A) Requisite Knowledge. Initial protective actions, methods to implement evacuation and shelter-in-place, applicable policies and procedures, tools and equipment provided by the AHJ, and the types of hazard and response information available from the Emergency Response Guidebook or equivalent guide, safety data sheets, shipper/manufacturer papers, and contacts to provide guidance in initiating protective actions.

(B)* Requisite Skills. Collecting hazard and response information for initiating protective actions from the Emergency Response Guidebook or equivalent guide, safety data sheets, shipper/manufacturer papers and contacts, limiting responder and civilian access to the incident, and initiating protective actions.

4.4* Scene Control Actions.

Perform scene control actions at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, and applicable policies, procedures, tools, and equipment provided by the AHJ, so that nearby persons, property, and the environment are protected from the effects of the released or potential release of a material, isolation distances are established, the need for personal protective equipment (PPE) is identified, initial protective actions are implemented and monitored, safety procedures are followed, hazards are avoided or minimized, and potential evidence is protected.

(A)* Requisite Knowledge. Scene control actions, isolation distances, safety procedures, applicable policies, procedures, tools, and equipment provided by the AHJ for scene control actions, different types of PPE including respiratory equipment and protective clothing (chemical protective clothing, high-temperature protective clothing, and structural firefighter protective clothing), methods to implement evacuation and shelter-in-place, and methods to protect evidence/potential evidence.

(B)* Requisite Skills. Performing scene control operations, using assigned tools and equipment provided by the AHJ, following safety procedures, and identifying and protecting evidence/potential evidence.

4.5 Notification.
Initiate the emergency notification process at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, and applicable policies and procedures for notification, reporting and communications, and communications equipment provided by the AHJ, so that the notification process is initiated and the necessary information is communicated.

**(A) Requisite Knowledge.** Incidents that require the need for additional resources, and applicable policies and procedures for notification, reporting, and communications, and types of communications equipment provided by the AHJ.

**(B) Requisite Skills.** Operating communication equipment provided by the AHJ and communicating in accordance with applicable policies and procedures of the AHJ.

### Chapter 5 Operations - Core

**Operations Level Personnel – Core.** Persons who respond to hazardous materials/WMD incidents for the purpose of protecting nearby persons, the environment, or property from the effects of the release. They should be trained to respond in a defensive fashion to control the release from a safe distance and keep it from spreading. Operations level responders can have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ.

#### 5.1 General.

For qualification at the Operations – Core level at a hazardous materials/WMD incident, the candidate shall meet the job performance requirements (JPRs) at the Awareness level, the general knowledge requirements (*), the general skill requirements (*), and the job performance requirements (JPRs) defined in Sections (*) through (*).

- Scene size-up (see 5.2).
- Response planning (see 5.3).
- Action plan implementation (see 5.4).
- Emergency decontamination (see 5.5).
- Progress Evaluation and Reporting (see 5.6).

**5.1.1 General Knowledge Requirements. (Reserved)**

**5.1.2 General Skills Requirements. (Reserved)**

**5.2* Scene Size-Up.**

Perform size-up at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, shipper/manufacturer papers and contacts, and reference sources, so that the hazardous materials/WMD incident is surveyed, hazard and response information is collected, the potential behavior of a material and its container is identified, and any potential harm is identified.

***(A) Requisite Knowledge.** Types of containers and their markings, methods for determining container capacities, types of hazard and response information available from the reference sources, behaviors of hazardous materials based on their properties, how hazardous materials cause harm, and the process for estimating outcomes.
(B) *Requisite Skills.* Collecting information regarding surrounding conditions, identifying the containers and materials involved, determining if materials have been released, collecting hazard and response information, describing the behavior of hazardous materials/WMD, describing the potential harm at a hazardous materials/WMD incident, and describing potential outcomes.

5.3* Response Planning.

Plan the response for a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, available resources, and incident size-up information, so that response objectives are identified, action options are identified and implemented, the suitability of available PPE is determined, and emergency decontamination issues are identified.

(A) *Requisite Knowledge.* Components of an action plan; response objectives for hazardous material/WMD incidents, action options for hazardous materials/WMD incidents, safety considerations and risk analysis, advantages, limitations, uses, and operational components of respiratory protection, purpose, advantages, and limitations of protective clothing, and emergency decontamination procedures and potential issues.

(B) *Requisite Skills.* Developing an action plan, identifying appropriate response objectives based on risk assessment, selecting appropriate actions based on available resources, determining if available respiratory protection is suitable for the given hazard(s), determining if available protective clothing is suitable for the given hazard(s), and identifying emergency decontamination issues.

5.4 Action Plan Implementation.

Implement the action plan for a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment in an action plan, and applicable policies and procedures, PPE, and tools and equipment provided by the AHJ, so that the actions of the plan are implemented, safety procedures are followed, hazards are avoided or minimized, and the assignment is completed.

(A) *Requisite Knowledge.* Scene control procedures, techniques for evacuation and sheltering-in-place, methods to communicate with first responders and public, evidence preservation and protection procedures, incident management system (IMS)/incident command system (ICS) organization and procedures, capabilities, limitations, and maintenance of PPE provided by the AHJ, maintenance of available PPE, signs/symptoms of heat/cold stress, safety precautions when working at hazardous materials/WMD incidents, cleaning, disinfecting, and inspecting tools and equipment including PPE, and purpose, advantages and limitations for emergency decontamination.

(B) *Requisite Skills.* Recognizing, preserving, and protecting evidence, establishing incident management system (IMS)/incident command system (ICS), using PPE, performing scene control, identifying signs of heat/cold stress, performing emergency decontamination, isolating contaminated tools and equipment, and cleaning, disinfecting, and inspecting PPE.

5.5* Emergency Decontamination.

Perform emergency decontamination procedures at a hazardous materials/WMD incident, given a hazardous materials/WMD incident that requires emergency decontamination, an assignment in an action plan, and applicable policies and procedures, PPE, and tools and equipment provided...
by the AHJ for emergency decontamination, so that exposures are protected, PPE is used, safety procedures are followed, hazards are avoided or minimized, and the victims and responders are decontaminated.

(A)* Requisite Knowledge. Contamination and decontamination, tools and equipment provided by the AHJ for emergency decontamination, hazard avoidance during decontamination, AHJ policies and procedures, and emergency decontamination procedures.

(B) Requisite Skills. Protecting exposures during emergency decontamination, avoiding hazards during emergency decontamination, and performing emergency decontamination.

5.6 Progress Evaluation and Reporting.
Evaluate and report the progress of the action plan for a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment in an action plan, an initial progress report, and communication equipment provided by the AHJ, so that the actions taken are evaluated to determine whether the response objectives are being accomplished, the action plan is adjusted as needed, and progress of the plan is communicated.

(A) Requisite Knowledge. Components of an action plan, components of an initial progress report, communication equipment and procedures of the AHJ, and available resources to ascertain improving, static, or deteriorating conditions based on the objectives of the action plan.

(B) Requisite Skills. Determining the whether the response objectives are being accomplished, using communications equipment provided by the AHJ, communicating the status of response objectives, and revising an action plan based on conditions found during the incident status review.

Chapter 6 Operations – Mission-Specific

Operations Level Personnel – Mission-Specific. Operations level responders can have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ.

6.1 General.

6.1.1 JPRs listed in this chapter are only required for those operations level responders assigned the responsibility of the specific action covered by the JPR by the AHJ utilizing the resources provided by the AHJ. Section 6.2 is a prerequisite for any other JPRs defined in Sections 6.3 through 6.8.

6.1.2 For qualification for an assigned Operations – Mission-Specific level task at a hazardous materials/WMD incident, the candidate shall meet the job performance requirements (JPRs) at the Awareness and Operations – Core levels, the general knowledge requirements (*), the general skill requirements (*), the job performance requirement (JPR) defined in Section 6.2, and the job performance requirement (JPR) for the assigned task defined in the appropriate Section - Sections (*) through (*),

- Personal protective equipment. (see 6.2).
- Decontamination.
  - Mass decontamination (see 6.3.1).
- Technical decontamination (see 6.3.2).
- Evidence preservation and sampling (see 6.4)
- Product control.
  - Basic product control. (see 6.5.1)
  - Flammable liquid fire control. (see 6.5.2)
  - Flammable gas fire control. (see 6.5.3)
- Air monitoring and sampling. (see 6.6)
- Victim rescue and recovery. (see 6.7)
- Illicit laboratory incidents. (see 6.8)

6.1.3 The operations level responder who is assigned mission-specific responsibilities at hazardous materials/WMD incidents shall operate under the guidance of a hazardous materials technician, an allied professional, an emergency response plan, or standard operating procedures.

6.1.4 General Knowledge Requirements. (Reserved)

6.1.5 General Skills Requirements. (Reserved)

6.2 Personal Protective Equipment.

Select, don, work-in, and doff PPE at a hazardous materials/WMD incident, given a hazardous materials/WMD incident that requires use of PPE, an assignment in an IAP including the results of the incident size-up and the response objectives and options for the incident, access to a hazardous materials technician or an allied professional, and applicable policies, procedures, and PPE provided by the AHJ, so that suitable PPE is selected under the guidance of a hazardous materials technician, allied professional, or standard operating procedures, PPE is used, inspected, donned, worked in, decontaminated, and doffed, safety procedures are followed, hazards are avoided or minimized, and all reports and documentation required by AHJ pertaining to PPE use are completed.

(A) Requisite Knowledge. The need for working under the guidance of a hazardous materials technician, allied professional, the action plan, or standard operating procedures when selecting and using PPE, capabilities, limitations, and use of the PPE provided by the AHJ, components of an incident action plan, procedures for decontamination, maintenance, inspection, and storage of PPE provided by the AHJ, process for undergoing decontamination while wearing PPE, and AHJ procedures for reporting and documenting the use of PPE.

(B) Requisite Skills. Determining the necessary PPE for the assignment, inspecting, donning, working in, and doffing PPE, undergoing decontamination (emergency or technical) while wearing the PPE, maintaining and storing PPE, and reporting and documenting the use of PPE.

6.3 Decontamination.

6.3.1 Mass Decontamination.

Perform mass decontamination for ambulatory and non-ambulatory victims at a hazardous materials/WMD incident, given a hazardous materials/WMD incident that requires mass decontamination, an assignment in an IAP, and applicable policies and procedures, PPE, and the tools and equipment provided by the AHJ, so that PPE is selected under the guidance of a hazardous materials technician, allied professional, or standard operating procedures and used,
appropriate mass decontamination procedures are selected, implemented, evaluated, and terminated, safety procedures are followed, hazards are avoided or minimized, emergency responders are not contaminated, and, if contaminated, personnel, tools, and equipment are decontaminated.

(A)* Requisite Knowledge. Different levels of PPE and when they are used, advantages and limitations of operations and methods of mass decontamination, applicable policies and procedures provided by the AHJ for selecting the correct mass decontamination procedures, tools and equipment provided by the AHJ for performing mass decontamination, procedures, safety precautions, and equipment for communicating with crowds provided by the AHJ, crowd management techniques, mass decontamination duties within the command structure, and procedures to perform mass decontamination.

(B)* Requisite Skills. Selecting and using the appropriate level of PPE, selecting correct/appropriate mass decontamination procedure, setting up and implementing mass decontamination operations for ambulatory and non-ambulatory victims, determining if victims have been fully decontaminated, and completing reporting and documentation requirements of the AHJ.

6.3.2 Technical Decontamination.

Perform technical decontamination in support of entry operations and for ambulatory and non-ambulatory victims at a hazardous materials/WMD incident, given a hazardous materials/WMD incident that requires technical decontamination, an assignment in an IAP, and applicable policies and procedures, PPE, and the tools and equipment provided by the AHJ, so that PPE is selected under the guidance of a hazardous materials technician, allied professional, or standard operating procedures and used, appropriate technical decontamination procedures are selected, implemented, evaluated, and terminated, safety procedures are followed, hazards are avoided or minimized, emergency responders are not contaminated, and, if contaminated, personnel, tools, and equipment are decontaminated.

(A)* Requisite Knowledge. Different levels of PPE and when they are used, advantages and limitations of operations and methods of technical decontamination, applicable policies and procedures provided by the AHJ for selecting the correct technical decontamination procedures, tools and equipment provided by the AHJ for performing technical decontamination, procedures, equipment provided by the AHJ, and safety precautions for communicating with crowds, crowd management techniques, technical decontamination duties within the command structure, and procedures to perform technical decontamination.

(B)* Requisite Skills: Selecting and using the appropriate level of PPE, selecting correct/appropriate technical decontamination procedure; setting up and implementing technical decontamination operations for ambulatory and non-ambulatory victims, determining if victims have been fully decontaminated, and completing reporting and documentation requirements of the AHJ.

6.4* Evidence Preservation and Public Safety Sampling.

Perform evidence preservation and public safety sampling at a hazardous materials/WMD incident, given a hazardous materials/WMD incident involving potential violations of criminal statutes or governmental regulations, an assignment in a incident action plan, applicable policies
and procedures, PPE, and tools and equipment provided by the AHJ, so that PPE is selected under the guidance of a hazardous materials technician, allied professional, or standard operating procedures and used, evidence preservation and public safety sampling is conducted in accordance with the AHJ protocols and techniques, public safety samples are packaged, safety procedures are followed, hazards are avoided or minimized, emergency responders are not contaminated, and, if contaminated, emergency responders, tools and equipment are decontaminated.

(A) Requisite Knowledge. Different levels of PPE and when they are used, unique aspects of a suspicious letter, suspicious package or device, illicit laboratories, a release/attack with a WMD agent, or potential violations of criminal statues or governmental regulations, agencies having response authority to collect evidence and public safety samples, notification procedures for agencies having investigative authority and explosive ordnance disposal responsibility, chain-of-custody procedures, securing, characterizing, and preserving the scene, documentation procedures for the AHJ, types of evidence, use and limitations of equipment used to conduct field sampling and screening for admission into a laboratory system, use of collection kits, collection and packaging of public safety samples, decontamination of packaging, prevention of secondary contamination, transportation requirements for sample packaging, AHJ policies and procedures for undergoing decontamination while wearing PPE.

(B) Requisite Skills: Determining if an incident is potentially a violation of criminal statues or governmental regulations, identifying the agency having investigative jurisdiction over an incident that is potentially criminal in nature or a violation of government regulations, operating field sampling equipment, securing, characterizing, and preserving the scene, identifying and protecting potential evidence until it can be collected by an agency with investigative authority, following chain of custody procedures, characterizing hazards, performing protocols for field screening samples for admission into the Laboratory Response Network or other forensic laboratory system, protecting evidence from secondary contamination, determining agency having response authority to collect public safety samples, determining agency having investigative law enforcement authority to collect evidence and public safety samples, collecting public safety samples, packaging and labeling samples, decontaminating samples, undergoing decontamination, and preparing samples for transportation to a laboratory.

6.5 Product Control.

6.5.1* Basic Product Control.

Perform basic control techniques at a hazardous materials/WMD incident, given a hazardous materials/WMD incident with release of product, an assignment in an IAP, and applicable policies and procedures, PPE, and tools and equipment, including foam, provided by the AHJ, so that an effective product control option is selected, PPE is selected under the guidance of a hazardous materials technician, allied professional, or standard operating procedures and used, product is controlled, safety procedures are followed, hazards are avoided or minimized, and emergency responders, tools and equipment are decontaminated.

(A)* Requisite Knowledge. Product control options and safety precautions associated with each option, location and use of emergency shutoff devices in MC/DOT-306, MC/DOT-307, and MC-331 cargo tanks containing flammable liquids or gases, location and operation of emergency remote shutoff devices at fixed facilities in AHJ response area, characteristics and applicability
of foams provided by the AHJ, capabilities and limitations of available PPE, applicable policies and procedures for basic product control operations, the tools and equipment provided by the AHJ, and applicable AHJ procedures for undergoing technical decontamination when wearing PPE.

**B)** Requisite Skills. Selecting and using the PPE provided by the AHJ, using foams and foam equipment or agents on a spill or fire involving hazardous materials/WMD, using emergency remote shutoff devices on cargo tanks containing flammable liquids or gases, undergoing decontamination, and performing product control operations.

