Standards Council Meeting  
Supplemental Agenda  
July 29-August 1, 2013  

NFPA  
1 Batterymarch Park  
Quincy, MA 02169  
(617) 770-3000

<table>
<thead>
<tr>
<th>13-8-1</th>
<th>Act on the issuance of NFPA 25, <em>Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems</em>, with an issuance date of August 1, 2013 and an effective date of August 21, 2013, as acted on at the Association Meeting, with six amendments as follows:</th>
</tr>
</thead>
</table>
| 13-8-1-a | Amendment No. 25-1 (CAM 25-4): Accept an Identifiable Part of Proposal 25-47. *(FAILED TC ballot)*  
See Attachment 13-8-1-a  

13-8-1-a-1 | APPEAL  
Appearance of K. Isman of National Fire Sprinkler Association, requesting the Council uphold the Association Action to Accept an Identifiable part of Proposal 25-47. This motion (CAM 25-4) passed on the floor of the Association Meeting but failed TC ballot.  
See SA 13-8-1-a-1 ADVERTISEMENT  

13-8-1-a-1-a | Comment received by W. Koffel, Chair of the Inspection, Testing, and Maintenance of Water-Based Systems Committee on the appeal by K. Isman.  
See CAM 25-4  
See SA 13-8-1-a-1-a ADVERTISEMENT  

13-8-1-a-2 | Two comments received on the Appeal filed by K. Isman in support of the Appeal.  
See SA 13-8-1-a-2 ADVERTISEMENT  

13-8-1-b | Amendment No. 25-2 (CAM 25-5): Accept Comment 25-32. *(FAILED TC ballot)*  
See Attachment 13-8-1-b  

13-8-1-b-1 | APPEAL  
Appeal of K. Isman of National Fire Sprinkler Association, requesting the Council uphold the Association Action to Accept Comment 25-32. This motion (CAM 25-5) passed on the floor of the Association Meeting but failed TC ballot.  
See SA 13-8-1-b-1 ADVERTISEMENT  

13-8-1-b-1-a | Comment received by W. Koffel, Chair of the Inspection, Testing, and Maintenance of Water-Based Systems Committee on the appeal by K. Isman.  
See CAM 25-5  
See SA 13-8-1-b-1-a ADDITION  

13-8-1-b-2 | One comment received on the Appeal filed by K. Isman in support of the Appeal.  
See SA 13-8-1-b-2 ADVERTISEMENT  

13-8-1-c | Amendment No. 25-3 (CAM 25-7): Accept Comment 25-34. *(FAILED TC ballot)*  
See Attachment 13-8-1-c  

13-8-1-c-1 | APPEAL  
Appeal of K. Isman of National Fire Sprinkler Association, requesting the Council uphold the Association Action to Accept Comment 25-34. This motion (CAM 25-7) passed on the floor of the Association Meeting but failed TC ballot.  
See SA 13-8-1-c-1 ADVERTISEMENT  

13-8-1-c-1-a | Comment received by W. Koffel, Chair of the Inspection, Testing, and Maintenance of Water-Based Systems Committee on the appeal by K. Isman.  
See CAM 25-7  
See SA 13-8-1-c-1-a ADDITION  

13-8-1-c-2 | One comment received on the Appeal filed by K. Isman in support of the Appeal.  
See SA 13-8-1-c-2 ADVERTISEMENT  


July 22, 2013  
Supplemental Agenda July 29-August 1, 2013  
Page 1 of 1861
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-8-1-d</td>
<td>Amendment No. 25-4 (CAM 25-9): Accept Comment 25-44. (FAILED TC ballot) See Attachment 13-8-1-d</td>
</tr>
<tr>
<td>13-8-1-d-1</td>
<td>APPEAL</td>
</tr>
<tr>
<td>13-8-1-d-1-a</td>
<td>Comment received by W. Koffel, Chair of the Inspection, Testing, and Maintenance of Water-Based Systems Committee on the appeal by K. Isman. (CAM 25-9) See SA 13-8-1-d-1-a ADDITION</td>
</tr>
<tr>
<td>13-8-1-e</td>
<td>Amendment No. 25-5 (CAM 25-17): Accept Comment 25-99. (FAILED TC ballot) See Attachment 13-8-1-e</td>
</tr>
<tr>
<td>13-8-1-e-1</td>
<td>APPEAL</td>
</tr>
<tr>
<td>13-8-1-e-1-a</td>
<td>Informational ballot on CAM 25-17 See SA 13-8-1-e-1-a ADDITION</td>
</tr>
<tr>
<td>13-8-1-f</td>
<td>Amendment No. 25-6 (CAM 25-19): Accept Comment 25-107. (FAILED TC ballot) See Attachment 13-8-1-f</td>
</tr>
<tr>
<td>13-8-1-f-1</td>
<td>APPEAL</td>
</tr>
<tr>
<td>13-8-1-f-1-a</td>
<td>Comment received by W. Koffel, Chair of the Inspection, Testing, and Maintenance of Water-Based Systems Committee on the appeal by K. Isman. SA 13-8-1-f-1-a ADDITION</td>
</tr>
<tr>
<td>13-8-1-g</td>
<td>Appeal of R. Huggins of American Fire Sprinkler Association, requesting the Council reject Comment 25-162. This motion (CAM 25-29) was not pursued by the submitter of the CAM at the Association Meeting. See Attachment 13-8-1-g</td>
</tr>
<tr>
<td>13-8-1-g-1</td>
<td>One comment received on the Appeal filed by R. Huggins in support of the Appeal. See Attachment 13-8-1-g-1</td>
</tr>
<tr>
<td>13-8-1-g-1-a</td>
<td>Comment received by W. Koffel, Chair of the Inspection, Testing, and Maintenance of Water-Based Systems Committee on the appeal by R. Huggins. (CAM 25-29) See SA 13-8-1-g-1-a ADDITION</td>
</tr>
<tr>
<td>13-8-1-g-2</td>
<td>APPEAL</td>
</tr>
<tr>
<td>13-8-1-h</td>
<td>APPEAL</td>
</tr>
<tr>
<td>13-8-1-h-1</td>
<td>Two comments received on the Appeal filed by W. Koffel in support of the Appeal. See Attachment 13-8-1-h-1</td>
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<tr>
<td>Section</td>
<td>Description</td>
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<tr>
<td>13-8-2-b-1</td>
<td>APPEAL Appeal of R. Fredenburg of North Carolina Department of Agriculture and Consumer Services, Standards Division, requesting the Council accept Comment 58-50. This motion (CAM-58-3) passed on the floor of the Association Meeting but failed TC ballot. See SA13-8-2-b-1 ADDITION</td>
</tr>
<tr>
<td>13-8-2-b-2</td>
<td>Comment received by F. Mortimer, Chair of the Liquefied Petroleum Gases Committee on the appeal by R. Fredenburg. (CAM 58-3) See SA 13-8-2-b-2 ADDITION</td>
</tr>
<tr>
<td>13-8-3</td>
<td>Act on the issuance of NFPA 70, <em>National Electrical Code</em>®, with an issuance date of August 1, 2013 and an effective date of August 21, 2013, as acted on at the Association Meeting, with eleven amendments as follows:</td>
</tr>
<tr>
<td>13-8-3-a</td>
<td>Amendment No. 70-1 (CAMs 70-2 and 70-3): Related Motions to Reject Comments 2-33 and 2-34. (FAILED TCC ballot PASSED Panel ballot) See Attachment 13-8-3-a See SA 13-8-3-a</td>
</tr>
<tr>
<td>13-8-3-b</td>
<td>APPEAL Appeal of M. Hirschler of GBH International, requesting the Council overturn the Association action, and accept Comment 3-21. This motion (CAM 70-5) failed on the floor of the Association Meeting. See Attachment 13-8-3-b See SA 13-8-3-b</td>
</tr>
<tr>
<td>13-8-3-c</td>
<td>Amendment No. 70-2 (CAMs 70-7, 70-8, 70-9 and 70-10): Related Motions to Reject Comments 6-4, 6-5, 6-6 and 6-7. (PASSED TCC ballot FAILED Panel ballot) See Attachment 13-8-3-c See SA 13-8-3-c</td>
</tr>
<tr>
<td>13-8-3-d</td>
<td>APPEAL Appeal of T. Lindsey of Travis Lindsey Consulting Services, Inc., requesting the Council Reject Comment 6-37. This motion (CAM 70-12) failed on the floor of the Association Meeting. See Attachment 13-8-3-d SA 13-8-3-d</td>
</tr>
<tr>
<td>13-8-3-d-1</td>
<td>Two comments received on the Appeal filed by T. Lindsey. See Attachment 13-8-3-d-1</td>
</tr>
<tr>
<td>13-8-3-d-2</td>
<td>Comment received by S. Cline, Chair of NEC Panel 6, on the appeal by T. Lindsey. (CAM 70-12). See SA 13-8-3-d-2 ADDITION</td>
</tr>
<tr>
<td>13-8-3-e</td>
<td>Amendment No. 70-3 (CAM 70-13): Accept Comment 7-14. (PASSED TCC ballot FAILED Panel ballot) See SA 13-8-3-e</td>
</tr>
<tr>
<td>13-8-3-f</td>
<td>Amendment No. 70-4 (CAM 70-19): Accept Comment 11-28. (PASSED TCC ballot FAILED Panel ballot) See Attachment 13-8-3-f See SA 13-8-3-f</td>
</tr>
<tr>
<td>13-8-3-g</td>
<td>Amendment No. 70-5 (CAM 70-21): Group Amending Motion to accept Proposal 12-129 and Comment 12-60. (PASSED TCC ballot FAILED Panel ballot) See Attachment 13-8-3-g See SA 13-8-3-g</td>
</tr>
<tr>
<td>13-8-3-g-1</td>
<td>APPEAL Appeal of T. Wysocki of Guardian Services, Inc., requesting the Council uphold the Association action and accept Proposal 12-129 and Comment 12-60. This motion (CAM 70-21) passed on the floor of the Association Meeting but failed TC ballot. See SA 13-8-3-g-1 ADDITION</td>
</tr>
<tr>
<td>13-8-3-g-1-a</td>
<td>Comment received by T. Croushore, Chair of NEC Panel 12, on the appeal by T. Wysocki. (CAM 70-21). See SA 13-8-3-g-1-a ADDITION</td>
</tr>
<tr>
<td>13-8-3-g-1-b</td>
<td>Additional information regarding the jurisdiction of combustibles in raised floor areas of computer rooms. See SA 13-8-3-g-1-b ADDITION</td>
</tr>
<tr>
<td>13-8-3-g-2</td>
<td>Appeal of S. McCluer of Schneider Electric Information Technology, requesting the Council uphold the Association action and accept Proposal 12-129 and</td>
</tr>
<tr>
<td>Comment 12-60. This motion (CAM 70-21) passed on the floor of the Association Meeting but failed TC ballot. See SA 13-8-3-g-2 <strong>ADDITION</strong></td>
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<tr>
<td><strong>13-8-3-g-2-a</strong></td>
<td>Comment received by T. Croushore, Chair of NEC Panel 12, on the appeal by T. Wysocki. (CAM 70-21). See SA 13-3-g-2-a <strong>ADDITION</strong></td>
</tr>
<tr>
<td><strong>13-8-3-g-2-b</strong></td>
<td>One comment received on the Appeals filed by S. McCluer and S. Kaufman in support of the Appeals. See SA 13-8-3-g-2-b <strong>ADDITION</strong></td>
</tr>
<tr>
<td><strong>13-8-3-g-3</strong></td>
<td>Appeal of S. Kaufman representing The Society of the Plastics Industry, requesting the Council accept Proposal 12-129 and revert back to ROP text. A motion (CAM 70-21) passed on the floor of the Association Meeting but failed TC ballot to accept Proposal 12-129 and Comment 12-60. See SA 13-8-3-g-3 <strong>ADDITION</strong></td>
</tr>
<tr>
<td><strong>13-8-3-h</strong></td>
<td>Amendment No. 70-6 (CAM 70-22): Accept Comment 12-65. (PASSED TCC ballot PASSED Panel ballot) See SA 13-8-3-h</td>
</tr>
<tr>
<td><strong>13-8-3-i</strong></td>
<td>Amendment No. 70-7 (CAMs 70-25 and 70-26): Related Motions to accept Comments 13-46 and 13-54. (PASSED TCC ballot FAILED Panel ballot) See Attachment 13-8-3-i See SA 13-8-3-i</td>
</tr>
<tr>
<td><strong>13-8-3-i-1</strong></td>
<td>APPEAL</td>
</tr>
<tr>
<td><strong>13-8-3-j</strong></td>
<td>Amendment No. 70-8 (CAMs 70-27 and 70-28): Related Motions to accept Comments 13-59 and 13-62. (PASSED TCC ballot FAILED Panel ballot) See Attachment 13-8-3-j See SA 13-8-3-j</td>
</tr>
<tr>
<td><strong>13-8-3-j-1</strong></td>
<td>APPEAL</td>
</tr>
<tr>
<td><strong>13-8-3-k</strong></td>
<td>Amendment No. 70-9 (CAM 70-29): Accept Comment 13-76. PASSED TCC ballot FAILED Panel ballot See Attachment 13-8-3-k See SA 13-8-3-k</td>
</tr>
<tr>
<td><strong>13-8-3-k-1</strong></td>
<td>APPEAL</td>
</tr>
<tr>
<td><strong>13-8-3-l</strong></td>
<td>Amendment No. 70-10 (CAM 70-31 and 70-32): Related Motions to accept Comments 13-101 and 13-102. (PASSED TCC ballot FAILED Panel ballot) See Attachment 13-8-3-l See SA 13-8-3-l</td>
</tr>
<tr>
<td><strong>13-8-3-l-1</strong></td>
<td>APPEAL</td>
</tr>
<tr>
<td><strong>13-8-3-m</strong></td>
<td>Appeal of D. Wechsler of the American Chemistry Council, requesting the Council overturn the Association action, and accept an Identifiable Part of Comment 14-56. This motion (CAM 70-36) failed on the floor of the Association Meeting. See Attachment 13-8-3-m See SA 13-8-3-m</td>
</tr>
<tr>
<td><strong>13-8-3-m-1</strong></td>
<td>Comment received by R. Jones, Chair of Code Making Panel 14 on CAM 70-36 Appeal. See Attachment 13-8-3-m-1</td>
</tr>
</tbody>
</table>
13-8-3-m-2 | Comments received by outgoing Chair J. Stallcup and incoming Chair W. Fiske of the Electrical Safety in the Workplace Committee on the appeal by D. Wechsler. (CAM 70-36) See SA 13-8-3-m-2 ADDITION