### 6.5.2 Flammable Liquid Fire Control.

Control a flammable liquid fire at a hazardous materials/WMD incident, given a hazardous materials/WMD incident involving a flammable liquid fire, an assignment in an IAP, applicable policies and procedures, PPE, and tools, extinguishing agents (including foams), and equipment provided by the AHJ, so that the proper control method is selected, PPE is selected under the guidance of a hazardous materials technician, allied professional, or standard operating procedures and used, the proper application technique is used, safety procedures are followed, hazards are avoided or minimized, exposures and personnel are protected, the fire is controlled or extinguished, and personnel and equipment are decontaminated.

**A)** Requisite Knowledge. Product control options for flammable liquid fires and safety precautions associated with each option, location and use of emergency shutoff devices in MC/DOT-306 and MC/DOT-307 cargo tanks containing flammable liquids, location and operation of emergency remote shutoff devices for flammable liquid storage at fixed facilities in the AHJ’s response area, characteristics and applicability of extinguishing agents (including foams) provided by the AHJ on flammable liquid fires, considerations for selecting product control options for flammable liquid fires, capabilities and limitations of available PPE, applicable policies and procedures for flammable liquid fires, application techniques for product control methods at a flammable liquid fire, agents, tools, and equipment for flammable liquid fires provided by the AHJ, and local procedures for undergoing technical decontamination when wearing PPE.

**B)** Requisite Skills. Selecting and using the PPE provided by the AHJ, applying foams or agents properly on a spill or fire involving flammable liquids, operating emergency remote shutoff devices on flammable liquid containers, performing product control methods at a flammable liquid fire using the equipment furnished by the AHJ, and undergoing technical decontamination.

### 6.5.3 Flammable Gas Fire Control.

Control of a flammable gas fire at a hazardous materials/WMD incident, given a hazardous materials/WMD incident involving a flammable gas fire, an assignment in an IAP, and applicable policies and procedures, PPE, and tools, extinguishing agents, and equipment provided by the AHJ, so that the proper control method is selected, PPE is selected under the guidance of a hazardous materials technician, allied professional, or standard operating procedures and used, the proper application technique is used, safety procedures are followed, hazards are avoided or minimized, exposures and personnel are protected, the fire is controlled or extinguished, and personnel and equipment are decontaminated.
(A) *Requisite Knowledge.* Product control options for flammable gas fires and safety precautions associated with each option, location and use of emergency shutoff devices in cargo tanks containing flammable gases, location and operation of emergency remote shutoff devices for flammable gas storage at fixed facilities in the AHJ response area, characteristics and applicability of extinguishing agents on flammable gas fires, considerations for selecting product control options for flammable gas fires, capabilities and limitations of PPE provided by the AHJ, applicable policies and procedures for flammable gas fires, application techniques for product control methods at a flammable gas fire, agents, tools, and equipment for flammable gas fires provided by the AHJ, and local procedures for undergoing technical decontamination when wearing PPE.

(B) *Requisite Skills.* Selecting and using the PPE provided by the AHJ, applying extinguishing agents properly on a spill or fire involving flammable gas, operating emergency remote shutoff devices on flammable gas containers, performing product control methods at a flammable gas fire using the agents, PPE, tools, and equipment furnished by the AHJ, and undergoing technical decontamination.

6.6* Air Monitoring and Sampling.*

Perform air monitoring, detection, and sampling activities, given a hazardous materials/WMD incident requiring air monitoring, detection, and/or sampling, an assignment in an incident action plan, and applicable policies and procedures, PPE, and air monitoring, detection, and sampling equipment provided by the AHJ, so that the proper equipment is selected to sample, detect, and monitor the solid, liquid, or gaseous hazardous materials/WMD present. Air monitoring, detection, and sampling methods are selected, PPE is selected under the guidance of a hazardous materials technician, allied professional, or standard operating procedures and used, safety procedures are followed, hazards are avoided or minimized, exposures and personnel are protected, results of air monitoring, detection, and sampling are properly read, interpreted, documented, and communicated, personnel performing air monitoring, detection, and sampling, and their equipment, are properly decontaminated, air monitoring, detection, and sampling equipment is maintained and all reports and documentation, required by AHJ, pertaining to air monitoring, detection, and sampling are completed.

(A) *Requisite Knowledge.* Air monitoring, detection, and sampling equipment provided by the AHJ, applicable AHJ policies and procedures for air monitoring, detection, and sampling, process for selection of air monitoring, detection, and sampling equipment for an assigned task, capabilities and limitations of PPE provided by the AHJ, operation of the air monitoring, detection, and sampling equipment provided by the AHJ including capabilities, limitations, local monitoring procedures, and field testing, how to read, interpret, document, and what to communicate, operation of communication equipment provided by the AHJ, methods for decontaminating air monitoring, detection, and sampling equipment per manufacturer recommendations or AHJ policies and procedures, local procedures for undergoing technical decontamination when wearing PPE, and maintenance procedures for air monitoring, detection, and sampling equipment per manufacturer recommendations or AHJ policies and procedures.

(B) *Requisite Skills.* Selecting and using PPE provided by the AHJ, field testing and operating each air monitoring, detection, and sampling device provided by the AHJ, reading, interpreting, and documenting the readings from air monitoring, detection, and sampling equipment,
communicating results of air monitoring, detection, and sampling operations, undergoing decontamination, decontaminating personnel and air monitoring, detection, and sampling equipment, and maintaining air monitoring, detection, and sampling equipment per manufacturer recommendations or AHJ policies and procedures.

6.7 Victim Rescue and Recovery.

Perform rescue or recovery operation, given a hazardous materials/WMD incident involving exposed or contaminated victims, an assignment in an IAP, applicable policies and procedures, PPE, and tools and equipment, including special rescue equipment, provided by the AHJ, so that the feasibility of conducting a rescue or a recovery operation is determined, victims are correctly triaged, rescue or recovery options are selected within the capabilities of available personnel, PPE, and tools, equipment, and special rescue equipment, PPE is selected under the guidance of a hazardous materials technician, allied professional, or standard operating procedures and used, safety procedures are followed, hazards are avoided or minimized, victims are rescued or recovered, and personnel performing rescue and recovery, victims, and equipment used are decontaminated.

(A)* Requisite Knowledge. The difference between victim rescue and victim recovery, victim triage methods, considerations for determining the feasibility of rescue or recovery operations, procedures for implementing rescue in applicable policies and procedures provided by the AHJ including safety issues, procedures, tactical guidelines, specialized rescue equipment required, and incident response considerations to effect a rescue in the following situations - line-of-sight with ambulatory victims, line-of-sight with nonambulatory victims, non-line-of-sight with ambulatory victims, non-line-of-sight with nonambulatory victims, and victim rescue operations versus victim recovery operations, rescue team positions and their functions, capabilities and limitations of available PPE, local procedures for undergoing technical decontamination when wearing PPE, and decontamination procedures.

(B) Requisite Skills. Determining the feasibility of conducting a rescue or recovery operation, triaging victims, selecting proper rescue or recovery methods for the assigned task, using available specialized rescue equipment, following AHJ procedures for safe and effective victim rescue or recovery, selecting and using proper PPE for the victim and rescuer, undergoing decontamination, and performing decontamination for personnel, tools, and equipment.

6.8 Response to Illicit Laboratories.

Perform response operations at an illicit laboratory, given a hazardous materials/WMD incident involving an illicit laboratory, an assignment in an incident action plan, applicable policies and procedures, PPE, and tools and equipment provided by the AHJ, so that the scene is secured, control procedures are implemented, type of laboratory is identified, potential hazards are identified, PPE is selected under the guidance of a hazardous materials technician, allied professional, or standard operating procedures and used, safety procedures are followed, hazards are avoided or minimized, evidence is preserved, and personnel/victims are decontaminated.

(A)* Requisite Knowledge. Process for determining if a hazardous materials/WMD incident is an illicit laboratory operation, types of illicit laboratories, operational considerations at illicit laboratories, hazards and products at illicit laboratories, potential booby traps found at illicit laboratories, law enforcement agency with investigative authority and responsibilities at illicit laboratories, securing and preserving evidence, procedures for conducting a joint hazardous
materials/EOD site recon and hazard identification, procedures for determining atmospheric hazards through air monitoring, detection, and sampling; procedures to mitigate immediate hazards, safety procedures and tactics, crime scene coordination with law enforcement agencies, capabilities and limitations of available PPE, factors to be considered in the selection of decontamination, factors to be considered in the selection of detection devices, and factors to be considered in the development of a remediation plan.

(B)* Requisite Skills. Selecting appropriate PPE, selecting air monitoring, detection, and sampling equipment, implementing decontamination procedures for tactical law enforcement personnel securing an illicit laboratory, implementing technical decontamination, identifying and avoiding unique safety hazards, conducting a joint hazardous materials/EOD operation to identify safety hazards, and implementing scene control procedures.

Chapter 7 Hazardous Materials Technician.

Hazardous materials technician - person who responds to hazardous materials/weapons of mass destruction (WMD) incidents using a risk-based response process by which they analyze a problem involving hazardous materials/WMD, select applicable decontamination procedures, and control a release using specialized protective clothing and control equipment.

7.1 General.

7.1.1 For qualification at the Hazardous Materials Technician level at a hazardous materials/WMD incident, the candidate shall meet the job performance requirements (JPRs) at the Awareness and Operations – Core levels, the general knowledge requirements (*), the general skill requirements (*), and the job performance requirements (JPRs) defined in Sections (*) through (*).

- Incident Analysis.
  - Container Identification. (see 7.2.1)
  - Air monitoring, Detection, and Sampling. (see 7.2.2)
  - Hazard and Response Information Collection and Interpretation. (see 7.2.3)
  - Container Damage Identification. (see 7.2.4)
  - Predicting Behavior. (see 7.2.5)
  - Estimating Outcomes. (see 7.2.6)

- Response Planning.
  - Response Objectives and Options. (see 7.3.1)
  - PPE Selection. (see 7.3.2)
  - Decontamination Operations and Methods Selection. (see 7.3.3)
  - IAP Development. (see 7.3.4)

- IAP Implementation. (see 7.4)
  - IMS/ICS Duties. (see 7.4.1)
  - PPE Use. (see 7.4.2)
  - Control Functions. (see 7.4.3)
    - Basic Product Control. (see 7.4.3.1)
    - Flammable Liquid Fire Control. (see 7.4.3.2)
    - Flammable Gas Fire Control. (see 7.4.3.3)
- Pressure Container Leaks. (see 7.4.3.4)
- Pressure Container Fitting Leaks. (see 7.4.3.5)
- 55 Gallon Drum Leaks. (see 7.4.3.6)
- Overpacking Drums. (see 7.4.3.7)
- Dome Clamp Application. (see 7.4.3.8)
- Decontamination. (see 7.4.4)
  - Mass Decontamination. (see 7.4.4.1)
  - Technical Decontamination. (see 7.4.4.2)
- Evaluating and Reporting Progress (see 7.5)
- Terminating the Incident (see 7.6)

7.1.2 General Knowledge Requirements. (Reserved)

7.1.3 General Skills Requirements. (Reserved)

7.2 Incident Analysis. Analyze a hazardous materials/WMD incident to determine the complexity of the problem and the potential outcomes.

7.2.1* Container Identification.

Identify containers at hazardous material/WMD incidents, given a hazardous materials/WMD incident, an assignment in an IAP required markings on the containers, applicable reference sources, and applicable policies and procedures, so that containers are identified by name, and specification number, capacity of the containers is determined, suitable PPE is used, safety procedures are followed, hazards are avoided or minimized, and container information is communicated as necessary.

(A) Requisite Knowledge. Markings and other resources that indicate the name, specification (when applicable), and typical contents by name and hazard class in transportation and fixed facility containers including railroad cars (nonpressure, pressure, cryogenic liquid tank cars and pressure differential covered hopper cars), intermodal tanks/HM portable tanks (nonpressure, pressure, cryogenic liquid tank containers and tube modules), cargo tanks (nonpressure, low pressure, high pressure, cryogenic liquid, corrosive liquid tanks, and compressed gas tube trailers), facility storage tanks (nonpressure, pressure, and cryogenic liquid tanks), nonbulk packaging (bags, carboys, cylinders, and drums), and radioactive materials packaging (excepted, industrial, Type A, Type B), and ton containers, markings and other resources that indicate the approximate capacity by weight or volume in transportation containers (cargo tanks, tank cars, and HM portable tanks) and fixed facility containers (cryogenic liquid, nonpressure, and pressure facility containers), and process for describing radiation dose rates from the information provided on a radioactive material label (type or category of label, contents, activity, transport index, and criticality safety index, as applicable).

(B) Requisite Skills. Identifying containers by name, specification number when applicable, identifying typical contents found in containers by name and hazard class, identifying the capacity of various containers, and describing radiation dose rates from label information on radioactive containers.

7.2.3 Air Monitoring, Detection, and Sampling.
Classify, identify, verify, and quantify the materials involved in a hazardous materials/WMD incident using air monitoring, detection, and sampling, given a hazardous materials/WMD incident with released hazardous materials/WMD (including one unknown), an assignment in an IAP (formal or informal), applicable resources, applicable policies and procedures, a selection of PPE, and air monitoring, detection, and sampling equipment, so that appropriate PPE is selected and used, unknown materials are identified or classified, identity of hazardous materials/WMD involved is verified, concentrations of hazardous materials are determined or verified through the use of monitoring, detection, and sampling, safety procedures are followed, hazards are avoided or minimized, results of air monitoring, detection, and sampling are properly read, interpreted, documented, and communicated as necessary, and personnel performing air monitoring, detection, and sampling and their equipment are decontaminated, and the necessary information is communicated.

(A) Requisite Knowledge. Methods for identifying, or classifying by hazard, an unknown material (solid, liquids, and atmosphere), hazard classes and divisions, methods for verifying the identity of hazardous materials/WMD, monitoring technology used to determine the following hazards - corrosivity, flammability, oxidation potential, oxygen deficiency, pathogenicity, radioactivity, and toxicity, capabilities and limitations associated with the selection and use of monitoring equipment, test strips, and reagents - including biological immunoassay indicators, chemical agent monitors (CAMs), colorimetric indicators (colorimetric detector tubes, indicating papers - pH paper and meters, reagents, test strips), combustible gas indicator, DNA fluoroscopy, electrochemical cells (carbon monoxide meter, oxygen meter), flame ionization detector, gas chromatograph/mass spectrometer (GC/MS), infrared spectroscopy, ion mobility spectroscopy, gamma spectrometer (radioisotope identification device (RIID)), metal oxide sensor, photo ionization detectors, polymerase chain reaction (PCR), radiation detection and measurement instruments, raman spectroscopy, surface acoustical wave (SAW), and wet chemistry.

(B) Requisite Skills. Selecting and using appropriate PPE, selecting and using appropriate monitoring equipment, test strips, and reagents, including carbon monoxide meter, colorimetric tubes, combustible gas indicator, oxygen meter, passive dosimeters, pH indicators and/or pH meters, photo ionization and flame ionization detectors, radiation detection instruments, reagents, test strips, WMD detectors (chemical and biological), and any specialized equipment provided by the AHJ, to identify or classify hazards, performing field maintenance and testing for monitoring equipment, test strips, and reagents provided by the AHJ, and collecting samples (gas, liquid, and solid).

7.2.4* Hazard and Response Information Collection and Interpretation.
Collect and interpret hazard and response information from sources other than the DOT Emergency Response Guidebook or a Safety Data Sheet (SDS), given a hazardous materials/WMD incident, an assignment in an IAP (formal or informal), hazardous materials databases, results of air monitoring, detection, and sampling including survey and monitoring equipment for radioactive materials, reference manuals, technical information centers (i.e., CHEMTREC/CANUTEC/SETIQ and local, state, and federal authorities), and technical information specialists, applicable policies and procedures, and available tools and equipment (computers, printers, etc), so that hazard and response information is collected and interpreted, signs and symptoms of exposure are identified, and information is communicated as necessary.
(A)* Requisite Knowledge. Types of hazard and response information available from specified resources (hazardous materials databases, monitoring equipment, reference manuals, technical information centers, technical information specialists), advantages and limitations of the various resources (hazardous materials databases, monitoring equipment, reference manuals, technical information centers, technical information specialists), significance and application of hazard and response terms including corrosive (acids and bases/alkaline), air reactivity, autorefrigeration, biological agents and biological toxins, blood agents, catalyst, chemical change, chemical interactions, compound, mixture, concentration, critical temperature and pressure, dissociation (acid/base), dose, dose response, expansion ratio, fire point, half-life, halogenated hydrocarbon, ignition (autoignition) temperature, inhibitor, instability, ionic and covalent compounds, irritants (riot control agents), maximum safe storage temperature (MSST), melting point and freezing point, miscibility, nerve agents, organic and inorganic, oxidation potential, physical change, polymerization, radioactivity, reactivity, riot control agents, saturated, unsaturated (straight and branched), and aromatic hydrocarbons, self-accelerating decomposition temperature (SADT), solubility, solution and slurry, strength, sublimation, temperature of product, vesicants (blister agents), viscosity, and volatility, signs and symptoms of exposure to hazardous materials/WMD, and target organ effects of exposure to hazardous materials/WMD,

(B) Requisite Skills. Collecting and interpreting hazard and response information, explaining the significance and application of hazard and response terms, and identifying signs and symptoms of exposure to hazardous materials/WMD including target organ effects of exposure to hazardous materials/WMD.

7.2.5 Identifying Container Condition.

Describe the damage to nonbulk and bulk packagings at an incident involving hazardous materials/WMD (damaged with no product release, undamaged with no product release, damaged with product release, and undamaged with product release), given an incident involving hazardous materials/WMD, an assignment in an IAP (formal or informal), specification markings on containers, printed and technical resources, computer databases, specialists in the field, applicable policies and procedures, and results of air monitoring, detection, and sampling, so that damage is identified (cracks, scores, gouges, dents), level of risk associated with the damage is identified, integrity of a radioactive material container is determined (breached or not), stress on container is identified (thermal, mechanical, chemical), and a description of the damage is communicated as necessary.

(A) Requisite Knowledge. Basic design and construction features, including closures, of bulk containers including cargo tanks – compressed gas tube trailers, corrosive liquid tanks, cryogenic liquid tanks, dry bulk cargo tanks, high-pressure tanks, low-pressure liquid tanks, and nonpressure liquid tanks, fixed facility tanks – cryogenic liquid tanks, nonpressure tanks, and pressure tanks, intermediate bulk containers – tote tanks, intermodal tanks/HM Portable Tanks – nonpressure intermodal tanks [IM-101 portable tank (IMO Type 1 internationally), IM-102 portable tank (IMO Type 2 internationally)], pressure intermodal tanks (DOT Specification 51; IMO Type 5 internationally), cryogenic intermodal tanks (IMO Type 7 internationally), and tube modules, one-ton containers, pipelines, railroad cars – cryogenic liquid tank cars, nonpressure tank cars, pneumatically unloaded hopper cars, and pressure tank cars, basic design and construction features, including closures, of nonbulk containers – bags, carboys, drums, cylinders, basic design features and testing requirements of radioactive material packages –
excepted, industrial, Type A, and Type B, basic design and construction of pipelines, including
how liquid petroleum product pipeline carries different products, and how identifying
information on a pipeline – ownership of the pipeline, procedures for checking for gas migration,
procedure for shutting down the pipeline or controlling the leak, and type of product in the
pipeline, types of damage and level of risk associated with the damage, types of stress, methods
for determining the pressure inside a container, methods for determining the quantity of the
commodity inside a container, and methods for determining whether the integrity of a radioactive
material container has been breached.

(B)* Requisite Skills. Identifying the container damage including quantity of the commodity
and pressure inside the container, identifying level of risk associated with the damage,
identifying stress on container, determining integrity of radioactive material containers, and
communicating the type and significance of damage as necessary.

7.2.6 Predicting Behavior.

Predict the behavior of the hazardous materials/WMD involved in a hazardous materials/WMD
incident, given an incident involving multiple hazardous materials/WMD, an assignment in an
IAP (formal or informal), results of hazard and response information collection, results of
monitoring and sampling, condition of the container both damage and stress, results of the
incident size-up including weather conditions (current and projected), terrain, time of day, etc.,
printed and technical resources, computer databases, specialists in the field, and applicable
policies and procedures, so that type stress applied is identified (thermal, mechanical, chemical),
type potential breach is identified (disintegration, runaway cracking, closures opening up,
punctures, and splits or tears), type potential release are identified (detonation, violent rupture,
rapid relief, and spill or leak), type potential dispersion pattern is identified (hemisphere, cloud,
plume, cone, stream, pool, and irregular), length of potential contact time is identified (short
term, medium term, long term), potential hazards that could cause harm are identified (thermal,
mechanical, poisonous, corrosive, asphyxiating, radiation, and etiological), and a description of
the likely behavior is communicated as necessary.

(A) Requisite Knowledge. Process for predicting behavior [considerations: stress, breach,
release, dispersion pattern, contact time, hazards creating harm, synergistic effects of mixing
materials], types of stress applied (thermal, mechanical, chemical), types potential breach
(disintegration, runaway cracking, closures opening up, punctures, and splits or tears), types
potential release (detonation, violent rupture, rapid relief, and spill or leak), types potential
dispersion patterns (hemisphere, cloud, plume, cone, stream, pool, and irregular), length of
potential contact time (short term, medium term, long term), potential hazards that could cause
harm (thermal, mechanical, poisonous, corrosive, asphyxiating, radiation, and etiological)
resources that indicate the synergistic effects of mixing various hazardous materials, impact of
fire and safety features on the behavior of products at a bulk liquid facility, impact of fire and
safety features on the behavior of products at a bulk gas facility, heat transfer processes that
occur as a result of a cryogenic liquid spill, and methods for communicating the results of
predicting behavior.

(B) Requisite Skills. Predicting likely behavior of materials and their containers when multiple
materials are involved (including identifying stress, identifying potential breach, identifying
potential release, identifying potential engulf, identifying potential contact, and identifying
potential harm) and identifying synergistic effects of mixing various hazardous materials.
7.2.7 Estimating Outcomes.

Estimate the likely outcomes at a hazardous materials/WMD incident, given an incident involving hazardous materials/WMD, an assignment in an IAP (formal or informal), results of the incident size-up including weather conditions (current and projected), terrain, time of day, etc. (buildings, people, bodies of water, etc.), results of hazard and response information collection, results of air monitoring and sampling, condition of container, predicted behavior, printed and technical resources, computer databases, specialists in the field, and applicable policies and procedures, so that the size and shape of the endangered area are determined, number and types of exposures within the endangered area are identified, concentrations of materials within the endangered area are measured or predicted, physical, health, and safety hazards within the endangered area are identified, areas of potential harm in the endangered area are identified, potential outcomes within the areas of potential harm in endangered area are identified, and potential outcomes are communicated as necessary.

(A) Requisite Knowledge. Resources for dispersion pattern prediction and modeling, including computers, monitoring equipment, or specialists in the field, methods for determining the dimensions of the endangered area, methods for identifying the number and types of exposures within the endangered area, methods for determining concentrations of materials within the endangered area, methods for identifying physical, health, and safety hazards within the endangered area, health hazard terms and exposure values and their significance in the analysis process including counts per minute (cpm) and kilocounts per minute (kcpm), immediately dangerous to life and health (IDLH) value, incubation period, infectious dose, lethal concentrations (LC50), lethal dose (LD50), parts per billion (ppb), parts per million (ppm), permissible exposure limit (PEL), radiation absorbed dose (rad), roentgen equivalent man (rem), millirem (mrem), microrem (μrem), threshold limit value ceiling (TLV-C), threshold limit value short-term exposure limit (TLV-STEL), threshold limit value time-weighted average (TLV-TWA), methods for identifying areas of potential harm within the endangered area, methods for identifying potential outcomes in the areas of potential harm within the endangered area, and procedures for communicating potential outcomes.

(B) Requisite Skills. Determining the dimensions of the endangered area, estimating the number of exposures within the endangered area, measuring or predicting concentrations of materials within the endangered area, estimating the physical, health, and safety hazards within the endangered area, identifying the areas of potential harm in the endangered area, estimating the potential outcomes within the areas of potential harm in endangered area, and communicating the potential outcomes.

7.3 Response Planning. Plan a response within the capabilities of available personnel, PPE, and control (tools and) equipment.

7.3.1* Response Objectives and Options.

Develop response objectives and response options, given a hazardous materials/WMD incident, an assignment in an IAP (formal or informal), results of the incident size-up including incident-related information, life safety risks, environmental risks, and property risks, available resources, and applicable policies and procedures, so that response objectives are identified for the incident and response options are identified for each response objective.
(A) Requisite Knowledge. Steps for developing response objectives and steps for identifying response options for each response objective.

(B) Requisite Skills. Developing response objectives for a hazardous materials incident and identifying response options for each response objective.

7.3.2* PPE Selection.
Select the PPE required for a given response option including both respiratory protection and liquid splash-protective clothing, vapor-protective clothing, high temperature protective clothing, and structural fire fighting protective clothing, given a hazardous materials/WMD incident, results of the incident size-up, response objectives and options for the given incident, available resources, and applicable policies and procedures, so that required PPE is identified for each response option.

(A) Requisite Knowledge. Four levels of PPE *[Annex: Specified by the Environmental Protection Agency (EPA) and National Institute for Occupational Safety and Health (NIOSH)], types of PPE available for various hazards *[Annex: Thermal, radiological, asphyxiating, chemical (liquids and vapors), etiological (biological), and mechanical (explosives)], factors to be considered in selecting respiratory protection, factors to be considered in selecting chemical-protective clothing, significance of degradation, penetration, and permeation on the selection of chemical-protective clothing, different designs of vapor-protective clothing and splash-protective clothing and their advantages and disadvantages, types of heat exchange units used for cooling personal in PPE and their advantages and disadvantages, information provided on chemical compatibility charts, and affects of physiological and psychological stresses on users of PPE.

(B) Requisite Skills. Selecting PPE ensemble (both respiratory protection and chemical-protective clothing) for a specified response option and determining protective clothing construction material using chemical compatibility charts.

7.3.3* Decontamination Operations and Methods.
Select the decontamination operations and methods required for a given response option, given a hazardous materials/WMD incident, results of the incident analysis, response objectives and options for the given incident, available resources, and applicable policies and procedures, so that decontamination operations and methods are identified to minimize the hazards for each response option and the equipment required to implement the decontamination method is identified.

(A) Requisite Knowledge. Decontamination operations, decontamination methods, advantages and disadvantages of various decontamination operations and methods including absorption, adsorption, chemical degradation, dilution, disinfecting, evaporation, isolation and disposal, neutralization, solidification, sterilization, vacuuming, and washing, reference sources for determining decontamination operations and methods, methods for accessing these resources, and equipment required to implement a specified decontamination operations and methods.

(B) Requisite Skills. Selecting decontamination operations and methods and identifying the equipment required to implement decontamination operations and methods.

7.3.4 IAP Development.
Develop an IAP, given a hazardous materials/WMD incident, an assignment, incident size-up information, response objectives and options for the given incident, available resources, and applicable policies and procedures, so that an IAP is developed, specified response objectives and response options are addressed, plan is consistent with the emergency response plan and applicable policies and procedures, plan is within the capability of available personnel, PPE, and control equipment, plan includes procedures, equipment, and safety precautions for preserving and collecting legal evidence, and equipment required for implementation is identified.

(A) Requisite Knowledge. Components of an IAP, including site safety and control, safety briefing, pre-entry activities, purpose of, procedures for, required equipment for, and applicable safety precautions (considerations?) for various methods (techniques) for HM/WMD control including absorption, adsorption, blanketing, covering, damming, diking, dilution, dispersion, diversion, fire suppression, neutralization, overpacking, patching, plugging, pressure isolation and reduction (flaring; venting, vent and burn, isolation of valves, pumps, or energy sources), retention, solidification, transfer, and vapor control (dispersion, suppression), atmospheric and physical safety hazards associated with HM/WMD in confined spaces, considerations for assessing a leak or spill inside a confined space, and procedures, equipment, and safety precautions for preserving and collecting legal evidence.

(B) Requisite Skills. Preparing an IAP, identifying site safety and control components, identifying points for a safety briefing, identifying pre-entry activities, identifying atmospheric and physical safety hazards when incident involves a confined space, and preserving and collecting legal evidence.

7.4 IAP Implementation. Implement the planned response consistent with the IAP.

7.4.1* Performing Assigned IMS/ICS Duties.

7.4.2* PPE Use.

Don, work-in, and doff PPE at a hazardous materials/WMD incident, given a hazardous materials/WMD incident that requires use of PPE, results of the incident size-up, response objectives and options for the given incident, an assignment in an incident action plan, available resources including PPE ensembles, and applicable policies and procedures, so that suitable PPE is selected, inspected, donned, worked in, decontaminated, and doffed, safety procedures are followed, hazards are avoided or minimized, equipment is maintained and stored properly, and the use of PPE is documented and reported.

(A) Requisite Knowledge. Capabilities, limitations, selection, and use of PPE, components of an incident action plan, safety procedures for personnel working in chemical-protective clothing (CPC) including keeping the individual cool and protected from heat exposure, the prevention of dehydration, medical monitoring, stringent accounting for time spent on air and in the suit, and additional safety concerns of working in the hot zone including visibility, mobility, and communications, emergency procedures for personnel working in chemical-protective clothing including loss of suit integrity, loss of verbal communications, the buddy system, and use of backup personnel wearing the same level of personal protective equipment (PPE), procedures for decontamination, maintenance, inspection, and storage of PPE, process for undergoing decontamination while wearing PPE, maintenance, testing, inspection, and storage for PPE.
provided by the AHJ according to manufacturer’s specifications, and AHJ procedures for reporting and documenting the use.

(B) Requisite Skills. Inspecting, donning, working in, undergoing decontamination (emergency or technical), and doffing liquid splash-protective and vapor protective chemical protective, clothing ensembles (including respiratory protection) and any other specialized personal protective equipment provided by the AHJ), recording the use of CPC, and repairing and testing of chemical protective clothing (CPC) according to the manufacturer’s specifications.

7.4.3* Performing Control Functions

7.4.3.1* Basic Product Control.

Perform basic control techniques at a hazardous materials/WMD incident including absorption, adsorption, damming, diking, dilution, diversion, retention, remote valve shut-off, vapor dispersion, and vapor suppression, given a hazardous materials/WMD incident with release of product, an assignment in an IAP (formal or informal), and applicable policies and procedures, PPE, and tools and equipment, including foam, provided by the AHJ, so that an effective product control option is selected, suitable PPE is used, product is controlled, safety procedures are followed, hazards are avoided or minimized, and emergency responders, tools and equipment are decontaminated.

(A)* Requisite Knowledge. Product control options (absorption, adsorption, damming, diking, dilution, diversion, retention, remote valve shut-off, vapor dispersion, and vapor suppression), safety precautions associated with each option, location and use of emergency shutoff devices in cargo tanks containing flammable liquids or gases, location and operation of emergency remote shutoff devices at fixed facilities within the AHJ response area, characteristics and applicability of foams provided by the AHJ, capabilities and limitations of available PPE, applicable policies and procedures for basic product control operations, the tools and equipment provided by the AHJ, and AHJ procedures for undergoing technical decontamination when wearing PPE.

(B)* Requisite Skills. Selecting and using the PPE provided by the AHJ, selecting and using foams and foam equipment or agents on a spill or fire involving hazardous materials/WMD, using emergency remote shutoff devices on cargo tanks containing flammable liquids or gases, undergoing decontamination, and performing product control operations.

7.4.3.2* Flammable Liquid Fire Control.

Control a flammable liquid fire at a hazardous materials/WMD incident, given a hazardous materials/WMD incident involving a flammable liquid fire, an assignment in an IAP (formal or informal), applicable policies and procedures, PPE, and tools, extinguishing agents (including foams), and equipment provided by the AHJ, so that the proper control method is selected, suitable PPE is used, the proper application technique is used, safety procedures are followed, hazards are avoided or minimized, exposures and personnel are protected, the fire is controlled or extinguished, and personnel and equipment are decontaminated.