13-8-3-n | Amendment No. 70-11 (CAM 70-37): Accept Proposal 15-62 as modified by Panel. (PASSED TCC ballot PASSED Panel ballot) See Attachment 13-8-3-n See SA 13-8-3-n

13-8-3-o | APPEAL | Appeal of W. Vernon of Mazzetti Engineers, requesting the Council overturn the NEC Panel 15 action and reject Proposal 15-64 which would return 517.30(E) to previous edition text. No public comment was received on Proposal 15-64 resulting in the only person eligible to file a NITMAM would have been the submitter. See Attachment 13-8-3-o

13-8-4 | Act on the issuance of NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, with an issuance date of August 1, 2013 and an effective date of August 21, 2013, as acted on at the Association Meeting, with one amendment as follows:

13-8-4-a | Amendment No. 96-1 (CAM 96-3): Reject Comment 96-8. (PASSED TC ballot) See Attachment 13-8-4-a

13-8-5 | Act on the issuance of NFPA 130, *Standard for Fixed Guideway Transit and Passenger Rail Systems*, with an issuance date of August 1, 2013 and an effective date of August 21, 2013, as acted on at the Association Meeting, with one amendment as follows:

13-8-5-a | Amendment No. 130-1 (CAM 130-1): Return a portion of a Report in the form of an Identifiable part of Proposal 130-115 and related Comment 130-1. (PASSED TC ballot) See Attachment 13-8-5-a

13-8-5-b | APPEAL | Appeal of A. Ramirez of Underwriters Laboratories requesting the Council overturn the Association Action and Reject an Identifiable Part of Comment 130-165. This motion (CAM 130-2) failed on the floor of the Association Meeting. See Attachment 13-8-5-b

13-8-6 | Act on the issuance of NFPA 502, *Standard for Road Tunnels, Bridges, and Other Limited Access Highways*, with an issuance date of August 1, 2013 and an effective date of August 21, 2013, as acted on at the Association Meeting, with one amendment as follows:

13-8-6-a | Amendment No. 502-1 (CAM 502-1): Return a portion of a Report in the form of Proposal 502-42 and related Comment 502-12. (PASSED TC ballot) See Attachment 13-8-6-a

13-8-6-b | APPEAL | Appeal of A. Ramirez of Underwriters Laboratories requesting the Council overturn the Association Action and Reject an Identifiable Part of Comment 502-27. This motion (CAM 502-2) failed on the floor of the Association Meeting. See Attachment 13-8-6-b

13-8-7 | Act on the issuance of NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*, with an issuance date of August 1, 2013 and an effective date of August 21, 2013, as acted on at the Association Meeting, with one amendment as follows:

13-8-7-a | Amendment No. 801-1 (CAM 801-1): Accept Comment 801-16. (PASSED TC ballot) See Attachment 13-8-7-a

Public Safety Telecommunicator, with an issuance date of August 1, 2013 and an effective date of August 21, 2013, as acted on at the Association Meeting, with no amendments. No Attachment

13-8-8-a Appeal of C. McDuffie of APCO International requesting the Council overturn the Association action and accept Comment 1061-2, accept Comments 1061-3 and 1061-4, and accept the motion to return the entire document. These motions (CAMs 1061-1, 1061-2 and 1061-18) failed on the floor of the Association Meeting. See Attachment 13-8-8-a

13-8-8-a-1 Comment received by J. Kilby-Richards, Chair of the Public Safety Telecommunications Personnel Professional Qualifications Committee and W. Peterson, Chair of the Professional Qualifications Correlating Committee on the appeal of C. McDuffie. See Attachment 13-8-8-a-1

13-8-9 Administratively Withdrawn

13-8-10 Administratively Withdrawn

13-8-11 The 2013 Revision Cycle Consent Documents were letter balloted by the Council with an issuance date of May 28, 2013 and an effective date of June 17, 2013 as shown below: No action is necessary

51B  Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
56   Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems
77   Recommended Practice on Static Electricity
306  Standard for the Control of Gas Hazards on Vessels
403  Standard for Aircraft Rescue and Fire-Fighting Services at Airports
412  Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment
610  Guide for Emergency and Safety Operations at Motorsports Venues

Standard for the Installation of Lightning Protection Systems
780  Standard for the Installation of Lightning Protection Systems
1002 Standard for Fire Apparatus Driver/Operator Professional Qualifications
1021 Standard for Fire Officer Professional Qualifications
1026 Standard for Incident Management Personnel Professional Qualifications
1031 Standard for Professional Qualifications for Fire Inspector and Plan Examiner
1033 Standard for Professional Qualifications for Fire Investigator
1143 Standard for Wildland Fire Management

The following 2014 Revision Cycle Consent Documents were letter balloted by the Council:


790 Standard for Competency of Third-Party Field Evaluation Bodies with an issuance date of July 5, 2013 and an effective date of July 25, 2013
### 13-8-12
Act on the issuance of proposed Tentative Interim Amendment (TIA) to Section 9.3.3 of the 2010 edition of NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines (TIA No. 1101).

| 13-8-12-a | Text of proposed TIA No. 1101. See Attachment 13-8-12-a |
| 13-8-12-b | Ballot results of TIA No. 1101. **PASSED** the TC ballot on both technical merit and emergency nature. See Attachment 13-8-12-b |
| 13-8-12-c | No comments received. No Attachment |

### 13-8-13
Act on the issuance of proposed Tentative Interim Amendment (TIA) to Section 6.6.3 of the 2010 and proposed 2014 editions of NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines (TIA No. 1102).

| 13-8-13-a | Text of proposed TIA No. 1102. See Attachment 13-8-13-a |
| 13-8-13-b | Ballot results of TIA No. 1102. **PASSED** the TC ballot on both technical merit and emergency nature. See Attachment 13-8-13-b |
| 13-8-13-c | One comment was received. See Attachment 13-8-13-c |

### 13-8-14
Act on the issuance of proposed Tentative Interim Amendment (TIA) to Section 6.12.9 of the proposed 2014 edition of NFPA 58, Liquefied Petroleum Gas Code (TIA No. 1095).

| 13-8-14-a | Text of proposed TIA No. 1095. See Attachment 13-8-14-a |
| 13-8-14-b | Ballot results of TIA No. 1095. **PASSED** the TC ballot on both technical merit and emergency nature. See Attachment 13-8-14-b |
| 13-8-14-c | No comments received. No Attachment |

### 13-8-15
Act on the issuance of proposed Tentative Interim Amendment (TIA to sections 11.1.1, A.11.1.1 and 11.15.2 of the 2014 edition of NFPA 58, Liquefied Petroleum Gas Code. (TIA No. 1079)

**STAFF NOTE:** At the March, 2013 Standards Council Meeting, TIA No. 1079 on NFPA 58, Liquefied Petroleum Gas Code, was proposed for the 2011 and 2014 editions. In the Regulations Governing Committee Projects (Regs) at Section 5.9, TIAs shall apply to the document existing at the time of issuance, except in the case of a document undergoing revisions where a TIA can apply to the existing and next edition of the document. Since the 2014 edition of NFPA 58 had not been submitted for issuance, the Council did not issue a TIA on the 2014 edition at the time of issuing a TIA on the 2011 edition. The proposed TIA was to be placed on the agenda for issuance concurrently with the 2014 edition of NFPA 58.

<p>| 13-8-15-a | Text of proposed TIA No. 1079. See Attachment 13-8-15-a |
| 13-8-15-b | Ballot results of TIA No. 1079. <strong>PASSED</strong> the TC ballot on both technical merit |</p>
<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
<th>Details</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>13-8-15</td>
<td>and emergency nature. See Attachment 13-8-15-b</td>
<td></td>
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</tr>
<tr>
<td>13-8-15-c</td>
<td>One comment was received. See Attachment 13-8-15-c</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-8-16</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Sections 516.3(A)(1)(a) and 516.10(A) of the proposed 2014 edition of NFPA 70, <em>National Electrical Code</em>® (TIA No. 1096).</td>
<td>Text of proposed TIA No. 1096. See Attachment 13-8-16-a</td>
<td>See Attachment 13-8-16-b</td>
</tr>
<tr>
<td>13-8-16-a</td>
<td></td>
<td>Ballot results of TIA No. 1096. <strong>PASSED</strong> the Panel ballot on both technical merit and emergency nature; <strong>PASSED</strong> the CC ballot on correlation and emergency nature. See Attachment 13-8-16-b</td>
<td></td>
</tr>
<tr>
<td>13-8-16-b</td>
<td></td>
<td>No comments received. No Attachment</td>
<td></td>
</tr>
<tr>
<td>13-8-16-c</td>
<td></td>
<td></td>
<td>See Attachment 13-8-16-c</td>
</tr>
<tr>
<td>13-8-17</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Sections 445.20 of the proposed 2014 edition of NFPA 70, <em>National Electrical Code</em>® (TIA No. 1097).</td>
<td>Text of proposed TIA No. 1097. See Attachment 13-8-17-a</td>
<td>See Attachment 13-8-17-a</td>
</tr>
<tr>
<td>13-8-17-a</td>
<td></td>
<td>Ballot results of TIA No. 1097. <strong>FAILED</strong> the Panel ballot on both technical merit and emergency nature; <strong>FAILED</strong> the CC ballot on correlation and emergency nature. See Attachment 13-8-17-b</td>
<td></td>
</tr>
<tr>
<td>13-8-17-b</td>
<td></td>
<td>One comment was received. See Attachment 13-8-17-c</td>
<td></td>
</tr>
<tr>
<td>13-8-17-c</td>
<td></td>
<td>Appeal of J. Harding of Portable Generator Manufacturers’ Association requesting that the Council issue the proposed TIA to NFPA 70 (TIA No. 1097). See Attachment 13-8-17-d <strong>APPEAL</strong></td>
<td>See Attachment 13-8-17-d</td>
</tr>
<tr>
<td>13-8-17-d</td>
<td></td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Sections 45.20, 6.3.2.10, 7.7.10, A.5.4.10.3, and A.6.3.2.10.2.1 of the 2012 and proposed 2015 edition of NFPA 99, <em>Health Care Facilities Code</em> (TIA No. 1104).</td>
<td>STAFF NOTE: Please note that TIA No. 1104 on NFPA 99, <em>Health Care Facilities Code</em>, is being proposed for the 2012 and the 2015 editions. In the Regulations Governing the Development of NFPA Standards (Regs) at Section 5.9, TIAs shall apply to the document existing at the time of issuance, except in the case of a document undergoing revisions where a TIA can apply to the existing and proposed editions. NFPA 99 is expected to be an A2014 document. If this TIA on the 2012 edition is issued by the Standards Council, the proposed TIA for the 2015 edition will be placed on a future Council agenda for consideration of issuance concurrently with the 2015 edition of NFPA 99.</td>
</tr>
<tr>
<td>13-8-18</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Sections 10.2.3.6(5) and A.10.2.3.6 (5) of the 2012 and proposed 2015 edition of NFPA 99, <em>Health Care Facilities Code</em> (TIA No. 1104).</td>
<td>Text of proposed TIA No. 1104. See Attachment 13-8-18-a</td>
<td>See Attachment 13-8-18-a</td>
</tr>
<tr>
<td>13-8-18-a</td>
<td></td>
<td>Ballot results of TIA No. 1104. <strong>PASSED</strong> the TC ballot on both technical merit and emergency nature; <strong>PASSED</strong> the CC ballot on correlation and emergency nature. See Attachment 13-8-18-b</td>
<td></td>
</tr>
<tr>
<td>13-8-18-b</td>
<td></td>
<td>Five comments were received. See Attachment 13-8-18-c</td>
<td></td>
</tr>
<tr>
<td>13-8-18-c</td>
<td></td>
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<tr>
<td>13-8-19</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Sections 5.4.10, 6.3.2.10, 7.7.10, A.5.4.10.3, A.6.3.2.10.2 and A.7.7.10.2 of the 2010 and proposed 2014 editions of NFPA 130, <em>Standard for Fixed Guideway Transit and Passenger Rail Systems</em>, (TIA No.1080).</td>
<td><strong>STAFF NOTE:</strong> At its March 6-7, 2013 meeting the Council voted to defer action on issuing proposed Tentative Interim Amendment (TIA) to Sections 5.4.10,</td>
<td></td>
</tr>
</tbody>
</table>
6.3.3.2.10, 7.7.10, A.5.4.10.3, A.6.3.3.2.10.2 and A.7.7.10.2 of the 2010 and proposed 2014 editions of NFPA 130, *Standard for Fixed Guideway Transit and Passenger Rail Systems*, (TIA No. 1080). The Council directed the Technical Committee seek further input from the National Electrical Code (NEC) Correlating Committee and NEC Code Making Panel 13 on whether this TIA, if issued, would cause any correlation issues with documents that report through the National Electrical Code Project.

| 13-8-19-a | Text of proposed TIA No. 1080 and Minute Item from March, 2013 meeting (13-3-11). See Attachment 13-8-19-a |
| 13-8-19-b | Ballot results of TIA No. 1080. **PASSED** TC ballot on both technical merit and emergency nature. See Attachment 13-8-19-b |
| 13-8-19-c | Four public comments were received. See Attachment 13-8-19-c |
| 13-8-19-d-1 | Comments on appeal from the Chairs of Fixed Guideway Transit and Passenger Rail Systems and Road Tunnel and Highway Fire Protection. See Attachment 13-8-19-d-1 |
| 13-8-19-f | Informational ballot. See Attachment 13-8-19-f |
| 13-8-20 | **STAFF NOTE**: At its March 6-7, 2013 meeting the Council voted to defer action on issuing proposed Tentative Interim Amendment (TIA) to Sections 12.1.2 and A.12.1.2 of the 2011 and proposed 2014 editions of NFPA 502, *Standard for Road Tunnels, Bridges, and Other Limited Access Highways*, (TIA No. 1083). |

Act on the issuance of proposed Tentative Interim Amendment (TIA) to Sections 12.1.2 and A.12.1.2 of the 2011 and proposed 2014 editions of NFPA 502, *Standard for Road Tunnels, Bridges, and Other Limited Access Highways*, (TIA No. 1083). The Council directed the Technical Committee seek further input from the National Electrical Code (NEC) Correlating Committee and NEC Code Making Panel 13 on whether the TIA, if issued, would cause any correlation issues with documents that report through the National Electrical Code Project.