(A)* Requisite Knowledge. Product control options for flammable liquid fires, safety precautions associated with each option, location and use of emergency shutoff devices in cargo tanks containing flammable liquids, location and operation of emergency remote shutoff devices for flammable liquid storage at fixed facilities in the AHJ’s response area, characteristics and
applicability of extinguishing agents (including foams) provided by the AHJ on flammable liquid fires, considerations for selecting product control options for flammable liquid fires, capabilities and limitations of available PPE, applicable policies and procedures for flammable liquid fires, application techniques for product control options at a flammable liquid fire, agents, tools, and equipment for flammable liquid fires provided by the AHJ, and local procedures for undergoing technical decontamination when wearing PPE.

(B)* Requisite Skills. Selecting and using the PPE provided by the AHJ, performing product control methods at a flammable liquid fire using the equipment furnished by the AHJ, applying foams or agents properly on a spill or fire involving flammable liquids, operating emergency remote shutoff devices on flammable liquid containers, and undergoing technical decontamination.

7.4.3.3* Flammable Gas Fire Control.

Control a flammable gas fire at a hazardous materials/WMD incident, given a hazardous materials/WMD incident involving a flammable gas fire, an assignment in an IAP (formal or informal), applicable policies and procedures, PPE, and tools, extinguishing agents, and equipment provided by the AHJ, so that the proper control method is selected, suitable PPE is used, the proper application technique is used, safety procedures are followed, hazards are avoided or minimized, exposures and personnel are protected, the fire is controlled or extinguished, and personnel and equipment are decontaminated.

(A)* Requisite Knowledge. Product control options for flammable gas fires, safety precautions associated with each option, location and use of emergency shutoff devices in cargo tanks containing flammable gases, location and operation of emergency remote shutoff devices for flammable gas storage at fixed facilities in the AHJ’s response area, characteristics and applicability of extinguishing agents provided by the AHJ on flammable gas fires, considerations for selecting product control options for flammable gas fires, capabilities and limitations of available PPE, applicable policies and procedures for flammable gas fires, application techniques for product control options at a flammable gas fire, agents, tools, and equipment for flammable gas fires provided by the AHJ, and local procedures for undergoing technical decontamination when wearing PPE.

(B) Requisite Skills. Selecting and using the PPE provided by the AHJ, performing product control methods at a flammable gas fire using the agents, PPE, tools and equipment furnished by the AHJ, applying extinguishing agents properly on a spill or fire involving flammable gas, operating emergency remote shutoff devices on flammable gas containers, and undergoing technical decontamination.

7.4.3.4 Pressure Container Leaks.

Contain a leak from a pressure container, given a hazardous materials/WMD incident, a leaking pressure container with a leak from a fusible plug, fusible plug threads, side wall of cylinder, valve blowout, valve gland, valve inlet thread, valve seat, or valve stem assembly blowout, and applicable policies and procedures, PPE, tools and equipment provided by the AHJ, so that the appropriate control method is used, the leak is controlled, suitable PPE is used, safety procedures are followed, hazards are avoided or minimized, emergency responders, tools and equipment are decontaminated, and tools and equipment are inspected and maintained.
(A) Requisite Knowledge. Ways in which pressure vessels may develop leaks via fusible plug, fusible plug threads, side wall of cylinder, valve blowout, valve gland, valve inlet threads, valve seat, or valve stem assembly blowout, methods to control pressure vessel leaks, applicable policies and procedures for pressure vessel leak control operations, the tools and equipment provided to control pressure vessel leaks, capabilities and limitations of available PPE, hazards associated with pressure vessel leaks, and local procedures for undergoing technical decontamination when wearing PPE, and equipment and maintenance procedures.

(B) Requisite Skills. Selecting and using suitable PPE, controlling the leak, following safety procedures, avoiding or minimizing hazards, decontaminating emergency responders, tools and equipment, and inspecting and maintaining tools and equipment.

7.4.3.2* Pressure Container Fitting Leaks.

Contain leaks from the fittings on a pressure container, given a hazardous materials/WMD incident, an assignment in an IAP (formal or informal), fittings on a pressure container, and applicable policies and procedures, PPE, tools and equipment provided by the AHJ, so that suitable PPE is used, open valves are closed, missing plugs are replaced, loose plugs are tightened, the leaks are controlled, safety procedures are followed, hazards are avoided or minimized, emergency responders, tools and equipment are decontaminated, and tools and equipment are inspected and maintained.

(A) Requisite Knowledge. Fittings on a pressure container, ways in which pressure containers may develop leaks from the fittings, methods to control leaks from fittings, applicable policies and procedures for controlling pressure container fitting leaks, the tools and equipment provided to control fitting leaks, capabilities and limitations of available PPE, hazards associated with pressure container leaks, procedures for undergoing technical decontamination when wearing PPE, and equipment and maintenance procedures.

(B) Requisite Skills. Closing open valves, replacing missing plugs, tightening loose plugs, controlling leaks, selecting and using suitable PPE, following safety procedures, minimizing hazards, decontaminating emergency responders, tools and equipment, and inspecting and maintaining tools and equipment.

7.4.3.3 55-Gallon Drum Leaks.

Contain a leak from a 55 gallon (208 L) drum, given a hazardous materials/WMD incident, a bung leak, chime leak, forklift puncture, or nail puncture on a 55 gallon (208 L) drum, and applicable policies and procedures, PPE, tools and equipment provided by the AHJ, so that the appropriate control method is used, the leak are controlled, suitable PPE is used, safety procedures are followed, hazards are avoided or minimized, emergency responders, tools and equipment are decontaminated, and tools and equipment are inspected and maintained.

(A) Requisite Knowledge. Ways in which drums leak including bung leak, chime leak, forklift puncture, or nail puncture, methods to control leaks from drums, applicable policies and procedures for controlling drum leaks, tools and equipment provided used to control leaking drums, capabilities and limitations of available PPE, hazards associated with drum leaks, local procedures for undergoing technical decontamination when wearing PPE, and equipment and maintenance procedures.
(B) Requisite Skills. Using the appropriate control method, controlling the leak, selecting and using suitable PPE, following safety procedures, decontaminating emergency responders, tools and equipment, and inspecting and maintaining tools and equipment.

7.4.3.4* Overpacking Drums.

Place a 55-gallon (208 L) drum into an overpack drum, given a hazardous materials/WMD incident, an assignment in an IAP (formal or informal), a leaking 55-gallon (208 L) drum, an overpack drum, and applicable policies and procedures, PPE, tools, and equipment provided by the AHJ, so that the drum is placed into the overpack drum using an appropriate overpack method - rolling slide-in, slide-in, slip-over, or other, suitable PPE is used, safety procedures are followed, hazards are avoided or minimized, emergency responders, tools, and equipment are decontaminated, and tools and equipment are inspected and maintained.

(A) Requisite Knowledge. Ways in which drums leak, hazards associated with drum leaks, methods to overpack leaking drums including rolling slide-in, slide-in, and slip-over, or other, capabilities and limitations of available PPE, applicable policies and procedures for using overpacks, the tools and equipment used to overpack leaking drums, local procedures for undergoing technical decontamination when wearing PPE, and equipment and maintenance procedures.

(B) Requisite Skills. Placing a drum into the overpack drum using an appropriate overpack method, selecting and using suitable PPE, following safety procedures, minimizing and avoiding hazards, decontaminating emergency responders, tools and equipment, and inspecting and maintaining tools and equipment.

7.4.3.5 Dome Clamp Application.

Install a dome cover clamp, given a hazardous materials/WMD incident, an assignment in an IAP (formal or informal), a nonpressure cargo tank with a dome leak from the dome, a dome clamp, and applicable policies and procedures, PPE, tools and equipment provided by the AHJ, so that the clamp is correctly installed on the dome, suitable PPE is used, safety procedures are followed, hazards are avoided or minimized, emergency responders, tools, and equipment are decontaminated, and tools and equipment are inspected and maintained.

(A) Requisite Knowledge. Types of dome cover leaks, hazards associated with dome leaks, use of dome cover clamps, capabilities and limitations of available PPE, applicable policies and procedures for using dome cover clamps, tools, and equipment provided by the AHJ, local procedures for undergoing technical decontamination when wearing PPE, and equipment and maintenance procedures.

(B) Requisite Skills. Installing the dome cover clamp, selecting and using suitable PPE, following safety procedures, minimizing and avoiding hazards, decontaminating emergency responders, tools and equipment, and inspecting and maintaining tools and equipment.

7.4.4 Decontamination

7.4.4.1 Mass Decontamination.

Perform mass decontamination for ambulatory and non-ambulatory victims at a hazardous materials/WMD incident, given a hazardous materials/WMD incident requiring mass
decontamination, an assignment in an IAP (formal or informal), and applicable policies and procedures, PPE, tools, and equipment provided by the AHJ, so that appropriate mass decontamination procedures are selected, set up, implemented, evaluated, and terminated, suitable PPE is used, safety procedures are followed, hazards are avoided or minimized, emergency responders are not contaminated, and personnel, tools, and equipment are decontaminated.

(A) Requisite Knowledge. Capabilities and limitations of available PPE, advantages and limitations of operations and methods of mass decontamination, applicable policies and procedures, tools and equipment provided by the AHJ, procedures for mass decontamination, safety precautions, procedures for communicating with crowds provided by the AHJ, and crowd management techniques,

(B) Requisite Skills. Selecting and using suitable PPE, selecting suitable mass decontamination procedure, setting up and implementing mass decontamination operations for ambulatory and non-ambulatory victims, determining if victims have been fully decontaminated, and completing reporting and documentation requirements of the AHJ.

7.4.4.2* Technical Decontamination.

Perform technical decontamination in support of entry operations and for ambulatory and non-ambulatory victims at a hazardous materials/WMD incident, given a hazardous materials/WMD incident requiring technical decontamination, an assignment in an IAP (formal or informal), and applicable policies and procedures, PPE, tools, and equipment provided by the AHJ, so that appropriate technical decontamination procedures are selected, set up, implemented, evaluated, and terminated, suitable PPE is used, safety procedures are followed, hazards are avoided or minimized, emergency responders are not contaminated, and personnel, tools, and equipment are decontaminated.

(A) Requisite Knowledge. Capabilities and limitations of available PPE, advantages and limitations of operations and methods of technical decontamination, applicable policies and procedures, tools and equipment provided by the AHJ, procedures for technical decontamination, safety precautions, procedures for communicating with crowds provided by the AHJ, and crowd management techniques,

(B) Requisite Skills. Selecting and using suitable PPE, selecting suitable technical decontamination procedure, setting up and implementing technical decontamination operations for ambulatory and non-ambulatory victims, determining if victims have been fully decontaminated, and completing reporting and documentation requirements of the AHJ.

7.4.5* Evidence Preservation and Public Safety Sampling.

7.5 Evaluating and Reporting Progress.

Evaluate the progress of the IAP for a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment in an IAP (formal and informal), an IAP, progress reports, and communication equipment provided by the AHJ, so that the actions taken are evaluated to determine whether the response objectives are being accomplished, the IAP is adjusted as needed, and progress of the IAP is communicated.
(A) Requisite Knowledge. Components of an IAP, the significance of the components of a progress report on evaluating progress of the IAP, resources for identifying improving, static, or deteriorating conditions based on the response objectives and response options set forth, and communication procedures and communication equipment provided by the authority having jurisdiction.

(B) Requisite Skills. Determining the whether the response objectives are being accomplished, communicating the status of response objectives using communications equipment provided by the AHJ, and revising an action plan based on conditions found during the incident status review.

7.6 Terminating the Incident.

Terminate a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment in an IAP (formal or informal), an assignment in an IAP (formal or informal), incident reports and supporting documentation, and applicable policies and procedures of the AHJ, so that assistance in scheduled debriefings and critiques of the incident are provided, required reports and supporting documentation are completed, and records required are filed and maintained.

(A) Requisite Knowledge. Purpose of debriefings and critiques, including key topics for debriefings and critiques, when they should take place, who should be involved, and what written documents to be prepared as a result of debriefings and critiques, reports and supporting documentation required by the AHJ, importance of reporting and documenting an incident, including what records are to be kept (personnel exposure records, debriefing records, and critique records) requirements for compiling records, including activity logs, exposure records, hot zone entry and exit logs, personal protective equipment logs, and requirements for filing documents and maintaining records.

(B) Requisite Skills. Communicating incident information as requested at a debriefing or critique, completing the reports and supporting documentation required by the AHJ, and filing and maintaining records required by the AHJ.

Chapter 8 Incident Commander.

Incident Commander. The individual that is responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources.

8.1 General.

8.1.1 For qualification as an Incident Commander at a hazardous materials/WMD incident, the candidate shall meet the job performance requirements (JPRs) at the Awareness and Operations – Core levels, the general knowledge requirements (*), the general skill requirements (*), and the job performance requirements (JPRs) defined in Sections (*) through (*).

- Incident Analysis.
  - Hazard and Response Information Collection and Interpretation. (see 8.2.1)
  - Outcome Estimates. (see 8.2.2).
- Response Planning.
  - Response Objectives. (see 8.3.1)
• PPE Approval. (see 8.3.2)
• IAP Development. (see 8.3.3)

• IAP Implementation.
  • IMS/ICS Implementation. (see 8.4.1)
  • Communications. (see 8.4.2)
  • Direct Resources. (see 8.4.3)

• Evaluate Progress and Modify the IAP As Necessary. (see 8.5)

• Incident Termination.
  • Transfer of Command. (see 8.6.2)
  • Debrief and Critiques. (see 8.6.3)

8.1.2 General Knowledge Requirements. (Reserved)

8.1.3 General Skills Requirements. (Reserved)

8.2 Incident Analysis. Analyze a hazardous materials/WMD incident to determine the complexity of the problem and the potential outcomes.

8.2.1* Hazard and Response Information Collection and Interpretation.

Collect and interpret hazard and response information from sources other than the DOT Emergency Response Guidebook or a Safety Data Sheet (SDS), given a hazardous materials/WMD incident, an assignment in an IAP (formal or informal), resources including hazardous materials databases, monitoring equipment, reference manuals, technical information centers (i.e., CHEMTREC/CANUTEC/SETIQ and local, state, and federal authorities), and technical information specialists, applicable policies and procedures, and available tools and equipment including computers, printers, etc, so that hazard and response information is collected and interpreted.

(A) Requisite Knowledge. Types of hazard and response information available from specified resources including hazardous materials databases, monitoring equipment, reference manuals, technical information centers, technical information specialists, advantages and limitations of these resources, and significance and application of hazard and response terms including corrosive (acids and bases/alkaline), air reactivity, autorefrigeration, biological agents and biological toxins, blood agents, catalyst, chemical change, chemical interactions, compound, mixture, concentration, critical temperature and pressure, dissociation (acid/base), dose, dose response, expansion ratio, fire point, half-life, halogenated hydrocarbon, ignition (autoignition) temperature, inhibitor, instability, ionic and covalent compounds, irritants (riot control agents), maximum safe storage temperature (MSST), melting point and freezing point, miscibility, nerve agents, organic and inorganic, oxidation potential, physical change, polymerization, radioactivity, reactivity, riot control agents, saturated, unsaturated (straight and branched), and aromatic hydrocarbons, self-accelerating decomposition temperature (SADT), solubility, solution and slurry, strength, sublimation, temperature of product, vesicants (blister agents), viscosity, and volatility.

(B) Requisite Skills. Collecting and interpreting hazard and response information and explaining the significance and application of hazard and response terms.

8.2.2 Outcome Estimates.
Estimate the likely outcomes at a hazardous materials/WMD incident, given an incident involving hazardous materials/WMD, an assignment in an IAP (formal or informal), results of the incident size-up including weather conditions (current and projected), terrain, time of day, etc. (buildings, people, bodies of water, etc.), results of hazard and response information collection, results of air monitoring and sampling, condition of container, predicted behavior, printed and technical resources, computer databases, specialists in the field, and applicable policies and procedures, so that the size and shape of the endangered area are determined, number and types of exposures within the endangered area are identified, concentrations of materials within the endangered area are measured or predicted, physical, health, and safety hazards within the endangered area are identified, areas of potential harm in the endangered area are identified, potential outcomes within the areas of potential harm in endangered area are identified, and potential outcomes are communicated as necessary.