<p>| 13-8-20-a | Text of proposed TIA No. 1083 and Minute Item from March, 2013 meeting (13-3-11). See Attachment 13-8-20-a |
| 13-8-20-b | Ballot results of TIA No. 1083. <strong>PASSED</strong> TC ballot on both technical merit and emergency nature. See Attachment 13-8-20-b |
| 13-8-20-c | Three public comments were received. See Attachment 13-8-20-c |
| 13-8-20-d | <strong>APPEAL</strong> Appeal of A. Schaefer of Underwriters Laboratories requesting the Council not issue TIA No. 1083 on NFPA 502, <em>Standard for Road Tunnels, Bridges, and Other Limited Access Highways</em>. See Attachment 13-8-20-d |
| 13-8-20-d-1 | Comments on appeal from the Chairs of Fixed Guideway Transit and Passenger Rail Systems and Road Tunnel and Highway Fire Protection. See Attachment 13-8-20-d-1 |
| 13-8-20-e | Report of the NEC Correlating Committee and NEC Code Making Panel 13. See |</p>
<table>
<thead>
<tr>
<th>13-8-20-f</th>
<th>Informational Ballots. <a href="#">See SA 13-8-20-f</a></th>
<th>ADDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-8-21-a</td>
<td>Text of proposed TIA No. 1098. See Attachment 13-8-21-a</td>
<td></td>
</tr>
<tr>
<td>13-8-21-b</td>
<td>Ballot results of TIA No. 1098. <strong>PASSED</strong> the TC ballot on both technical merit and emergency nature; <strong>PASSED</strong> the CC ballot on correlation and emergency nature. See Attachment 13-8-21-b</td>
<td></td>
</tr>
<tr>
<td>13-8-21-c</td>
<td>No comments were received. No Attachment</td>
<td></td>
</tr>
<tr>
<td>13-8-22</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to Section 8.2.5(1) of the 2013 edition of NFPA 1951, <em>Standard on Protective Ensembles for Technical Rescue Incidents</em> (TIA No. 1099).</td>
<td></td>
</tr>
<tr>
<td>13-8-22-a</td>
<td>Text of proposed TIA No. 1099. See Attachment 13-8-22-a</td>
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<tr>
<td>13-8-22-b</td>
<td>Ballot results of TIA No. 1099. <strong>PASSED</strong> the TC ballot on both technical merit and emergency nature; <strong>PASSED</strong> the CC ballot on correlation and emergency nature. See Attachment 13-8-22-b</td>
<td></td>
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<tr>
<td>13-8-22-c</td>
<td>No comments were received. No Attachment</td>
<td></td>
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<tr>
<td>13-8-23-a</td>
<td>Text of proposed TIA No. 1100. See Attachment 13-8-23-a</td>
<td></td>
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<tr>
<td>13-8-23-b</td>
<td>Ballot results of TIA No. 1100. <strong>PASSED</strong> the TC ballot on both technical merit and emergency nature; <strong>PASSED</strong> the CC ballot on correlation and emergency nature. See Attachment 13-8-23-b</td>
<td></td>
</tr>
<tr>
<td>13-8-23-c</td>
<td>No comments were received. No Attachment</td>
<td></td>
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<tr>
<td>13-8-24-a</td>
<td>Text of proposed TIA No. 1111. See Attachment 13-8-24-a</td>
<td></td>
</tr>
<tr>
<td>13-8-24-b</td>
<td>Ballot results of TIA No. 1111. <strong>PASSED</strong> the TC ballot on both technical merit and emergency nature; <strong>PASSED/FAILED</strong> the CC ballot on correlating and emergency nature. See SA 13-8-24-b <a href="#">ADDITION</a></td>
<td></td>
</tr>
<tr>
<td>13-8-24-c</td>
<td>Six comments were received to date. Comment Closing Date is August 12, 2013. See SA 13-8-24-c <a href="#">ADDITION</a></td>
<td></td>
</tr>
<tr>
<td>13-8-25-a</td>
<td>Text of proposed TIA No. 1112. See Attachment 13-8-25-a</td>
<td></td>
</tr>
<tr>
<td>13-8-25-b</td>
<td>Ballot results of TIA No. 1112. <strong>PASSED</strong> the TC ballot on both technical merit and emergency nature; <strong>PASSED/FAILED</strong> the CC ballot on correlating and emergency nature. See SA 13-8-25-b <a href="#">ADDITION</a></td>
<td></td>
</tr>
<tr>
<td>13-8-25-c</td>
<td>One comment was received to date. Comment Closing Date is August 12, 2013. See SA 13-8-25-c <a href="#">ADDITION</a></td>
<td></td>
</tr>
<tr>
<td>13-8-26</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to various Sections of the 2012 edition of NFPA 2112, <em>Standard on Flame-Resistant</em></td>
<td></td>
</tr>
</tbody>
</table>
Garments for Protection of Industrial Personnel Against Flash Fire (TIA No. 1105).

13-8-26-a Text of proposed TIA No. 1105. See Attachment 13-8-26-a

13-8-26-b Ballot results of TIA No. 1105. PASSED the TC ballot on both technical merit and emergency nature. See Attachment 13-8-26-b

13-8-26-c No comments were received. No Attachment

13-8-27 APPEAL


13-8-27-b Copy of Public Input 26 submitted by G. Cahanin. See Attachment 13-8-27-a See SA 13-8-27-a

13-8-27-c Correspondence between G. Cahanin and Secretary of the Standards Council. See Attachment 13-8-27-b See SA13-8-27-b


13-8-27-e Comment received by T. Euson, Chair of the Technical Committee on Finishing Processes, on the Appeal of G. Cahanin. See Attachment 13-8-27-d

13-8-28 At the March 2013 meeting, the Council reviewed the request of William Reilly of Victaulic that NFPA establish a new standard for the application of hybrid, gas, and fine water droplet systems. After review of all the material before it, the Council voted to publish a notice to solicit public comments on the need for the project, information on resources on the subject matter, those interested in participating, if established, and other organizations actively involved with the subject. The Council was specifically looking for manufacturers that are actively developing hybrid droplet systems and whether there are enough common installation practices and procedures available to support a standard, and the intended application for this technology. The Council is also seeking input on whether the subject matter could be covered by an existing technical committee or possibly through the creation of a new document.

The comment period has passed and twenty-two comments were received. See SA 13-8-28

13-8-28-a Review the correspondence from the Code Fund concerning an information gathering project on hybrid water mist systems that will be undertaken as a student project with the University of Maryland. See SA 13-8-28-a ADDITION

13-8-29 Consider the request of Chief Kenneth Richards on behalf of the Technical Committee on Fire Service Training that NFPA establish a new standard for training structures, props, and equipment. See Attachment 13-8-29

13-8-30 Consider the request from Brian Montgomery, Chair of the Non-structural Fire Fighting SCBA Committee to approve a Committee Scope. This Committee was approved by the Council at their October, 2012 meeting. The proposed scope is as follows:

Proposed Committee Scope: This Committee shall have primary responsibility for documents on respiratory equipment, including breathing
air, for emergency response personnel other than those involved in structural fire fighting operations, during incidents involving hazardous or oxygen deficient atmospheres. These types of operations include tactical law enforcement, confined space, and hazardous materials response operations. This Committee shall also have primary responsibility for documents on the selection, care and maintenance of respiratory equipment and systems by emergency services organizations and personnel.

See Attachment 13-8-30  **See SA 13-8-30**

### 13-8-31
Consider requests from NFPA Committees to change revision cycles for the following documents:

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>2013 F2015</td>
<td>F2015 to F2016</td>
<td>Permanent Move</td>
<td>3 to 4 year cycle</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>2011 F2014</td>
<td>F2014 to F2015</td>
<td>One Time Move</td>
<td>4 to 5 year cycle</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>2010 F2013</td>
<td>F2017 to F2016</td>
<td>Permanent Move</td>
<td>4 to 3 year cycle</td>
<td></td>
</tr>
<tr>
<td>96</td>
<td>2014 A2016</td>
<td>A2016 to F2016</td>
<td>One Time Move</td>
<td>3 to 3 ½ year cycle</td>
<td></td>
</tr>
</tbody>
</table>

See Attachment 13-8-31

### 13-8-32
**Report of the Membership Task Group (M. Snyder, Chair)**

#### 13-8-32-a
Act on pending applications for Committee Members.  **See SA 13-8-32-a**

#### 13-8-32-b
Aircraft Rescue and Fire Fighting Committee’s request approval for their Guidelines for Additional Clarification of Interest Classifications for NFPA Technical Committee Members and reclassification of members.  **See SA 13-8-32-b**

#### 13-8-32-c
Appeal from E. Bonifas of Alarm Detection Systems requesting the Council re-evaluate some members of the Signaling Systems for the Protection of Life and Property - Supervising Station Fire Alarm and Signaling Systems Committee.  **See SA 13-8-32-c**  **ADDITION**

### 13-8-33
**Report of the Policy and Procedures Task Group (J. Milke, Chair)**  **See SA 13-8-33**

### 13-8-34
**Report of the Recording Secretary on the Minutes for the March 2013.  No Attachment**

### 13-8-35
Review the dates and locations of upcoming Council Meetings, as follows:

- October 22-23, 2013  **(REVISED)**  **(TG Meeting 8:00 AM on October 22)**  San Diego, CA
- March 5-6, 2014  **(TG Meeting 8:00 AM on March 5)**  San Juan, Puerto Rico
- August 11-14, 2014  **(TG Meeting 12:00 PM on August 11)**  Quincy, MA
- October 28-29, 2014  **(TG Meeting 8:00 AM on October 28)**  TBD

### 13-8-36
Consider the request of Barry Badders, Chair of the Fire Test Committee that NFPA consider the establishment of a new test method to evaluate fire/ignition resistance of upholstered furniture subject to a flaming ignition source. The proposed scope for the documents is as follows:
<table>
<thead>
<tr>
<th>Proposed Document Scope:</th>
<th>This document would provide a test method to evaluate fire/ignition resistance of upholstered furniture subject to a flaming ignition source.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>See SA 13-8-36</strong> ADDITION</td>
<td></td>
</tr>
</tbody>
</table>

|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Proposed Document Scope:** This guide is intended to protect workers who enter into confined spaces for inspection or testing or to perform associated work from death and from life-threatening and other injuries or illnesses and to protect facilities, equipment, non–confined space personnel, and the public from injuries associated with confined space incidents.

**See SA 13-8-37** ADDITION
Item 13-8-4
ASSOCIATION AMENDMENT BALLOT RESULTS

DATE: July 8, 2013

AMENDMENT (96-3)


Motion: To Reject Comment 96-8 and thereby Accept Proposal 96-17

TC FINAL Ballot Results

According to 4.7.1 in the NFPA (RGCP), the final results show this Amendment HAS achieved the necessary 2/3 majority vote. The number of affirmative votes needed to obtain a recommendation to issue the Amendment is 17 [29 (eligible to vote) – 4 (ballots not returned) – 0 (abstentions) = 25 × 0.66 = 16.5]

<table>
<thead>
<tr>
<th>Eligible to Vote</th>
<th>29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Returned</td>
<td>4</td>
</tr>
</tbody>
</table>

22 Agree
3 Do Not Agree (Conroy, Murphy, Reisman)
0 Abstain

TC Action: PASS
Shea, Kimberly

From: Mark Conroy [MConroy@BrooksEquipment.com]
Sent: Monday, June 17, 2013 3:06 PM
To: Shea, Kimberly
Cc: Todd Warner
Subject: RE: NFPA 96 Amendment 96-3 Ballot

Kim,

Please record my vote as “do not agree” as I do not agree with this amendment. My recommendation is to return to previous edition text.

My reason for voting “do not agree” is as follows:

Since the current edition text and the proposed text allows zero clearance to limited-combustible materials where they are protected by metal lath and plaster, ceramic tile, quarry tile, it is only logical to allow other noncombustible materials or an assembly of noncombustible materials (without requiring them to be listed).

Sincerely,
Mark T. Conroy

Mark Conroy
Senior Engineer, Technical Services
Brooks Equipment Company
20 Hampden Dr. Suite 2
S. Easton, MA 02375
774-274-7481
mconroy@brooksequipment.com

---

From: Shea, Kimberly [mailto:kshea@NFPA.org]
Sent: Thursday, June 13, 2013 10:43 AM
To: Shea, Kimberly
Cc: Foley, Patrick; Walker, Nancy
Subject: NFPA 96 Amendment 96-3 Ballot

Technical Committee on Venting Systems for Cooking Appliances:

Please find attached a ballot on Amendment 96-3 to Reject Comment 96-8 and thereby Accept Proposal 96-17.

**Ballots are due no later than Wednesday, June 26, 2013.**

Kimberly Shea
Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
617-984-7953
Shea, Kimberly

From: Jim Murphy [jmurphy@amerex-fire.com]
Sent: Monday, June 24, 2013 10:58 AM
To: Shea, Kimberly
Subject: RE: NFPA 96 Amendment 96-3 Ballot Reminder - Due Wed. June 26, 2103

To: Kimberly Shea
Administrator, Technical Projects
NFPA

Please accept this email as my ballot. I am voting to not agree with the amendment.

My reasoning is: The current edition text and the proposed text allows zero clearance to limited-combustible materials where they are protected by metal lath and plaster, ceramic tile, quarry tile, it is only logical to allow other noncombustible materials or an assembly of noncombustible materials without requiring them to be listed.

Jim Murphy
Amerex Corporation – representing the Fire Equipment Manufacturers Association

From: Shea, Kimberly [mailto:kshea@NFPA.org]
Sent: Monday, June 24, 2013 8:36 AM
To: Shea, Kimberly
Subject: NFPA 96 Amendment 96-3 Ballot Reminder - Due Wed. June 26, 2103

Technical Committee on Venting Systems for Cooking Appliances:

Please note that Amendment ballots are due no later than Wednesday, June 26, 2013 and as of this time, your ballot has not been received.

Kimberly Shea
Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
617-984-7953

From: Shea, Kimberly
Sent: Thursday, June 13, 2013 10:43 AM
To: Shea, Kimberly
Cc: Foley, Patrick; Walker, Nancy
Subject: NFPA 96 Amendment 96-3 Ballot

Technical Committee on Venting Systems for Cooking Appliances:

Please find attached a ballot on Amendment 96-3 to Reject Comment 96-8 and thereby Accept Proposal 96-17.
NFPA 96
TC BALLOT ON VENTING SYSTEMS FOR COOKING APPLIANCES
JUNE 2013 ASSOCIATION AMENDMENT 96-3

Amendment: Reject Comment 96-8 and thereby Accept Proposal 96-17

☐ Agree

If you agree with this amendment, the recommendation will be to modify the following sections to read as follows:

4.2.3.3 Zero clearance to limited-combustible materials shall be permitted where protected by metal lath and plaster, ceramic tile, quarry tile, other noncombustible materials or assembly of noncombustible materials, or materials and products that are listed for the purpose of reducing clearance one of the following:
   4.2.3.3.1 metal lath and plaster
   4.2.3.3.2 ceramic tile
   4.2.3.3.3 quarry tile
   4.2.3.3.4 other noncombustible materials or assembly of noncombustible materials that are listed for the purpose of reducing clearance
   4.2.3.3.5 other materials and products that are listed for the purpose of reducing clearance.

☐ Do Not Agree*  

If you do not agree with this amendment, the recommendation is to return to previous edition text which reads as follows:

4.2.3.3 Zero clearance to limited-combustible materials shall be permitted where protected by metal lath and plaster, ceramic tile, quarry tile, other noncombustible materials or assembly of noncombustible materials, or materials and products that are listed for the purpose of reducing clearance.

☐ Abstain*

*Please give reasons for voting “Do Not Agree” or “Abstain”:

I DO NOT SEE THE REASON TO LIST EXAMPLES OF TYPES OF "ZERO CLEARANCE" MATERIALS. THESE TYPES OF SPECIFICS MAY GIVE EXAMPLES TO AHJ'S BUT I BELIEVE THEM TO BE UNNECESSARY.

Signature: [Signature]

Name - Please Print: M. D. Reisman

Date: 24 June 2013

Ballots are due no later than June 26, 2013.

Kim Shea, Administrator, Technical Projects
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7070
EMAIL: kshea@nfpa.org
REJECT Comment 96-8

96-8 Log #18 Final action: Accept in Principle
(4.2.3.3)

Submitter: David A. de Vries, Firetech Engineering Inc.
Comment on Proposal No: 96-17
Recommendation: Reject the proposal and revert to the 2011 text.
Substantiation: The substantiation does not address the issue. A wood stud
framed wall, even when covered with a limited combustible material such as
gypsum wall board, still requires appropriate clearance between the exhaust
system and the combustible wood studs even if the gypsum wall board can
be covered with a non-combustible material, such as those listed in the 2011
text, and reduce the clearance to zero with minimal risk of fire. A sheet metal
backsplash over gypsum wall board on a steel stud framed wall does not need
to be a “listed assembly”.
Committee Meeting Action: Accept in Principle
Revise text as follows:
4.2.3.3 Zero clearance to limited-combustible materials, shall be permitted
where protected by metal lath and plaster, ceramic tile, quarry tile, other
noncombustible materials or assembly of noncombustible materials, or
materials and products that are listed for the purpose of reducing clearance
by one of the following:
(a) metal lath and plaster
(b) ceramic tile
(c) quarry tile
(d) other noncombustible materials or assembly of noncombustible
materials.
(e) other materials and products that are listed for the purpose of reducing
clearance
Committee Statement: It is not reasonable for materials that are
noncombustible to be listed as noncombustible.
Number Eligible to Vote: 28
Ballot Results: Affirmative: 24 Negative: 1
Ballot Not Returned: 3 Caraway, Jr., L., Lopes, J., Reisman, M.
Explanation of Negative:
SLOAN, D.: I am voting negative on this Comment based on my agreement
with the proposed language and Substantiation for Proposal 96-17 Log#10.
The Proposal substantiation stated “…In actuality “noncombustible materials
or assemblies of noncombustible materials” were not intended to be used to
reduce clearances unless they too were so listed. A sheet of lightweight steel,
although noncombustible, may not adequately protect a combustible wall when
the steel is adhered directly onto it.” The Committee originally agreed with this
substantiation and Accepted the proposal such that noncombustible materials
or assembly of noncombustible materials were required to be listed for the
purpose of reducing clearance reducing clearance.
However, during this ROC, the wording was changed to permit any or all
noncombustible materials or assembly of noncombustible materials. While
I continue to be in favor of keeping the traditional widely used methods
(metal lath and plaster, ceramic tile, and quarry tile), I believe that that not
all noncombustible materials or assembly of noncombustible materials would
ensure zero clearance to limited combustibles.

Backup Proposal 96-17

96-17 Log #10 Final Action: Accept
(4.2.3.3)

Submitter: R. T. Leicht, Delaware State Fire Marshal’s Office
Recommendation: Revise text to read as follows:
4.2.3.3 Zero clearance to limited-combustible materials shall be permitted
where protected by metal lath and plaster, ceramic tile, quarry tile, other
noncombustible materials or assembly of noncombustible materials, or
materials and products that are listed for the purpose of reducing clearance
one of the following:
4.2.3.3.1 metal lath and plaster
4.2.3.3.2 ceramic tile
4.2.3.3.3 quarry tile
4.2.3.3.4 other noncombustible materials or assembly of noncombustible
materials that are listed for the purpose of reducing clearance
4.2.3.3.5 other materials and products that are listed for the purpose of
reducing clearance
Substantiation: As currently written, the paragraph has been misinterpreted
at times as though the phrase “listed for the purpose of reducing clearance”
only referred to materials and products. In actuality “noncombustible materials
or assemblies of noncombustible materials” were not intended to be used to
reduce clearances unless they too were so listed. A sheet of lightweight steel,
although noncombustible, may not adequately protect a combustible wall when
the steel is adhered directly onto it.
Committee Meeting Action: Accept
Number Eligible to Vote: 29
Ballot Results: Affirmative: 25
Ballot Not Returned: 4 Demers, D., Gibbons, Jr., C., Lopes, J., Schumacher, M.
vote. Balloting will be closed in 5 seconds.

Balloting is closed. Motion fails, 129 to 19. Thank you.

Let's proceed with the discussion on Certified Amending Motion 96-3. Microphone 3, please.