(A) Requisite Knowledge. Resources for dispersion pattern prediction and modeling including computers, monitoring equipment, or specialists in the field, methods for determining the dimensions of the endangered area, methods for identifying the number and types of exposures within the endangered area, methods for determining concentrations of materials within the endangered area, methods for identifying physical, health, and safety hazards within the endangered area, health hazard terms and exposure values and their significance in the analysis process including counts per minute (cpm) and kilocounts per minute (kcpm), immediately dangerous to life and health (IDLH) value, incubation period, infectious dose, lethal concentrations (LC50), lethal dose (LD50), parts per billion (ppb), parts per million (ppm), permissible exposure limit (PEL), radiation absorbed dose (rad), roentgen equivalent man (rem), millirem (mrem), microrem (μrem), threshold limit value ceiling (TLV-C), threshold limit value short-term exposure limit (TLV-STEL), threshold limit value time-weighted average (TLV-TWA), methods for identifying areas of potential harm within the endangered area, methods for identifying potential outcomes in the areas of potential harm within the endangered area, and procedures for communicating potential outcomes.

(B) Requisite Skills. Determining the dimensions of the endangered area, estimating the number of exposures within the endangered area, measuring or predicting concentrations of materials within the endangered area, estimating the physical, health, and safety hazards within the endangered area, identifying the areas of potential harm in the endangered area, estimating the potential outcomes within the areas of potential in endangered area, and communicating the potential outcomes.

8.3  Response Planning. Plan a response within the capabilities of available personnel, PPE, and control (tools and) equipment.

8.3.1  Response Objectives.

Develop response objectives and response options, given a hazardous materials/WMD incident, an assignment in an IAP (formal or informal), results of the incident size-up including incident-related information, life safety risks, environmental risks, and property risks, available resources, and applicable policies and procedures, so that response objectives are identified for the incident and response options are identified for each response objective.

(A) Requisite Knowledge. Steps for developing response objectives and for identifying response options for each objective.
(B) Requisite Skills. Developing response objectives for a hazardous materials incident and identifying response options for each objective.

8.3.2 PPE Approval.

Approve the level of personal protective equipment, given a hazardous materials/WMD incident, an assignment in an IAP, results of the incident size-up including incident-related information, life safety risks, environmental risks, and property risks, available resources, and applicable policies and procedures, so that levels of PPE are approved for each response option in the IAP.

(A) Requisite Knowledge. Four levels of personal protective equipment (specified by EPA/OSHA), equipment required for each level, application of each level, significance of degradation, penetration, and permeation on the selection of chemical-protective clothing, safety considerations for personnel working in personal protective equipment, and physiological and psychological stresses on users of personal protective equipment.

(B) Requisite Skills. Approving the level of PPE for response options specified in the IAP.

8.3.3 IAP Development.

Develop an IAP including site safety and control plan component, given a hazardous materials/WMD incident, an assignment in an IAP, results of the incident size-up including incident-related information, life safety risks, environmental risks, and property risks, available resources including ICS forms and documentation, and applicable policies and procedures, so that the plan is consistent with AHJ policies and procedures and within the capabilities of available personnel, personal protective equipment, and control equipment, strategic objectives are defined and communicated, safe operating practices and procedures are identified, a safety briefing is provided to all working on the incident, incident command structure is adjusted as necessary (from general to incident specific), resources are deployed to meet the goals of the plan, and the plan is documented in writing in the format established by the AHJ.

(A) Requisite Knowledge. NIMS, ICS, jurisdictional authority and boundaries, scope of responsibility for the IC and involved agencies, roles of various people and resources within the ICS, components of an IAP, applicable response objectives (strategies) and response options (tactics) for various types of incidents, safety considerations for incident operations, safety precautions for search and rescue missions, atmospheric and physical hazards associated with confined space operations, contents of a safety briefing, advantages, limitations, and use of decontamination methods including absorption, adsorption, chemical degradation, dilution, disinfecting, evaporation, isolation and disposal, neutralization, solidification, sterilization, vacuuming, and washing, and identification of approved personal protective equipment (JPR 8.3.2).

(B) Requisite Skills. Making effective decisions, using applicable ICS forms and documentation, prioritizing needs and actions based on rapidly changing conditions, and developing an incident safety plan.

8.4 IAP Implementation. Implement the planned response consistent with the IAP.

8.4.1 IMS/ICS Implementation.
Develop and manage an incident management organization capable of accomplishing strategic objectives, given a hazardous materials/WMD incident, an IAP, results of the incident size-up including incident-related information, life safety risks, environmental risks, and property risks, available resources including a communication system, and applicable policies and procedures, so that the IMS/ICS organization is established and maintained, applicable span of control is maintained, resources and personnel cooperating in incident objectives are obtained and managed effectively, adjustments are made in the command structure when necessary, and the command structure remains in place until the incident is terminated.

(A) Requisite Knowledge. NIMS, ICS, IMS forms and documentation, unity of command, knowledge of how an incident management team functions, policies and procedures of the AHJ, responsibilities and authority of the IC, command staff, and other personnel under NIMS IMS/ICS, elements of the National Response Framework, principles of unified command, procedures for ordering resources specific to the AHJ, communications protocols, kinds and type of resources available to the AHJ, resource management techniques, roles, and responsibilities, and authority of responders and response agencies available to the AHJ.

(B) Requisite Skills. Completing IMS/ICS forms and documentation, operating incident communications equipment, deploying applicable resources for incident-specific functions, and determining changing incident situations and matching the IMS/ICS structure and resources to meet them.

8.4.2 Communications.

Communicate relevant information to internal and external stakeholders, given a hazardous materials/WMD incident, an IAP, incident status information, available resources including a communication system, applicable policies and procedures, and internal and external stakeholders, so that support staff duties are delegated, incoming resources and section chiefs are briefed, hazardous situations are communicated, and incident objectives are validated and revised. [NFPA 1026, 2009]

(A) Requisite Knowledge. Potential internal and external stakeholders, AHJ communications SOPs, procedures for establishing communications systems, sources for communications equipment and technical assistance, difference between relevant and irrelevant information, and communications protocols. [NFPA 1026, 2009]

(B) Requisite Skills. Completing IMS/ICS forms and documentation, operating incident communications equipment, deploying applicable resources for incident-specific functions, and determining changing incident situations and matching the IMS/ICS structure and resources to meet them. [NFPA 1026, 2009]

8.4.3 Direct Resources.

Implement and monitor incident assignments, given a hazardous materials/WMD incident, incident assignments in an IAP, incident status information, available resources including a communication system, and applicable policies and procedures, so that organizational entities are established to accomplish tactical and support tasks, specific work tasks are assigned to specific individuals, applicable span of control is maintained, plans and/or assignments are modified as directed by incident conditions, resources needs for personnel assigned are obtained, and command and general staff are notified of changes necessary to the IAP. [NFPA 1026, 2009]
(A) **Requisite Knowledge.** IMS/ICS organization structure expansion procedures, communication skills, span of control procedures, tactics for the incident, accountability, and transfer of duty procedures. [NFPA 1026, 2009]

(B) **Requisite Skills.** Communicating by radio or other means and knowing accountability procedures and tactical operations specific to the incident. [NFPA 1026, 2009]

### 8.5 Evaluate Progress.

Evaluate the progress of the IAP and make adjustments as necessary, given a hazardous materials/WMD incident, an IAP, incident status information, available resources including a communication system, and applicable policies and procedures, so that changing incident conditions are identified, the effectiveness of the IAP is determined to be appropriate, plans and/or assignments are modified as directed by incident conditions, resource needs for personnel assigned are obtained, the IAP is kept current, and command and general staff are notified of changes necessary to the IAP.

(A) **Requisite Knowledge.** NIMS, ICS, IMS forms and documentation, unity of command, knowledge of how an incident management team functions, policies and procedures of the AHJ, responsibilities and authority of the IC, command staff, and other personnel under NIMS IMS/ICS, elements of the National Response Framework, principles of unified command, procedures for ordering resources specific to the AHJ, communications protocols, kinds and type of resources available to the AHJ, resource management techniques, roles, and responsibilities, and authority of responders and response agencies available to the AHJ.

(B) **Requisite Skills.** Completing IMS/ICS forms and documentation, operating incident communications equipment, deploying applicable resources for incident-specific functions, and determining changing incident situations and matching the IMS/ICS structure and resources to meet them.

### 8.6 Terminating the Incident.

#### 8.6.1 Transfer of Command.

Manage the transfer of command at an incident, given a hazardous materials/WMD incident, established command structure in an IAP, current incident status information, command post, incident documentation, available resources including a communication system (operational procedures), and applicable policies and procedures, so that incident information is exchanged, reports and plans for the subsequent operational period are completed, the new IC is fully briefed on the incident, and new incident management team members are identified to all personnel and stakeholders.

(A) **Requisite Knowledge.** Who are the affected internal and external stakeholders at an incident, transfer of command procedures, knowledge of how an incident management team functions, policies and procedures of the AHJ, responsibilities and authority of the IC, command staff, and other personnel under NIMS IMS/ICS, elements of the National Response Framework, principles of unified command, appropriate response objectives (strategies) and response options (tactics) for various types of incidents, capabilities of resources assigned to an incident, various command documentation used by the AHJ, principles of unified command, and identification of affected stakeholders.
(B) Requisite Skills. Completing ICS forms, developing and reading incident scene maps, recognizing the need to expand and/or transfer command in the IMS/ICS structure, reviewing and understanding documents use for transfer of command, and identifying affected stakeholders and determining perceived needs.

8.6.2 Debrief and Critiques.

Direct after-action review, debriefings, and critiques (internal or external), given a hazardous materials/WMD incident, incident records and reports, documentation procedures used by the AHJ, and personnel who were assigned to the incident, so that the effectiveness of incident operations is measured to improve future operations, completion of response objectives is determined, performance evaluations are discussed with subordinates and other participants, and after incident reports are prepared and submitted according to the AHJ.

(A) Requisite Knowledge. NIMS, IMS/ICS, purpose and operation of an IAP, components, key topics, and procedures for conducting a debriefing, components, and procedures for conducting a critiques, when a debriefing should take place, who should be involved in the debriefing, who should be involved in the critique, reporting requirements of federal, state, and local agencies, including training records, exposure records, incident reports, critique reports, activity log, standard operating procedures of the AHJ, and incident reporting and documentation procedures used by the AHJ (filing documents and maintaining records; legal documentation and chain of custody and continuity).

(B) Requisite Skills. Using form, programs, and equipment for documenting incident outcomes, conducting an after-action meeting (debriefing, internal critique, external critique), recording information during the course of a meeting, and handling people with strong or conflicting opinions.
Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1.1 Outside the United States, hazardous materials might be called dangerous goods (see Annex X). Weapons of mass destruction (WMD) are known by many different abbreviations and acronyms, including CBRNE (chemical, biological, radiological, nuclear, explosive), B-NICE (biological, nuclear, incendiary, chemical, explosive), COBRA (chemical, ordinance, biological, radiological agents), and NBC (nuclear, biological, chemical).

A.1.2 The committee believes that this document specifies the minimum job performance requirements for emergency response personnel to hazardous materials/weapons of mass destruction incidents given specific levels. The committee recognizes that emergency services organizations might have to invest considerable resources to provide the equipment and training needed to perform at hazardous materials/weapons of mass destruction incidents safely and efficiently. The committee does not mean to imply that organizations with limited resources cannot provide hazardous materials/weapons of mass destruction emergency response services, only that the individuals charged with performing hazardous materials/weapons of mass destruction responsibilities are qualified to specific levels according to this standard.

A.1.2.3 Organization/management responsibilities should be addressed by the agency that the emergency response personnel represent. The authority having jurisdiction should define the agency requirements for progression to positions of management responsibility.

A.1.2.5 See Annex B.

A.1.2.6 Continuing education or training is necessary to ensure that all remain current and up to date with their knowledge and skills by attending workshops and seminars, undergoing competency testing, participating in recurring proficiency evolutions, and/or accessing professional publications as determined by the AHJ. Nationally recognized certification is one means of demonstrating proficiency in current practices.

A.1.3.2 See Annex B.

A.1.3.3 It is recommended, where practical, that evaluators be individuals who were not directly involved as instructors for the requirement being evaluated.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the AHJ may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The AHJ may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a police chief, sheriff, fire chief; fire marshal; chief of a fire prevention bureau, labor
department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.3 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.1 Allied Professional. Examples could include Certified Safety Professional (CSP), Certified Health Physicist (CHP), Certified Industrial Hygienist (CIH), Radiation Safety Officer (RSO) or similar credentialed or competent individuals as determined by the AHJ. May also be referred to as a Subject Matter Expert (SME) in a mission-specific area. [472, 2013]

A.3.3.8 Confined Space. Additionally, a confined space is further defined as having one or more of the following characteristics:

1. The area contains or has the potential to contain a hazardous atmosphere, including an oxygen-deficient atmosphere.
2. The area contains a material with the potential to engulf a member.
3. The area has an internal configuration such that a member could be trapped by inwardly converging walls or a floor that slopes downward and tapers to a small cross section.
4. The area contains any other recognized serious hazard. [472, 2013]

A.3.3.15 Control Zones. Law enforcement agencies might utilize different terminology for site control, for example, inner and outer perimeters as opposed to hot or cold zones. The operations level responder should be familiar with the terminology and procedures used by the AHJ and coordinate on-scene site control operations with law enforcement. Many terms are used to describe these control zones; however, for the purposes of this standard, these zones are defined as the hot, warm, and cold zones. [472, 2013]

A.3.3.15.4 Warm Zone. The warm zone includes control points for the decontamination corridor, thus helping to reduce the spread of contamination. This support may include staging of backup personnel and equipment, staging of evidence, and personnel and equipment decontamination. Additionally, portions of this area may be used as a safe refuge for initial patient evacuation and triage. [472, 2013]

A.3.3.17 Decontamination. There are two types of decontamination (commonly known as “decon”) performed by emergency responders: gross and technical. Gross decontamination is performed on the following:

1. Entry team members before their technical decontamination
2. Victims during emergency decontamination
3. Persons requiring mass decontamination

Technical decontamination is performed on entry team members. Decontamination sometimes performed on victims in a hospital setting is generally referred to as definitive decontamination, but is not covered in this standard.
The types of decontamination (except definitive decontamination) are further defined in A.3.3.17.1 through A.3.3.17.4. [472, 2013]

**A.3.3.17.1 Emergency Decontamination.** This process can be as simple as removal of outer or all garments from the individual to washing down with water from a fire hose or emergency safety shower. The sole purpose is to quickly separate as much of the contaminant as possible from the individual to minimize exposure and injury. [472, 2013]

**A.3.3.17.2 Gross Decontamination.** Victims of a hazardous material release that is potentially life threatening due to continued exposure from contamination are initially put through a gross decontamination, which will significantly reduce the amount of additional exposure. This is usually accomplished by mechanical removal of the contaminant or initial rinsing from handheld hose lines, emergency showers, or other nearby sources of water. Responders operating in a contaminated zone in personal protective equipment (PPE) are put through gross decontamination, which will make it safer for them to remove the PPE without exposure and for members assisting them. [472, 2013]

**A.3.3.17.3 Mass Decontamination.** Mass decontamination is initiated where the number of victims and time constraints do not allow the establishment of an in-depth decontamination process. Mass decontamination is a gross decontamination process utilizing large volumes of low-pressure water to reduce the level of contamination. A soap-and-water solution or universal decontamination solution would be more effective; however, availability of such solutions in sufficient quantities cannot always be ensured.

Extensive research into mass decontamination operations at terrorist incidents involving hazardous materials and chemical warfare agents has been conducted by the U.S. Army's Research, Development, and Engineering Command (RDECOM), and the resulting guidelines and documents are available on the Internet (see X.1.2.5).