MR. HIRSCHLER: Marcelo Hirschler, GBH International, and I move to reject Comment 96-8.

MR. McDANIEL: Thank you. There's a motion on the floor to reject Comment 96-8. Is there a second?

A VOICE: Second.

MR. McDANIEL: We do have a second. Please proceed with the discussion on the motion.

MR. HIRSCHLER: Marcelo Hirschler, GBH International, speaking on behalf of NAFRA.

Let me try to explain. This is not an issue related with definitions. This is a technical issue. So let me explain what we're talking about here.

We're talking about that the comment requires that the clearance to limited-combustible materials be protected by materials --

noncombustible materials listed for the purpose of reducing clearance. There are no noncombustible materials listed for the purpose of reducing clearance from furnaces. This just something that makes no sense.
And if you go to Page 96-5 of the Report of Comments, you see an extensive negative from Mr. Dwayne Sloan of Underwriters Laboratories, one of the Committee members, explaining this. I would urge your support on this motion. Thank you.

MR. McDANIEL: Mr. Leicht, would you like to present the Committee's position?

MR. LEICHT: Yes. If you do refer to the original proposal that was made, the intent of that proposal was to take what seemed to be a lengthy sentence that had a lot of comments, a lot of phrases in it, and list the four specific areas to be listed in kind of a bullet-point fashion. What this -- and that proposal was accepted and balloted and got the two-thirds ballot.

We had a series of comments that came back. I want to point out that this comment actually does achieve what the proposal initially was supposed to do; however, the comment having been rejected by the Committee, it did receive the two-thirds vote necessary to back that decision.

MR. McDANIEL: Thank you, Mr. Chairman. Let's proceed with the discussion Certified Amending Motion 96-3. Microphone Number 2, please. State your name affiliation and whether you're for or against the motion.

MR. HOPPER: Thank you. Howard Hopper, UL, speaking in favor of the motion on the floor.
Now as pointed out by Mr. Hirschler, our representative on this Committee voted against Comment 96-8 because we agree with the language that resulted from Proposal 96-17 which formed the basis for the content.

The language that we would like to see in the standard is reflected in the last column of the orange handout that the membership should have received earlier today which is basically the language in Proposal 96-17. Now the original proposal included a number of options that can be used to achieve zero clearances. One included using noncombustible materials or assemblies of noncombustible materials that are listed for the purpose of reducing clearances to limited-combustible materials.

Now the comment revised the proposal to allow an option to allow basically any noncombustible material to be used to reduce clearances to zero whether it's been investigated or listed or not. So if you think about it, you can now take a piece of sheet metal, put it against a combustible construction, and you can reduce your clearances to zero. We're not really sure the technical basis for doing that.

And also when we looked at the Committee's statement, it said it's not reasonable for materials that are noncombustible to be listed as noncombustible. I think if you read the wording,
that's not what happened. They're listed for reduced installation clearances.

So the motion before you addresses our concerns. We feel that the Committee got it right with Proposal 96-17 and would urge you to vote in favor of the motion on the floor. Thank you.

MR. McDANIEL: Thank you. Microphone Number 5, please. State your name, affiliation and whether you're for or against the motion, please.

MR. CONROY: Thank you, Mr. Chairman.

Mark Conroy, Brooks Equipment, member of the 96 Committee. I'm in opposition to this motion.

The ROC text and the previous edition are the same. Only the ROC reformats or formats the information as a list so that it's easier to comprehend for the casual reader of the standard.

The Committee accepted in principle ROC 96-8 due to the sensible and reasonable argument provided in the substantiation, and I encourage the membership to read that substantiation.

The technical argument today that I'm presenting is if metal lath and plaster, ceramic tile, quarry tile are acceptable, then why aren't other noncombustible materials or an assembly of noncombustible materials acceptable? And that's what is presented in the ROC.

The topic of clearance is addressed in the
current Standard 96 in Section 4.2.1, and it says, "Where enclosures are not required, hoods, grease removal devices, exhaust fans, and ducts shall have at least a clearance of at least 18 inches to combustible materials, 3 inches to limited combustible materials, and 0 inches to noncombustible material."

The section we are talking about here is a clarification of the last piece. If you reduce the clearance to zero, if you're dealing with noncombustible material or assemblies of noncombustible material, you really don't even need a list of noncombustible material as it's provided in the standard. The important part of the sentence is other combustible materials or products that are listed for the purpose of reducing clearance.

I urge the membership to review the substantiation, provided with comment. If you agree with that substantiation, you will vote in opposition to this motion. Thank you.

MR. McDANIEL: Microphone Number 3, please. Would you state your name, affiliation and whether you're for or against the motion.

MS. BREWER: Sarah Brewer. I am representing the International Firestop Council, and I'm speaking in favor of the motion today.

IFC favors this motion feeling that without this language the ROC text could
potentially cause a hazardous condition. Going back to the point made earlier with regard to specifying a material that is merely noncombustible may not be sufficient to ensure it's appropriate for clearance reduction in every case.

The point -- the example that was just provided that it might be sufficient for concrete but may not be appropriate for using sheet metal, and I think that example was articulated further in the original ROP in the substantiation that said, "A sheet of light-weight steel, although noncombustible, may not adequately protect a combustible wall when the steel is adhered directly to it."

The point here that I'm making is the motion is proposing that both combustible and noncombustible materials and/or assemblies would need to be listed for the purpose of clearance reduction; and that listing process verifies the clearance reduction performance based on the configuration of how it would be installed in the field and that configuration would be defined in the listing.

So the wording on this point in the motion is important so that these materials are correctly
installed in the market and would then permit the wording that mirrors the original ROP which the Committee had voted to accept. Thank you.

MR. McDaniel: Thank you. Microphone Number 2, please. State your name and affiliation and whether you're for or against the motion, please.

MR. WILLSE: Peter Willse with XL Global Asset Protection Services, and I think I rise in motion -- for the motion.

If you take a look at the ROP Page 96-5 at 4.2.3.3.4, it says, "Other noncombustible materials or assembly of noncombustible materials that are listed for the purpose of reducing clearance." But yet if you go to the ROC on Number D, that last part of that sentence is omitted.

So I'm not too sure whether it was an error in the ROC and it's supposed to be picked up by the ROP or what, but this amending motion will make it so it's positive. Thank you.

MR. McDaniel: Thank you. Is there any other discussion? Microphone Number 5, please. Please state your name, affiliation and whether you're for or against the motion.

MR. CONROY: Mark Conroy, Brooks Equipment,

against the motion.

The previous speaker was wondering if it was a mistake; and, indeed, it was no mistake on the part of the Committee. The Committee made an
informed decision that what was in the previous
edition is correct. The ROC is just reformatting
what's in the current edition of the standard. Let
me put my glasses back on.

I would like to repeat what the submitter
said in the last sentence of the substantiation in
the ROC, "A sheet metal backsplash over gypsum
wallboard on a steel stud frame wall does not need
to be a 'listed assembly'."

MR. McDANIEL: Thank you. Microphone Number 3,
please. State your name, affiliation and for or
against the motion, please.

MR. HIRSCHLER: Marcelo Hirschler,
GBH International, speaking in support of the
motion.

Let me clarify. What the ROC says on
number -- the fourth, it's a D instead of being a 4
in the ROC, "Other noncombustible materials or
assembly of noncombustible materials." What the
ROP says, "Other noncombustible materials or

assembly of noncombustible materials that are
listed for the purpose of reducing clearance."

That's the big difference. That's what we want to
change. We want those to be listed for the
purpose. Please support the motion. Thank you.

MR. McDANIEL: Thank you. Microphone, 2
please.

MR. WILLSE: Pete Willse with XL Global Asset
Professional Services. Then I'm totally confused
because if I'm looking at the ROC, if something is supposed to be taken out from what is in the ROP, isn't it supposed to be stricken also as a matter of procedure?

MR. McDANIEL: Microphone 5.

MR. CONROY: Thank you, Mr. Chairman.

Mark Conroy, Brooks Equipment, in opposition to the motion.

I believe the ROC text is correct and it should not be a requirement for other noncombustible materials or assembly of noncombustible materials to be listed. I think that the Committee debated this at length. They reviewed the comment. The comment states that clearly, and the Committee made an informed decision to stick with what's in the current edition of NFPA 96.

MR. McDANIEL: Thank you. Microphone 3, please. Please state your name, affiliation and whether you're for or against the motion.

MS. BREWER: Again, Sarah Brewer, representing the International Firestop Council speaking in favor of the motion.

One last comment. I would disagree with the previous speaker in that it appears to me that the Committee reasoning during the ROC may have been misinterpreted of the proponents in 10. Their comment was that the listing was required in the
revised language had nothing to -- that the listing
of noncombustible materials as being
noncombustible, and really this has nothing to do
with listing noncombustible material. It's
noncombustible. It has to do with listing
materials for the purpose of use of reducing
clearances. And, again, that's the point in terms
of making sure these materials are applied
correctly in the field so that the way they're
installed are better defined. Thank you.

MR. McDANIEL: Microphone Number 5, please.

MR. CONROY: Mark Conroy, Brooks Equipment,
against the motion. The previous speaker said that
the Committee misunderstood the intent of the
submitter. I'll read the recommendation. It says,
"Reject the proposal and Revert to the 2011 text."
The Committee, in essence, has done that. It's
just the reformatting.

MR. McDANIEL: Thank you. Microphone number 2.

MR. JAEGER: Thomas Jaeger. I call the
question.

MR. McDANIEL: We have a motion to call the
question. Can we have a second?

A VOICE: Second.

MR. McDANIEL: We'll proceed to the vote on
calling the question. 1 for the motion, and 2 to
reject.

A VOICE: Is that the motion or the question?

MR. McDANIEL: On the question. 1 is in favor
of the motion to accept the call the question; 2 is
to reject it. Please record your vote. 5 seconds.
Voting is closed. And the motion is to
accept to call the question, 130 to 32.
So we'll proceed to the voting on the
amending motion. Before we vote, let me restate
the motion. The motion on the floor is to reject
Comment 96-8. Please record your vote 1 in favor
of the motion, accept, or 2, opposed the motion,
reject. Please record your vote. Balloting will
close in 5 seconds.
Balloting is closed. The motion passes,
86 to 63.
Let's proceed with the discussion of
Certified Amending Motion 96-4. Microphone 2,
please.

MR. SIWY: Good afternoon. My name is
Chris Siwy (phonetic). I'm here representing
Mr. John Chartier, Chair of the Northeastern
Regional Fire Code Development Committee. I'm here
to ask for the acceptance of Amending Motion 96-4.

MR. McDANIEL: Thank you. There is a motion on
the floor to return a portion of a report in the
form of identifiable parts of Proposal 96-50 and
related Comments 96-22 and 96-24. Is there a
second?

A VOICE: Second.

MR. McDANIEL: We have a second. Please
Item 13-8-5
ASSOCIATION AMENDMENT BALLOT RESULTS

DATE: July 8, 2013

AMENDMENT (130-1)


Motion: To Return a portion of a Report in the form of an Identifiable Part of Proposal 130-115 and related Comment 130-1

TC FINAL Ballot Results

According to 4.7.1 in the NFPA (RGCP), the final results show this Amendment *HAS* achieved the necessary 2/3 majority vote. The number of affirmative votes needed to obtain a recommendation to issue the Amendment is 16 [32 (eligible to vote) – 7 (ballots not returned) – 1 (abstention) = 24 × 0.66 = 15.84]

32 Eligible to Vote
7 Not Returned (Krempasky, Mao, Markos, Middlebrook, Sandu, Sorensen, Weng)

22 Agree (Giblin w/comment)
2 Do Not Agree (Harrison, Thomas)
1 Abstain (Zicherman)

TC Action: PASS
NFPA 130
TC BALLOT FOR STANDARD FOR FIXED GUIDEWAY
TRANSIT AND PASSENGER RAIL SYSTEMS
JUNE 2013 ASSOCIATION AMENDMENT 130-1

Amendment: Return a portion of a Report in the form of an Identifiable Part of Proposal 130-115 and related Comment 130-1

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot for the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regs"). Under the Regs., if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs. at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends the term "enclosed exit" in Sections 3.3.35 and 5.3.5 be returned to previous edition text. Where no corresponding previous edition text exists, the text is deleted. In this case, the result is:

Sections 3.3.35 and 5.3.5.5 will maintain the term "enclosed exit", and not change to "fire-separated exit"

This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs. that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☐ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

The change in wording provides for significant difference in protection from a fire for the civilian population in the facility.

________________________________________________________

Signature: Kevin Harrison

Name - Please Print: ______________________________________

Date: 6/26/13

Please return as soon as possible, but no later than Wednesday, June 26, 2013 to:

Kimberly Shea, Administrator, Technical Projects
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7056
EMAIL: kshea@nfpa.org
NFPA 130
TC BALLOT FOR STANDARD FOR FIXED GUIDEWAY
TRANSIT AND PASSENGER RAIL SYSTEMS
JUNE 2013 ASSOCIATION AMENDMENT 130-1

Amendment: Return a portion of a Report in the form of an Identifiable Part of Proposal 130-115 and related Comment 130-1.

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot for the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reg.""). Under the Regs., if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regs. at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends the term "enclosed exit" in Sections 3.3.35 and 5.3.5. be returned to previous edition text. Where no corresponding previous edition text exists, the text is deleted. In this case, the result is:

Sections 3.3.35 and 5.3.5.5 will maintain the term "enclosed exit", and not change to "fire-separated exit"

This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regs., that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☒ Do Not Agree*

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

Maintaining the term "enclosed exit" does not provide adequate clarification in defining a point of safety, which should include "a location within another portion of the building or tunnel separated by smoke barriers with less than ½ hour resistance rating and that portion of the building or structure has access to a means of escape". From the fire/life safety perspective, a "fire separated exit" ensures emergency ventilation will be adequate to protect the concourse until occupants can leave by addressing the ventilation out of service phenomena.

______________________________
Signature: Michael J. Thomas

Name - Please Print: Michael J. Thomas

Date: 06-24-13

Please return as soon as possible, but no later than Wednesday, June 26, 2013 to:

Kimberly Shea, Administrator, Technical Projects
National Fire Protection Association
1 Batterymarch Park
NFPA 130
TC BALLOT FOR STANDARD FOR FIXED GUIDEWAY
TRANSIT AND PASSENGER RAIL SYSTEMS
JUNE 2013 ASSOCIATION AMENDMENT 130-1

Amendment: Return a portion of a Report in the form of an Identifiable Part of Proposal 130-115 and related Comment 130-1

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot for the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regx"). Under the Regx, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regx at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends the term "enclosed exit" in Sections 3.3.35 and 5.3.5. be returned to previous edition text. Where no corresponding previous edition text exists, the text is deleted. In this case, the result is:

Sections 3.3.35 and 5.3.5. will maintain the term "enclosed exit", and not change to "fire-separated exit"

This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regx, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☐ Do Not Agree*

☒ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I have no preference for EITHER the present or suggested language.

__________________________________________
Signature: [Signature]

Name - Please Print: Joseph B. Zicherman

Date: 6 14 2015

Please return as soon as possible, but no later than Wednesday, June 26, 2013 to:

Kimberly Shea, Administrator, Technical Projects
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169

FAX: 617-984-7056
EMAIL: kshea@nfpa.org
NFPA 130
TC BALLOT FOR STANDARD FOR FIXED GUIDEWAY
TRANSIT AND PASSENGER RAIL SYSTEMS
JUNE 2013 ASSOCIATION AMENDMENT 130-1

Amendment: Return a portion of a Report in the form of an identifiable Part of Proposal 130-115 and related Comment 130-1

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot for the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Regts"). Under the Regts, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Regts at 4.7.1(e). Please note that the Amendment that is the subject of this ballot recommends the term "enclosed exit" in Sections 3.3.35 and 5.3.5, be returned to previous edition text. Where no corresponding previous edition text exists, the text is deleted. In this case, the result is:

Sections 3.3.35 and 5.3.5 will maintain the term "enclosed exit", and not change to "fire-separated exit"

This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Regts, that recommendation is not binding; and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

Agree✓

Enclosed exit is consistent with 1, 101, and industry standards

Do Not Agree*

Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

Signature: ________________________________

Name - Please Print: Charles Giblin

Date: 6/24/13

Please return as soon as possible, but no later than Wednesday, June 26, 2013 to:

Kimberly Shea, Administrator, Technical Projects
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7056
EMAIL: kshea@ nfpa.org
RETURN FOR FURTHER STUDY: Return a portion of a Report in the form of identifiable part(s) of a proposal and related comment(s).

130-1 Log #81 Final Action: Accept in Principle (Entire Document)

Submitter: Harold A. Locke, Locke & Locke Inc.

Comment on Proposal No: 130-115

Recommendation: Revise text to read as follows:

1.1.1.1 This standard shall cover life safety from fire and fire protection requirements for underground, surface, and elevated fixed guideway transit and passenger rail systems, including but not limited to stations, trainways, emergency ventilation systems, vehicles, emergency procedures, communications, control systems, and vehicle storage areas.

3.3.12 Collateral Ventilation. The minimum steady-state airflow velocity of the ventilation airflow moving toward the fire within an enclosed trainway-tunnel or passageway that is required to prevent backlayering at the fire site.

3.23 Guideway. That portion of the fixed guideway transit or passenger rail line system included within right-of-way fences, outside lines of curbs or shoulders, underground tunnels and stations, cut or fill slopes, ditches, channels, and waterways, and including all appurtenant structures.

3.3.35 Point of Safety. A point of safety is one of the following: (1) an enclosed fire-separated exit that leads to a public way or safe location outside the station, trainway, or vehicle; (2) an at-grade point beyond the vehicle, enclosing station, or trainway; (3) any other approved location.

5.2.3.1.1 Stair and Escalator Enclosure. Stairs and escalators used by passengers shall not be required to be enclosed fire-separated.

5.6.6.3.2 In computing the means of egress capacity available on platforms, corridors, and raised platforms (12 in. (300 mm) shall be deducted at each sidewalk and 450 mm (18 in.) at open platform edges that are open to the trainway.

5.6.6.2.5 (3) For enclosed stations, at least one enclosed fire-separated exit stair or exit passageway shall provide continuous access from the platforms to the public way.

5.7.3.1 Where underground enclosed stations include more than one platform level (such as crossover subway lines), there shall be a connection-connection pipe of a minimum size of 100 mm (4 in.) in diameter between each standpipe system, so that supplying water through any fire department connection will furnish water throughout the entire system.

5.7.6.1 Underground Enclosed stations shall be provided with a fire command center in accordance with NFPA 72.

5.7.6.2 The ventilation systems at adjacent tunnels trainways and stations shall be permitted to be omitted from the controls of the fire command center.

6.2.2.1 Means of Egress Underground from Enclosed Trainways.

6.2.2.2 Exit for exit stairs serving underground or enclosed trainways, the width of exit stairs shall not be required to exceed 1120 mm (44 in.).

6.2.2.3 Exitways shall be permitted to be used in lieu of emergency exit stairways to the surface where trainways in tunnels are divided by a minimum of 2 hour-rated fire-rated separations or where trainways are in twin bores.

6.2.2.3.2 Where cross-passageways are utilized in lieu of emergency exit stairways, the following shall apply: (2)* Cross-passageways shall not be farther than 244 m (800 ft) from the station or tunnel portal of the enclosed trainway.

6.2.2.4 (4) Openings in open Cross-passageways shall be separated from the trainway protected with self-closing fire door assemblies having a fire protection rating of 1½ hours with a self-closing fire door.

6.5.3 (6) A ventilation system for the contaminated tunnel incident trainway shall be designed to control smoke in the vicinity of the passengers.