Mass decontamination should be established quickly to reduce the harm being done to the victims by the contaminants. Initial operations will likely be through handheld hose lines or master streams supplied from fire apparatus while a more formal process is being set up. Examples of mass decontamination methods are the ladder pipe decontamination system and the emergency decontamination corridor system, both of which are described in RDECOM's guidelines. [472, 2013]

**A.3.3.17.4 Technical Decontamination.** Technical decontamination is the process subsequent to gross decontamination designed to remove contaminants from responders, their equipment, and victims. It is intended to minimize the spread of contamination and ensure responder safety. Technical decontamination is normally established in support of emergency responder entry operations at a hazardous materials incident, with the scope and level of technical decontamination based on the type and properties of the contaminants involved. In non life-threatening contamination incidents, technical decontamination can also be used on victims of the initial release. Examples of technical decontamination methods are the following:

1. Absorption
2. Adsorption
3. Chemical degradation
4. Dilution
5. Disinfecting
(6) Evaporation
(7) Isolation and disposal
(8) Neutralization
(9) Solidification
(10) Sterilization
(11) Vacuuming
(12) Washing

The specific decontamination procedure to be used at an incident is typically selected by a hazardous materials technician (see NFPA 472 - 7.3.4) and is subject to the approval of the incident commander. [472, 2013]

A.3.3.19 Demonstrate. This performance can be supplemented by simulation, explanation, illustration, or a combination of these. [472, 2013]

A.3.3.25 Exposure. The magnitude of exposure is dependent primarily on the duration of exposure and the concentration of the hazardous material. This term is also used to describe a person, animal, the environment, or a piece of equipment. The exposure can be external, internal, or both. [472, 2013]

A.3.3.26 Fissile Material. Department of Transportation (DOT) regulations define fissile material as plutonium-239, plutonium-242, uranium-233, uranium-235, or any combination of these radionuclides. This material is usually transported with additional shipping controls that limit the quantity of material in any one shipment. Packaging used for fissile material is designed and tested to prevent a fission reaction from occurring during normal transport conditions as well as hypothetical accident conditions. [472, 2013]

A.3.3.28 Hazardous Material. The following are explanations of several CBRN-related terms:

1. CBRN. An abbreviation for chemicals, biological agents, and radiological particulate hazards.

2. CBRN terrorism agents. Chemicals, biological agents, and radiological particulates that could be released as the result of a terrorist attack. Chemical terrorism agents include solid, liquid, and gaseous chemical warfare agents and toxic industrial chemicals. Chemical warfare agents include, but are not limited to, GB (Sarin), GD (Soman), HD (sulfur mustard), VX, and specific toxic industrial chemicals. Many toxic industrial chemicals (e.g., chlorine and ammonia) are identified as potential chemical terrorism agents because of their availability and the degree of injury they could inflict. Biological agents are bacteria, viruses, or the toxins derived from biological material.

3. Chemical terrorism agents. Liquid, solid, gaseous, and vapor chemical warfare agents and toxic industrial chemicals used to inflict lethal or incapacitating casualties, generally on a civilian population as a result of a terrorist attack.

4. Biological terrorism agents. Liquid or particulate agents that can consist of a biologically derived toxin or pathogen to inflict lethal or incapacitating casualties.

5. Radiological particulate terrorism agents. Particles that emit ionizing radiation in excess of normal background levels used to inflict lethal or incapacitating casualties, generally on a civilian population, as the result of a terrorist attack.

6. Toxic industrial chemicals. Highly toxic solid, liquid, or gaseous chemicals, which have
been identified as mass casualty threats that could be used to inflict casualties, generally on a civilian population, during a terrorist attack. [472, 2013]

A.3.3.29 Hazardous Materials Branch/Group. This function is directed by a hazardous materials officer and deals principally with the technical aspects of the incident. [472, 2013]

A.3.3.30 Hazardous Materials Officer. This individual might also serve as a technical specialist for incidents that involve hazardous materials/WMD. [472, 2013]

A.3.3.31 Hazardous Materials Response Team (HMRT). The team members respond to releases or potential releases of hazardous materials/WMD for the purpose of control or stabilization of the incident. [472, 2013]

A.3.3.32 Hazardous Materials Safety Officer. The hazardous materials safety officer will be called on to provide technical advice or assistance regarding safety issues to the hazardous materials officer and incident safety officer at a hazardous materials/WMD incident. [472, 2013]

A.3.3.33 Hazardous Materials Technician. These persons might have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ. [472, 2013]

A.3.3.33.1 Hazardous Materials Technician with a Cargo Tank Specialty. The hazardous materials technicians are expected to use specialized chemical-protective clothing and specialized control equipment. [472, 2013]

A.3.3.33.3 Hazardous Materials Technician with an Intermodal Tank Specialty. See A.3.3.33.1. [472, 2013]

A.3.3.33.4 Hazardous Materials Technician with a Tank Car Specialty. See A.3.3.33.1. [472, 2013]

A.3.3.36 Incident Commander (IC). This position is equivalent to the on-scene incident commander as defined in OSHA 1910.120(8), Hazardous Waste Operations and Emergency Response. The IC has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site. [472, 2013]

A.3.3.38 Incident Management System (IMS). The IMS provides a consistent approach for all levels of government, private sector, and volunteer organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. An IMS provides for interoperability and compatibility among all capability levels of government, the private sector, and volunteer organizations. The IMS includes a core set of concepts, principles, terminology, and technologies covering the incident command system, multiagency coordination systems, training, and identification and management of resources. [472, 2013]

A.3.3.40 Material Safety Data Sheet (MSDS). Under the Global Harmonization System, the MSDS is known as an SDS (Safety Data Sheet) and contains more detailed information. [472, 2013]

A.3.3.43 Packaging. Packaging for hazardous materials includes bulk and nonbulk packaging. [472, 2013]

A.3.3.43.1 Bulk Packaging. Bulk packaging can be either placed on or in a transport vehicle or vessel or constructed as an integral part of the transport vehicle. [472, 2013]

A.3.3.43.3 Radioactive Materials Packaging. Excepted packaging is packaging used to transport materials with extremely low levels of radioactivity that meet only general design
requirements for any hazardous material. Excepted packaging ranges from a product's fiberboard box to a sturdy wooden or steel crate, and typical shipments include limited quantities of materials, instruments, and articles such as smoke detectors. Excepted packaging will contain non-life-endangering amounts of radioactive material.

Industrial packaging is used to transport materials that present limited hazard to the public and environment. Examples of these materials are contaminated equipment and radioactive waste solidified in materials such as concrete. This packaging is grouped into three categories (IP-1, IP-2, IP-3), based on the strength of packaging. Industrial packaging will contain non-life-endangering amounts of radioactive material.

Type A packaging is used to transport radioactive materials with concentrations of radioactivity not exceeding the limits established in 49, CFR, Part 173.431. Typically, Type A packaging has an inner containment vessel made of glass, plastic, or metal and packing material made of polyethylene, rubber, or vermiculite. Examples of materials shipped in Type A packaging include radiopharmaceuticals and low-level radioactive waste. Type A packaging will contain non-life-endangering amounts of radioactive material.

Type B packaging is used to transport radioactive materials with radioactivity levels higher than those allowed in Type A packaging, such as spent fuel and high-level radioactive waste. Limits on activity contained in a Type B packaging are provided in Title 49, CFR 173.431. Type B packaging ranges from small drums (55 gal (208 L)), to heavily shielded steel casks that sometimes weigh more than 98 tons (100 metric tons). Type B packaging can contain potentially life-endangering amounts of radioactive material.

Type C packaging is used for consignments, transported by aircraft, of high-activity radioactive materials that have not been certified as “low dispersible radioactive material” (including plutonium). They are designed to withstand severe accident conditions associated with air transport without loss of containment or significant increase in external radiation levels. The Type C packaging performance requirements are significantly more stringent than those for Type B packaging. Type C packaging is not authorized for domestic use but can be authorized for international shipments of these high-activity radioactive material consignments. Regulations require that both Type B and Type C packaging be marked with a trefoil symbol to ensure that the package can be positively identified as carrying radioactive material. The trefoil symbol must be resistant to the effects of both fire and water so that it will be likely to survive a severe accident and serve as a warning to emergency responders.

The performance requirements for Type C packaging include those applicable to Type B packaging with enhancements on some tests that are significantly more stringent than those for Type B packaging. For example, a 200 mph (321.8 km/hr) impact onto an unyielding target is required instead of the 30 ft (9.1 m) drop test required of a Type B packaging; a 60-minute fire test is required instead of the 30-minute test for Type B packaging; and a puncture/tearing test is required. These stringent tests are expected to result in packaging designs that will survive more severe aircraft accidents than Type B packaging designs. [472, 2013]

A.3.3.46 Personal Protective Equipment. Personal protective equipment includes both personal protective clothing and respiratory protection. Adequate personal protective equipment should protect the respiratory system, skin, eyes, face, hands, feet, head, body, and hearing. [472, 2013] Personal protective equipment includes both personal protective clothing and respiratory protection. Adequate personal protective equipment should protect the respiratory system, skin, eyes, face, hands, feet, head, body, and hearing.
A.3.3.48.1 Emergency Response Plan. Emergency response plans can be developed at organizational, agency, local, state, and federal levels. [472, 2013]

A.3.3.48.2 Incident Action Plan. It can include the identification of operational resources and assignments. It can also include attachments that provide direction and important information for management of the incident during one or more operational periods. [472, 2013]

A.3.3.49 Planned Response. The following site safety plan considerations are from the EPA's Standard Operating Safety Guides:

1. Site description
2. Entry objectives
3. On-site organization
4. On-site control
5. Hazard evaluations
6. Personal protective equipment
7. On-site work plans
8. Communication procedures
9. Decontamination procedures
10. Site safety and health plan [472, 2013]

3.3.XX Policies and procedures. Personal protective equipment includes both personal protective clothing and respiratory protection. Adequate personal protective equipment should protect the respiratory system, skin, eyes, face, hands, feet, head, body, and hearing.

A.3.3.50 Protective Clothing. Protective clothing is divided into three types:

1. Structural fire-fighting protective clothing
2. High temperature–protective clothing
3. Chemical-protective clothing
   a. Liquid splash–protective clothing
   b. Vapor-protective clothing [472, 2013]

A.3.3.50.1 Chemical-Protective Clothing. Chemical-protective clothing (garments) can be constructed as a single- or multipiece garment. The garment can completely enclose the wearer either by itself or in combination with the wearer's respiratory protection, attached or detachable hood, gloves, and boots. [472, 2013]

A.3.3.50.2 High Temperature–Protective Clothing. This type of clothing is usually of limited use in dealing with chemical commodities. [472, 2013]

A.3.3.50.3 Liquid Splash–Protective Clothing. This type of protective clothing is a component of EPA Level B chemical protection. Liquid splash–protective clothing should meet the requirements of NFPA 1992, Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies. [472, 2013]

A.3.3.50.4 Structural Fire-Fighting Protective Clothing. Structural fire-fighting protective clothing provides limited protection from heat but might not provide adequate protection from the harmful gases, vapors, liquids, or dusts that are encountered during hazardous materials/WMD incidents. [472, 2013]
A.3.3.50.5 Vapor-Protective Clothing. This type of protective clothing is a component of EPA Level A chemical protection. Vapor-protective clothing should meet the requirements of NFPA 1991, Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies. [472, 2013]

A.3.3.52 Respiratory Protection. Respiratory protection is divided into three types:

1. Positive pressure self-contained breathing apparatus
2. Positive pressure air-line respirators
3. Air-purifying respirators [472, 2013]

A.3.3.53 Response. The activities in the response portion of a hazardous materials/WMD incident include analyzing the incident, planning the response, implementing the planned response, evaluating progress, and terminating the emergency phase of the incident. [472, 2013]

A.3.3.58.1 Specialist Employee A. Consistent with the organization's emergency response plan and/or standard operating procedures, the specialist employee A is able to analyze an incident involving chemicals within the organization's area of specialization, plan a response to that incident, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response. Specialist employees are those persons who, in the course of their regular job duties, work with or are trained in the hazards of specific chemicals or containers within their organization's area of specialization. In response to emergencies involving hazardous materials/WMD in their organization's area of specialization, they could be called on to provide technical advice or assistance to the incident commander relative to specific chemicals or containers for chemicals. Specialist employees should receive training or demonstrate competency in their area of specialization annually. Specialist employees also should receive additional training to meet applicable DOT, OSHA, EPA, and other appropriate state, local, or provincial occupational health and safety regulatory requirements. Specialist employees respond to hazardous materials/WMD incidents under differing circumstances. They respond to incidents within their facility, inside and outside their assigned work area, and outside their facility. Persons responding away from the facility or within the facility outside their assigned work area respond as members of a hazardous materials response team or as specialist employees as outlined in this definition and in NFPA 472, Chapter 9. When responding to incidents away from their assigned work area, specialist employees should be permitted to perform only at the response level at which they have been trained.

Persons responding to a hazardous materials/WMD incident within their work area are not required to be trained to the levels specified by this chapter. Persons within their work area who have informed the incident management structure of an emergency as defined in the emergency response plan who have adequate personal protective equipment and adequate training in the procedures they are to perform and who have employed the buddy system can take limited action in the danger area (e.g., turning a valve) before the emergency response team arrives. The limited action taken should be addressed in the emergency response plan. Once the emergency response team arrives, these persons should be restricted to the actions that their training level allows and should operate under the incident command structure. [472, 2013]

A.3.3.58.2 Specialist Employee B. Because of the employee's education, training, or work experience, the specialist employee B can be called on to respond to incidents involving specific chemicals or containers. The specialist employee B can be used to gather and record information, provide technical advice, and provide technical assistance (including work within the hot zone)
A.3.3.58.3 Specialist Employee C. Consistent with the organization's emergency response plan and/or standard operating procedures and the emergency response plan. See NFPA 472 - 3.3.47.1. [472, 2013]

A.3.3.60 Termination. Termination is divided into three phases: debriefing the incident, post incident analysis, and critiquing the incident. [472, 2013]

A.3.3.61 UN/NA Identification Number. United Nations (UN) numbers are four-digit numbers used in international commerce and transportation to identify hazardous chemicals or classes of hazardous materials. These numbers generally range between 0000 and 3500 and usually are preceded by the letters “UN” (e.g., “UN1005”) to avoid confusion with number codes. North American (NA) numbers are identical to UN numbers. If a material does not have a UN number, it may be assigned an NA number. These usually are preceded by “NA” followed by a four-digit number starting with 8 or 9. [472, 2013]

A.3.3.63 Weapon of Mass Destruction (WMD). The source of this definition is 18 USC 2332a. [472, 2013]

A.3.3.63.1 Radiological Weapons of Mass Destruction. The intent of this annex material is to provide information on the different types of radiological/nuclear devices that can be used as a weapon by those with malicious intent. [472, 2013]

A.3.3.63.1.1 Radiation Exposure Device. Sealed source means radioactive material encased in a capsule or closely bonded to another material in order to contain the radioactive material and prevent its leakage or escape under normal conditions of intended use. Radioactive material may be in a sealed or unsealed (dispersible) form. Shipments of sealed and dispersible forms of radioactive material are made in accordance with Department of Transportation regulations in a variety of packaging dependent on the physical and chemical form of the material, quantity of radioactive material present, and associated radiation levels on the exterior of the packaging. An RED may cause a few deaths, but normally would not cause widespread radiological contamination.

An RED may be concealed in public transportation (under a bus or subway seat), a busy shopping mall (the food court, for example), movie theater, or any other location where a large number of people may sit, stand, or pass by individuals who come in contact with, touch, or sit on a radioactive material container do not become contaminated. The danger is from exposure, for extended periods of time, to high levels of radiation close to the radioactive material or generating device. If radioactive material was used in the RED and it was to break open, some of the radioactive material could be released, causing contamination. If this occurs, the RED becomes a Radiological Dispersal Device (RDD), and people coming in contact with the radioactive material could spread contamination elsewhere. [472, 2013]

A.3.3.64.2 Radiation Dispersal Device. Any device that intentionally spreads radioactive material across an area with the intent to cause harm, without a nuclear explosion occurring. An RDD that uses explosives for spreading or dispersing radioactive material is commonly referred to as a “dirty bomb” or “explosive RDD.” Non-explosive RDDs could spread radioactive
material using common items such as pressurized containers, fans, building air-handling systems, sprayers, crop dusters, or even spreading by hand. [472, 2013]

A.3.3.64.3 Improvised Nuclear Device. The nuclear explosion from an IND produces extreme heat, powerful shockwaves, and prompt radiation that would be acutely lethal for a significant distance. It also produces potentially lethal radioactive fallout, which may spread and deposit over very large areas. A nuclear detonation in an urban area could result in over 100,000 fatalities (and many more injured), massive infrastructure damage, and thousands of square kilometers of contaminated land. If the IND fails to work correctly and does not create a nuclear explosion, then the detonation of the conventional explosives would likely disperse radioactive material like an explosive Radiological Dispersal Device (RDD). [472, 2013]

A.3.4.4 Operations Level Responders. The source of this definition is 29 CFR 1910.120. These responders can have additional competencies that are specific to their response mission, expected tasks, and equipment and training as determined by the AHJ. [472, 2013]

A.4.2(A) Including indicators of terrorist attacks and other potentials. Instructors should emphasize that if you can smell it, taste it or feel it you are now (or may be) part of the problem.

A.4.3(B) Including evacuation and protect-in-place.

A.4.4 Wear assigned safety and PPE provided as required by AHJ policies and procedures; define monitoring

A.4.4(A) Liquid-splash protective clothing and vapor-protective clothing are examples of chemical protective clothing.

A.4.4(B) Something about wearing assigned safety and PPE provided by the AHJ.

A.5.2 Minimum list of references sources to be identified in Annex, including material safety data sheets, other reference sources, shipper/manufacturer contacts, the Emergency Response Guidebook, CHEMTREC/ CANUTEC/SETIQ and governmental authorities, items that are included in a survey – location, weather conditions, topography, populated buildings, bodies of water, other buildings, remedial actions taken, container/ package, contents, release, terms with significance and effect on behavior.

A.5.2(A) From material safety data sheets, other reference sources, shipper/manufacturer contacts, the Emergency Response Guidebook, CHEMTREC/ CANUTEC/SETIQ and governmental authorities, methods for describing the potential behavior of the hazardous material and its container in the incident, process for estimating outcomes; need to differentiate between estimating and potential harm used under requisite skills

A.5.2(B) Weather conditions current and projected, terrain, time of day, etc, from material safety data sheets, other reference sources, shipper/manufacturer contacts, the Emergency Response Guidebook, CHEMTREC/ CANUTEC/SETIQ and governmental authorities.

A.5.3 Results of the size-up – an indication of the risk assessment], the ERG or other reference sources may provide operations level responders with the actions to be followed in the initial response to a hazardous material incident. The recommendations provided in the ERG or equivalent guides can be used as the basis for an incident action plan. Operations Level responders are not expected to formalize an incident action plan or implement an incident action plan as an incident commander.
A.5.3(A) Need to know what information is going to be provided from the action plan and how - explain that planning must be accomplished to meet an assignment – decisions about objectives, options, safety procedures, etc. -- even though they may not be formalized, including positive pressure self-contained breathing apparatus, positive pressure air-line respirator with required escape unit, closed circuit SCBA, powered air-purifying respirator (PAPR), air-purifying respirator (APR), and particulate respirator, including chemical protective clothing (liquid-splash protective clothing and vapor-protective clothing), high-temperature protective clothing (proximity and entry suits), and structural firefighting protective clothing.

A.5.4(A) Over and above what is discussed at the awareness level

A.5.4(B) Over and above what is discussed at the awareness level, separate JPR

A.5.5 Emergency decontamination is the physical process of immediately reducing contamination of individuals in potentially life-threatening situations with or without the formal establishment of a decontamination corridor. That can be decontaminated by firefighters in firefighting PPE with equipment readily available to firefighters See 6.3.1.1 and 6.3.1.2.

A.5.5(A) Methods of exposure protection during decontamination.

A.5.6 IAP can be formal or informal depending on stage of emergency; initially IAP might be local policies and procedures

A.5.6(A) Provide examples of resources

A.6.2(B) This includes using the incident action plan (including product involved), policies and procedures for PPE, and other resources available.

A.6.3.1(A) Explanation

A.6.3.1(B) Select the PPE required to support mass decontamination based on local procedures, using resources available – list resources, victims – defined to include animals

A.6.3.2(A) Explanation

A.6.3.2(B) Select the PPE required to support technical decontamination based on local procedures, using resources available – list resources, victims – defined to include animals

A.6.4 Criminal statutes could include local, state, or federal statutes, such as 18 USC § 2332a - Use of weapons of mass destruction

A.6.5.1 Absorption, adsorption, damming, diking, dilution, diversion, retention, remote valve shut-off, vapor dispersion, and vapor suppression; control of fire or not?; with WMD type incidents, multiple variables may be present and multiple modes of product control may need to be performed. Spill control and leak control; based on product(s) involved, applicable policies and procedures and available personnel, PPE, and control equipment, including foam, provided by the AHJ

A.6.5.1(A) Absorption, adsorption, damming, diking, dilution, diversion, retention, remote valve shut-off, vapor dispersion, and vapor suppression: Aqueous film-forming foam, alcohol-resistant foam, fluoroprotein foam, high-expansion foam, special purpose or hazard suppressing foams or agents supplied by the AHJ
A.6.5.1(B) Meet requirements of JPR 6.2]; List other “agents”; Absorption, adsorption, damming, diking, dilution, diversion, retention, remote valve shut-off, vapor dispersion, and vapor suppression; using available tools and equipment and following policies and procedures of the AHJ.

A.6.5.2 Including fixed facility or transportation situations; based on product(s) involved, applicable policies and procedures and available personnel, PPE, control equipment, and extinguishing agents (including foams) provided by the AHJ; explanation of proper control method options which include, but are not limited to, withdrawal, letting the fire burn, as well as using extinguishing foams and agents.

A.6.5.2(A) Aqueous film-forming foam, alcohol-resistant foam, fluoroprotein foam, high-expansion foam, special purpose or hazard suppressing foams or agents supplied by the AHJ.

A.6.5.3 Including fixed facility or transportation situations; based on product(s) involved, applicable policies and procedures and available personnel, PPE, control equipment, and extinguishing agents provided by the AHJ; Explanation of proper control method options which include, but are not limited to, withdrawal, letting the fire burn, as well as using extinguishing foams and agents.

A.6.5.3(A) Including contacts to have shut off devices activated on pipeline, distribution; considerations for product control prior to extinguishment as to avoid reignition or flash conditions, i.e., control the release before you put the fire out.

A.6.6 Explanation of air monitoring, detection, and sampling; within the capabilities of available personnel, PPE, and tools, air monitoring, detection, and sampling equipment; examples, in an atmosphere where there is a risk of dust explosion, ignition sources are eliminated and or isolated – intrinsically safe equipment.

A.6.6(A) Identify “process”.

A.6.7(A) Risk vs. benefit, available personnel and rescue equipment; self directed rescue, directed rescue.

A.6.8(A) Definitions of types of laboratories

A.6.8(B) Define tactical enforcement personnel decontamination above technical decontamination.

A.7.2.1 Capacity of the containers is determined using markings on the container, shipping papers accompanying the shipment in transportation, or facility documentation or resources.

A.7.2.4 Specific minimum resources to be listed in Annex.

A.7.2.4(A) which ones – specific NIOSH Pocket Guide, CHRIS minimum standard.

A.7.2.5(B) Might have to use protective equipment to determine actual quantity of material and pressure involved; might have to use detection equipment to determine whether a breach has occurred - JPR on air monitoring which brings in the PPE issue.

A.7.3.1 Defensive, offensive, nonintervention.

A.7.3.2 Clothing, hood, boots, gloves designed to protect the wearer’s torso, head, arms, legs,
hands, and feet from hazardous materials” – see definition 3.3.46 and 3.3.50, specifically .1 - .5) and any specialized PPE provided by the AHJ.

A.7.3.3 Decontamination operations include emergency, mass, technical, equipment. Decontamination methods include absorption, adsorption, chemical degradation, dilution, disinfecting, evaporation, isolation and disposal, neutralization, solidification, sterilization, vacuuming, and washing.

A.7.4.1 Duties of those A.7.4.1. Role of the HMT.

A.7.4.2 Respiratory protection and liquid splash-protective and vapor-protective chemical-protective clothing ensembles and any other specialized PPE provided by the AHJ.

A.7.4.3 Product control includes the procedures, techniques, and methods used in the mitigation of hazardous materials/weapons of mass destruction (WMD) incidents, including containment, extinguishment, and confinement. Confinement is keeping a material, once released, in a defined or local area. Containment includes the actions taken to keep a material in its container (e.g., stop a release of the material or reduce the amount being released). Extinguishment is not defined in 472.

A.7.4.3.1 Control of fire; with WMD type incidents, multiple variables may be present and multiple modes of product control may need to be performed. Spill control and leak control; based on product(s) involved, applicable policies and procedures and available personnel, PPE, and control equipment, including foam, provided by the AHJ.

A.7.4.3.1(A) Aqueous film-forming foam, alcohol-resistant foam, fluoroprotein foam, high-expansion foam, special purpose or hazard suppressing foams or agents supplied by the AHJ; identify other “agents”.

A.7.4.3.1(B) Absorption, adsorption, damming, diking, dilution, diversion, retention, remote valve shut-off, vapor dispersion, and vapor suppression. Using available tools and equipment and following policies and procedures of the AHJ

A.7.4.3.2 Including fixed facility or transportation situations; based on product(s) involved, applicable policies and procedures and available personnel, PPE, control equipment, and extinguishing agents (including foams) provided by the AHJ; Explanation of proper control method which include, but are not limited to, withdrawal, letting the fire burn, as well as using extinguishing foams and agents.

A.7.4.3.2(A) Aqueous film-forming foam, alcohol-resistant foam, fluoroprotein foam, high-expansion foam, special purpose or hazard suppressing foams or agents supplied by the AHJ.

A.7.4.3.3 Including fixed facility or transportation situations; based on product(s) involved, applicable policies and procedures and available personnel, PPE, control equipment, and extinguishing agents provided by the AHJ; explanation of proper control method which include, but are not limited to, withdrawal, letting the fire burn, as well as using extinguishing foams and agents.

A.7.4.3.3(A) Including contacts to have shut off devices activated on pipeline, distribution; considerations for product control prior to extinguishment as to avoid reignition or flash conditions, i.e., control the release before you put the fire out.
A.7.4.3.2 Define pressure vessels, pressure container.

A.7.4.3.4 Need to define “other” method

A.7.4.4.2 Is this too much to meet 7.3.5.5. And if so, what stays and what goes – Salient part go to Monitoring section – rest will be deleted.

A.7.4.5 Explanation of evidence preservation and sampling; aimed at law enforcement, regulatory agencies, etc. Material identical to Chapter 6 material for same topic

A. 8.2.1 Specific minimum resources to be listed in Annex.

A.8.3.1 Defensive, offensive, nonintervention.

Annex B Explanation of the Standard and Concepts of JPRs

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 Explanation of the Standard and Concepts of Job Performance Requirements (JPRs).

The primary benefit of establishing national professional qualification standards is to provide both public and private sectors with a framework of the job requirements for the fire service. Other benefits include enhancement of the profession, individual as well as organizational growth and development, and standardization of practices.

NFPA professional qualifications standards identify the minimum JPRs for specific fire service positions. The standards can be used for training design and evaluation, certification, measuring and critiquing on-the-job performance, defining hiring practices, and setting organizational policies, procedures, and goals. (Other applications are encouraged.)

Professional qualifications standards for a specific job are organized by major areas of responsibility defined as duties. For example, the fire fighter’s duties might include fire suppression, rescue, and water supply, and the public fire educator’s duties might include education, planning and development, and administration. Duties are major functional areas of responsibility within a job.

The professional qualifications standards are written as JPRs. JPRs describe the performance required for a specific job. JPRs are grouped according to the duties of a job. The complete list of JPRs for each duty defines what an individual must be able to do in order to successfully perform that duty. Together, the duties and their JPRs define the job parameters — that is, the standard as a whole is a description of a job.

B.2 Breaking Down the Components of a JPR.

The JPR is the assembly of three critical components. (See Table B.2.) These components are as follows:
(1) Task that is to be performed

(2) Tools, equipment, or materials that must be provided to successfully complete the task

(3) Evaluation parameters and/or performance outcomes

Table B.2 Example of a JPR

<table>
<thead>
<tr>
<th>(1) Task</th>
<th>(1) Ventilate a pitched roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) Tools, equipment, or materials</td>
<td>(2) Given an ax, a pike pole, an extension ladder, and a roof ladder</td>
</tr>
<tr>
<td>(3) Evaluation parameters and performance outcomes</td>
<td>(3) So that a 4 ft × 4 ft (1.22 m × 1.22 m) hole is created; all ventilation barriers are removed; ladders are properly positioned for ventilation; ventilation holes are correctly placed; and smoke, heat, and combustion by-products are released from the structure</td>
</tr>
</tbody>
</table>

B.2.1 The Task to Be Performed. The first component is a concise, brief statement of what the person is supposed to do.

B.2.2 Tools, Equipment, or Materials That Must be Provided to Successfully Complete the Task. This component ensures that all individuals completing the task are given the same minimal tools, equipment, or materials when being evaluated. By listing these items, the performer and evaluator know what must be provided in order to complete the task.

B.2.3 Evaluation Parameters and/or Performance Outcomes. This component defines how well one must perform each task — for both the performer and the evaluator. The JPR guides performance towards successful completion by identifying evaluation parameters and/or performance outcomes. This portion of the JPR promotes consistency in evaluation by reducing the variables used to gauge performance.

In addition to these three components, the JPR contains requisite knowledge and skills. Just as the term requisite suggests, these are the necessary knowledge and skills one must have prior to being able to perform the task. Requisite knowledge and skills are the foundation for task performance.

Once the components and requisites are put together, the JPR might read as follows.

B.2.3.1 Example 1. The Fire Fighter I shall ventilate a pitched roof, given an ax, a pike pole, an extension ladder, and a roof ladder, so that a 4 ft × 4 ft (1.22 m × 1.22 m) hole is created, all ventilation barriers are removed, ladders are properly positioned for ventilation, and ventilation holes are correctly placed.

(A) Requisite Knowledge. Pitched roof construction, safety considerations with roof ventilation, the dangers associated with improper ventilation, knowledge of ventilation tools, the effects of ventilation on fire growth, smoke movement in structures, signs of backdraft, and the knowledge of vertical and forced ventilation.
(B) **Requisite Skills.** The ability to remove roof covering; properly initiate roof cuts; use the pike pole to clear ventilation barriers; use ax properly for sounding, cutting, and stripping; position ladders; and climb and position self on ladder.

**B.2.3.2 Example 2.** The Fire Investigator shall interpret burn patterns, given standard equipment and tools and some structural/content remains, so that each individual pattern is evaluated with respect to the burning characteristics of the material involved.

(A) **Requisite Knowledge.** Knowledge of fire development and the interrelationship of heat release rate, form, and ignitibility of materials.

(B) **Requisite Skills.** The ability to interpret the effects of burning characteristics on different types of materials.

**B.3 Examples of Potential Uses.**

**B.3.1 Certification.** JPRs can be used to establish the evaluation criteria for certification at a specific job level. When used for certification, evaluation must be based on the successful completion of JPRs.

First, the evaluator would verify the attainment of requisite knowledge and skills prior to JPR evaluation. Verification might be accomplished through documentation review or testing.

Next, the candidate would be evaluated on completing the JPRs. The candidate would perform the task and be evaluated based on the evaluation parameters, the performance outcomes, or both. This performance-based evaluation can be either practical (for psychomotor skills such as “ventilate a roof”) or written (for cognitive skills such as “interpret burn patterns”).

Note that psychomotor skills are those physical skills that can be demonstrated or observed. Cognitive skills (or mental skills) cannot be observed, but are rather evaluated on how one completes the task (process oriented) or the task outcome (product oriented).

Using Example 1, a practical performance-based evaluation would measure one’s ability to “ventilate a pitched roof.” The candidate passes this particular evaluation if the standard was met — that is, a 4 ft × 4 ft (1.22 m × 1.22 m) hole was created; all ventilation barriers were removed; ladders were properly positioned for ventilation; ventilation holes were correctly placed; and smoke, heat, and combustion by-products were released from the structure.

For Example 2, when evaluating the task “interpret burn patterns,” the candidate could be given a written assessment in the form of a scenario, photographs, and drawings and then be asked to respond to specific written questions related to the JPR’s evaluation parameters.

Remember, when evaluating performance, you must give the person the tools, equipment, or materials listed in the JPRs — for example, an ax, a pike pole, an extension ladder, and a roof ladder — before he or she can be properly evaluated.

**B.3.2 Curriculum Development/Training Design and Evaluation.** The statements contained in this document that refer to job performance were designed and written as JPRs. Although a resemblance to instructional objectives might be present, these statements should not be used in a teaching situation until after they have been modified for instructional use.
JPRs state the behaviors required to perform specific skill(s) on the job, as opposed to a learning situation. These statements should be converted into instructional objectives with behaviors, conditions, and standards that can be measured within the teaching/learning environment. A JPR that requires a fire fighter to “ventilate a pitched roof” should be converted into a measurable instructional objective for use when teaching the skill. [See Figure B.3.2(a).]

****INSERT FIGURE HERE****

FIGURE B.3.2(a) Converting JPRs into Instructional Objectives.

Using Example 1, a terminal instructional objective might read as follows:

The learner will ventilate a pitched roof, given a simulated roof, an ax, a pike pole, an extension ladder, and a roof ladder, so that 100 percent accuracy is attained on a skills checklist. (At a minimum, the skills checklist should include each of the measurement criterion from the JPRs.)

Figure B.3.2(b) is a sample checklist for use in evaluating this objective.

****INSERT FIGURE HERE****

FIGURE B.3.2(b) Sample Skills Checklist.

While the differences between JPRs and instructional objectives are subtle in appearance, the purpose of each statement differs greatly. JPRs state what is necessary to perform the job in the “real world.” Instructional objectives, however, are used to identify what students must do at the end of a training session and are stated in behavioral terms that are measurable in the training environment.

By converting JPRs into instructional objectives, instructors will be able to clarify performance expectations and avoid confusion related to using statements designed for purposes other than teaching. Additionally, instructors will be able to add local/state/regional elements of performance into the standards as intended by the developers.

Requisite skills and knowledge should be converted into enabling objectives. These help to define the course content. The course content would include each of the requisite knowledge and skills. Using the above example, the enabling objectives would be pitched roof construction, safety considerations with roof ventilation, removal of roof covering, properly initiated roof cuts, and so on. This ensures that the course content supports the terminal objective.

Note that it is assumed that the reader is familiar with curriculum development or training design and evaluation.

B.4 Other Uses.

While the professional qualifications standards are principally used to guide the development of training and certification programs, there are a number of other potential uses for the documents. Because the documents are written in JPR terms, they lend themselves well to any area of the profession where a level of performance or expertise must be determined. These areas might include the following:
(1) **Employee Evaluation/Performance Critiquing.** The JPRs can be used as a guide by both the supervisor and the employee during an evaluation. The JPRs for a specific job define tasks that are essential to perform on the job as well as the evaluation criteria to measure when those tasks are completed.

(2) **Establishing Hiring Criteria.** The professional qualifications standards can be used in a number of ways to further the establishment of hiring criteria. The AHJ could simply require certification at a specific job level — for example, Fire Fighter I. The JPRs could also be used as the basis for pre-employment screening by establishing essential minimal tasks and the related evaluation criteria. An added benefit is that individuals interested in employment can work towards the minimal hiring criteria at local colleges.

(3) **Employee Development.** The professional qualifications standards can be useful to both the employee and the employer in developing a plan for the individual’s growth within the organization. The JPRs and the associated requisite knowledge and skills can be used as a guide to determine additional training and education required for the employee to master his or her job or profession.

(4) **Succession Planning.** Succession planning or career pathing addresses the efficient placement of people into jobs in response to current needs and anticipated future needs. A career development path can be established for targeted individuals to prepare them for growth within the organization. The JPRs and requisite knowledge and skills could then be used to develop an educational path to aid in the individual’s advancement within the organization or profession.

(5) **Establishing Organizational Policies, Procedures, and Goals.** The JPRs can be incorporated into organizational policies, procedures, and goals where employee performance is addressed.

**Annex C Informational References**

**C.1 Referenced Publications.**
The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

**C.1.1 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


C.1.2 Other Publications.

C.1.2.1 American Chemistry Council (formerly Chemical Manufacturers Association) Publications. American Chemistry Council, 1300 Wilson Blvd., Arlington, VA 22209.

*Recommended Terms for Personal Protective Equipment*, 1985.

C.1.2.2 API Publications. American Petroleum Institute, 1220 L Street, N.W., Washington, DC 20005-4070.


C.1.2.3 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.


C.1.2.4 IMO Publications. International Maritime Organization, 4 Albert Embankment, London SE1 7SR, UK.


*MARPOL 73/78*.

*Safety of Life at Sea* (SOLAS).

National Incident Management System (NIMS), *Site Safety and Control Plan* (formerly ICS 208 HM)
Title 18, U.S. Code, Section 2332a, “Use of Weapons of Mass Destruction.”
Title 29, Code of Federal Regulations, Parts 1910.119–1910.120.
Title 46, Code of federal Regulations, “Shipping.”

C.1.2.7 Additional Publications.


C.2 Informational References. The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

C.2.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


C.2.2 ASTM Publication. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA, 19428-2959.


C.3 References for Extracts in Informational Sections. (Reserved)
Item 12-10-18
The TC on Fire and Emergency Services Organization and Deployment-Career wishes to ask the standards council to for a one time skip their current cycle of A2014 to A2015. The extension is to let the committee work on high-rise staffing levels to be included in the proposed edition of the standard. The research has just been completed and the report is due out in early 2013 after the public input stage of the current A2014 cycle. The committee believes the inclusion of this information is important to include in the proposed edition and does not wish to wait 5-7 more years. The committee does not wish to reopen the public input stage.

Steven Sawyer
Senior Fire Service Specialist
Executive Secretary IFMA
NFPA 1 Batterymarch Park, Quincy, MA 02169
617.984.7423 Fax 617.984.7056
ssawyer@nfpa.org
To: NFPA Standards Council

From: Dr. Christina M. Baxter, Chair
Technical Committee on Hazardous Materials Protective Clothing and Equipment

Date: September 7, 2012

Re: Request to Enter Fall 2015 Cycle for NFPA 1991, Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies

The Technical Committee on Hazardous Materials Protective Clothing and Equipment is requesting approval to change from the Fall 2014 to the Fall 2015 cycle for the next revision of NFPA 1991, Standard for Vapor-Protective Ensembles for Hazardous Materials Emergencies.

The Technical Committee is requesting the additional time so that it may review current and expected new test methods and design and performance requirements for vapor-protective ensemble elements for hazardous materials emergency response.

Should you require additional information please do not hesitate to contact me.

Sincerely,

Christina M. Baxter,
Chair, Technical Committee on Hazardous Materials Protective Clothing and Equipment
Item 12-10-21
As required by the operating procedures adopted by the HRBSAC, this memo serves as the 2012 Annual Report to the NFPA Standards Council.

The High Rise Building Safety Advisory Committee held a meeting on October 26-27, 2011 in Portland, OR. The primary purpose of the meeting was to develop public inputs to be submitted to the applicable Technical Committees of NFPA 1, NFPA 101 and NFPA 5000 regarding high rise building issues. In addition, the HRB-SAC committee discussed and continued its development of the document, “Guidelines to Develop an Emergency Action Plan for All-Hazard Emergencies.”

The High Rise Building Safety Advisory Committee also held a meeting via conference call on March 22, 2012. The primary purpose of this planning meeting was to identify and develop action items and tasks to be completed and further addressed at the next in person meeting. The committee reviewed the SFPE draft publication “Guidelines for Designing Fire Safety in Very Tall Buildings” as well as continued revision and development of the EAP guide noted above.

It should be noted that during HRBSAC’s meeting in June 2010, the committee decided that it would meet twice per year. A planning conference call would be held at the beginning of each year to establish action items for the committee. An in-person meeting would be held each year in the summer/fall to complete those action items and additional work of the committee. For 2012, the fall, in-person meeting will not be held to assist with budgeting. However, a conference call will be scheduled before the end of 2012 to address the development of public comments for NFPA 1, NFPA 101 and NFPA 5000 as well as develop plans for the finalization of the EAP guide noted above.

The current committee roster for HRBSAC is provided below. NFPA decided to allow HRBSAC members to designate an Alternate member in September of 2006 and continues to offer that to members. Alternates will be able to participate and attend at the expense of NFPA when the principal member is not available.

<table>
<thead>
<tr>
<th>NAME</th>
<th>COMPANY/ORGANIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>James R. Quiter – Chair</td>
<td>Arup</td>
</tr>
<tr>
<td>Geoff Craighead</td>
<td>Universal Protection Service</td>
</tr>
</tbody>
</table>
HRBSAC has pursued the following over the past year:

i) **NFPA 101 and NFPA 5000 public input**

In accordance with the scope of the committee, the committee will continue to be a part of the code making process by developing work products relating to high rise building safety. NFPA 1, NFPA 101, and NFPA 5000 held their Public Input meetings for the 2015 editions in May and August of 2012. HRBSAC was able to contribute to these meetings with the submission of several Public Inputs to various committees. At their next meeting, HRBSAC will review the results of the NFPA 1, NFPA 101 and NFPA 5000 First Draft meetings and develop a series of Public Comments in response.

ii) **Emergency Action Planning Guide**

HRB-SAC is continuing work on producing a final copy of the EAP Guide. The document provides minimum criteria for developing an all-hazard (fire and non-fire) emergency action plan for use by personnel responding to emergencies. It remains as the top action item to be completed by the committee.

iii) **Events of Interest to HRB-SAC**

Over the past year, the committee has reviewed several events and items related to the scope and expertise of the HRBSAC membership including the following:

- FPRF project on elevator messaging strategies
- Review of the Wellesley Street high rise apartment building fire, as presented by committee member, Chief Bill Stewart
- Electronic Building Information Cards (eBIC)

The committee has continued to express interest in the following topics and will continue to pursue activities and action items related to the following:

- Elevators for occupant evacuation
- High rise building technologies
- Safety of existing high rise buildings
- High rise building practices during construction/retrofitting
- Green building technologies

iv. **Future of the High Rise Building Safety Advisory Committee**
Overall HRBSAC continues to be dedicated to and involved in the many issues surrounding high rise building safety. Over the past year, HRBSAC has provided key input to NFPA staff and TC’s for consideration in the revision of NFPA documents as well as peripheral projects that can benefit NFPA. The diverse views, backgrounds and emerging issues in building construction and life safety discussed by the committee are critical as NFPA moves forward with addressing changes and meaningful safety improvements that encompass the high rise environment. We look forward to the renewed energy of the committee and their future work in high rise building safety.

C: R.Solomon
   A.Cronin
Item 12-10-22
# 2014 Annual Revision Cycle

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## 2014 FALL REVISION CYCLE

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Approved October 18, 2011
Revised October 24, 2012
## 2015 ANNUAL REVISION CYCLE

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### Tech Session Preparation (& Issuance)

- **Notice of Intent to Make a Motion (NITMAM) Closing Date**: 3/6/2015
- **Posting of Certified Amending Motions (CAMs) and Consent Standards**: 5/1/2015
- **Appeal Closing Date for Consent Standards**: 5/16/2015
- **SC Issuance Date for Consent Standards**: 5/26/2015

### Tech Session

- **8/20/2015**

### Appeals and Issuance

- **Appeal Closing Date for Standards with CAMs**: 7/15/2015
- **SC Issuance Date for Standards with CAMs**: 8/20/2015
## 2015 FALL REVISION CYCLE

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## 2016 Fall Revision Cycle

*Public Input Dates may vary according to standards and schedules for Revision Cycles may change. Please check the NFPA Website for the most up-to-date information on Public Input Closing Dates and schedules at www.nfpa.org/document # (i.e. www.nfpa.org/101) and click on the Next Edition tab.*

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<th>Dates for TC</th>
<th>Dates for TC with CC</th>
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| Comment Stage            | Public Comment closing date                              | 11/16/15     | 11/16/15             |
| (Second Draft)           | Final Date to Publish Notice of Consent Standards (Standards that received no Comments) | 11/30/15     | 11/30/15             |
|                          | Appeal Closing Date for Consent Standards (Standards that received no Comments) | 12/14/15     | 12/14/15             |
|                          | Final date for TC Second Draft Meeting                   | 5/2/16       | 1/25/16              |
|                          | Posting of Second Draft and TC Ballot                    | 6/13/16      | 3/7/16               |
|                          | Final date for Receipt of TC Second Draft ballot         | 7/5/16       | 3/28/16              |
|                          | Final date for receipt of TC Second Draft ballot - recirc| 7/11/16      | 4/4/16               |
|                          | Posting of Second Draft for CC Meeting                   | 4/11/16      |                      |
|                          | Final date for CC Second Draft Meeting                   | 5/23/16      |                      |
|                          | Posting of Second Draft for CC Ballot                    | 6/13/16      |                      |
|                          | Final date for Receipt of CC Second Draft ballot         | 7/5/16       |                      |
|                          | Final date for Receipt of CC Second Draft ballot - recirc| 7/11/16      |                      |
|                          | **Post Second Draft Report** for NITMAM Review            | 7/18/16      | 7/18/16              |

| Tech Session Preparation | **Notice of Intent to Make a Motion (NITMAM) Closing Date** | 8/22/16 | 8/22/16 |
| (CAMs) & Issuance        | **Posting of Certified Amending Motions (CAMs) and Consent Standards** | 10/17/16 | 10/17/16 |
|                          | Appeal Closing Date for Consent Standards                 | 11/1/16      | 11/1/16  |
|                          | SC Issuance Date for Consent Standards                    | 11/11/16     | 11/11/16 |

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# 2017 Annual Revision Cycle

*Public Input Dates may vary according to standards and schedules for Revision Cycles may change. Please check the NFPA Website for the most up-to-date information on Public Input Closing Dates and schedules at www.nfpa.org/document # (i.e. www.nfpa.org/101) and click on the Next Edition tab.*

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<thead>
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<th>Process Step</th>
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| Comment Stage \(\text{Second Draft}\) | Public Comment closing date | 5/16/16 | 5/16/16 |
| | Final Date to Publish Notice of Consent Standards (Standards that received no Comments) | 5/30/16 | 5/30/16 |
| | Appeal Closing Date for Consent Standards (Standards that received no Comments) | 6/13/16 | 6/13/16 |
| | Final date for TC Second Draft Meeting | 10/31/16 | 7/25/16 |
| | Posting of Second Draft and TC Ballot | 12/12/16 | 9/5/16 |
| | Final date for Receipt of TC Second Draft ballot | 1/2/17 | 9/26/16 |
| | Final date for receipt of TC Second Draft ballot - recirc | 1/9/17 | 10/3/16 |
| | Posting of Second Draft for CC Meeting | | 10/10/16 |
| | Final date for CC Second Draft Meeting | | 11/21/16 |
| | Posting of Second Draft for CC Ballot | | 12/12/16 |
| | Final date for Receipt of CC Second Draft ballot | | 1/2/17 |
| | Final date for Receipt of CC Second Draft ballot - recirc | | 1/9/17 |
| | Post Second Draft Report for NITMAM Review | 1/16/17 | 1/16/17 |

| Tech Session Preparation \(\text{& Issuance}\) | Notice of Intent to Make a Motion (NITMAM) Closing Date | 2/20/17 | 2/20/17 |
| | Posting of Certified Amending Motions (CAMs) and Consent Standards | 4/17/17 | 4/17/17 |
| | Appeal Closing Date for Consent Standards | 5/2/17 | 5/2/17 |
| | SC Issuance Date for Consent Standards | 5/12/17 | 5/12/17 |

| Tech Session | Association Meeting for Standards with CAMs | 6/4-7/2017 | 6/4-7/2017 |

| Appeals and Issuance | Appeal Closing Date for Standards with CAMs | 6/27/17 | 6/27/17 |
| | SC Issuance Date for Standards with CAMs | 8/10/17 | 8/10/17 |