6.2.2.4.2 Doors in the means of egress shall comply with the following: (2) Be adequate to withstand positive and negative pressures caused by passing trains and be tamper resistant emergency ventilation system.

6.5.2.1 The requirements of 6.2.5.2 through 6.2.5.3.2 shall apply to all underground or enclosed trainways that are greater than 30.5 m (100 ft) in length or 2 car lengths, whichever is greater.

6.7.1.1 Blue light stations shall be provided at the following locations:

(2) In underground or enclosed trainways as required by the authority having jurisdiction.

6.8.1 Underground or Enclosed trainways greater in length than the minimum length of one train shall be provided with directional signs as appropriate for the emergency procedures developed for the fixed guideway transit or passenger rail system in accordance with Section 9.1.

6.8.2 Signs indicating station or portal directions shall be installed at maximum 25 m (82 ft) intervals on either side of the underground or enclosed trainways.

6.8.4 Points of exit from elevated and underground or enclosed trainways shall be marked with internally or externally illuminated signs.

6.3.1.1 Underground (Subways) Enclosed Trainways.

6.3.1.1.5.1 Rail ties used in underground or enclosed locations, except as permitted in 6.3.1.1.5.2 or 6.3.1.1.5.3, shall be noncombustible materials, which comply with the requirements of ASTM E 136.
8.11.1 General. The requirements of this section shall apply to fixed guideway and passenger rail system vehicles designed to meet the engineering and operational requirements stated in Sections 8.2 and to meet the goals and objectives for fire safety stated in Sections 8.2.4 and 8.2.5.

9.2 Emergencies. The emergency management plan shall address the following types of emergencies:

9.2.1 Flooding from internal or external sources.

9.2.2 Commissions. An emergency procedure shall be developed to address specifically the various types of emergencies that might be experienced on the system and shall include, but not be limited to, the following:

1. Location of train in tunnel-enclosed trainway and fire location on train

A.6.2.3 Prior to the publication of NFPA 130, the NFAA issued two orders requiring this requirement by prescribing the maximum travel distance to an exit. The intent of this requirement was to ensure that the fire would be provided within a building or structure that provides the maximum travel distance to an exit. This same requirement is applied in NFPA 130. Where two means of egress are required, the maximum travel distance to an exit occurs at the midpoint. For example, in a building with two exits, in the event of a fire adjacent to an exit rendering that exit unavailable, NFPA 130 recognizes that an individual in proximity to the affected exit must travel twice the prescribed exit travel distance to the alternate exit. Since two means of egress are required for any one point in a tunnel-enclosed guideway, the exits cannot be more than twice the travel distance, or 762 m (2500 ft) apart.

A.7.1.1 Separate ventilation systems for tunnels and underground enclosed trainways and stations can be provided but are not required. Annex B provides information on the types of mechanical systems for normal and emergency ventilation of trainways and stations and information for determining a tenable environment.

A.9.4.4 Tunnel Enclosed Trainways more than 610 m (2000 ft) in length should be equipped with emergency tunnel evacuation capabilities (ETECs) at locations to be determined by the authority having jurisdiction. ETECs should be capable of carrying a capacity of at least four stretchers and a total weight capacity of at least 453.5 kg (1000 lb). ETECs should be constructed of corrosion-resistant materials, equipped with a "deadman" brake, and safely operate on the track rails in the tunnel-enclosed trainway.

B.1 General. …

Current technology is capable of analyzing and evaluating all unique conditions of each property to provide proper ventilation for normal operating conditions and for pre-identified emergency conditions. The same ventilating devices might or might not serve both normal operating conditions and pre-identified emergency requirements. The goals of the subway emergency ventilation system for an enclosed trainway, in addition to addressing fire and smoke emergencies, are to assist in the containment and purging of hazardous gases and aerosols such as those that could result from a chemical/biological release.

B.3.4.1 General. …

Enclosed trainways and stations might be configured with the following:

1. High or low ceilings
2. Open or doorless entries
3. Open or screened platform edges
4. End-of-station or mid-tunnel fan shafts
5. End-of-station or mid-tunnel vent shafts
6. Single, double, or varying combinations of tracks in tunnel-enclosed trainways
7. Intersecting tunnel-enclosed trainways
8. Multilevel stations
9. Multilevel tunnel-enclosed trainways
10. Varying grades below the surface
11. Varying grades and curvatures of tracks and tunnel-enclosed trainways
12. Varying blockage ratios of vehicles to tunnel-enclosed trainway cross-section
13. Varying surface ambient conditions
14. Varying exit points to surface or points of safety

B.4.1 General. …

B.4.2 Draft control can be achieved by the placement of shafts along the tunnel length of the enclosed trainway between stations. Shafts can be arranged with the fan shafts at the ends of stations, with vent shafts mid-tunnel if required or with vent shafts at the ends of stations and fan shafts mid-tunnel. End-of-station shaft configurations should be related to the station geometries in the consideration of patron egress in the station relative to train piston draft effects.

B.5.2 Temperature control and ventilation for ancillary areas housing special equipment should reflect the optimum operating conditions for the specific equipment to ensure the availability of critical equipment and should also give consideration for intermittent occupancy by maintenance personnel. These systems should be separate from the emergency ventilation system for stations and tunnel-enclosed trainways and should be considered in the design of the emergency ventilation system.

B.7.1 The inclusion of platform edge screens is a design option to provide effective control for comfort control in stations as well as for smoke control in tunnel-enclosed trainways. When used, the screens should meet both fire resistivity and structural strength requirements relative to the train and ventilation system design and the operational efficiency requirements.

B.7.2 In a tunnel-enclosed trainway-to-station evacuation scenario, access to the platform level from the trainway should be considered.

B.7.8 Nonfire Tunnel Ventilation for Enclosed Trainways. Where trains might be stopped or delayed in an enclosed trainway for a period of time, the ventilation system should be capable of maintaining an acceptable level of patron comfort. If not operating in a fire emergency scenario, the tunnel emergency ventilation fans can be used to augment the vehicle system capability. Velocities should consider the comfort levels of employees required to be in the tunnel-enclosed trainways.

C.12.1 Calculating Evacuation Time. The total evacuation time is the sum of the walking travel time for the longest exit route plus the waiting times at the various circulation elements. The tunnel trainway can be considered as an auxiliary exit from the station under certain fire scenarios.

C.1.3.2 Single-Platform Station. A single-platform station is a subway or enclosed station with a concourse above the platform level but below grade. (See Figure C.1.4.) The platform is 183 m (600 ft) long to accommodate the train length. The vertical distance from grade to concourse is 8 m (26 ft). The concourse is 5.5 m (18 ft) above the platform.

D.1.3.1 Introduction. This annex provides additional information on the hazards associated with burning vehicles and the impact of a burning vehicle on the evacuation of passengers and crew to a point of safety. Emergency evacuation from a vehicle containing a fire could include exiting a vehicle containing the fire to an adjacent vehicle, exiting the train into the operating environment (station), or exiting the train into the operating environment to the point of safety. Chapter 8 contains minimum prescriptive requirements that are intended to provide sufficient time for passengers and crew to safely evacuate from a train containing a fire. This annex provides guidance for designing and evaluating train fire performance. A fire in a tunnel or train will have an impact on the operating environment, and this type of fire is often used to design emergency systems in operating environments. Chapters 5 through 7 provide requirements on design of the operating environment to ensure that passengers can safely egress to a point of safety.

D.4.3 The vehicle heat release rate history of a vehicle fire should include the heat release rate during all stages of the fire. Fires inside of vehicles that are allowed to grow sufficiently large can reach flashover, where all of the items inside of the vehicle ignite. The largest heat release rates are expected after flashover occurs (i.e., post-flashover). The heat release rate during post-flashover is particularly important since many tunnel-enclosed trainways and station smoke control system designs are based on the maximum expected heat release rate.

E.3.2.3.3 Guideway. That portion of the fixed guideway transit or passenger rail system included within right-of-way fences, outside lines of curbs or shoulders, underground tunnels and stations, cut or fill slopes, ditches, culverts, and waterways, and including all appurtenant structures.

E.3.3.3 Point of Safety. A point of safety is one of the following: (1) an enclosed fire-separated exit that leads to a public way or safe location outside the station, trainway, or vehicle; (2) an at-grade point beyond the vehicle, enclosing station, or trainway; (3) any other approved location.

7 of 20
In computing the means of egress capacity available on platforms, corridors, and ramps, 300 mm (12 in.) shall be deducted at each sidewalk and 450 mm (18 in.) at open platform edges that are open to the trainway.

For enclosed stations, at least one enclosed fire-separated exit stair or exit passageway shall provide continuous access from the platforms to the public way.

Where underground enclosed stations include more than one platform level (such as crossover subway lines), there shall be a cross-connection pipe of a minimum size of 100 mm (4 in.) in diameter between each standpipe system, so that supplying water through any fire department connection will furnish water throughout the entire system.

Underground enclosed stations shall be provided with a fire command center in accordance with NFPA 72.

The ventilation systems at adjacent tunnel-trainway and stations shall be permitted to be omitted from the controls of the fire command center.

Within underground or enclosed trainways, the maximum distance between exits shall not exceed 1219 m (4000 ft).

Cross-passageways shall be permitted to be used in lieu of emergency exit stairways to the surface where trainway sections are divided by a minimum of 2 hour-rated fire wall separations or where trainways are in twin bays.

Doors in the means of egress shall comply with the following:

For enclosed stations, at least one enclosed entrance or tunnel shall be provided with a fire-separating construction that leads to a public way or safe location outside the station.

The total evacuation time is the sum of the time-of-tenability criteria for stations and tunnels and the calculated egress time used to establish egress capacity in 5.5.6.

The time-of-tenability criteria for stations and tunnels are defined in 5.7.4.3.

The ventilation systems at adjacent tunnels shall be provided with a fire command center in accordance with NFPA 72.

The inclusion of platform edge screens is a design option that is effective in reducing smoke movement while providing the necessary structural strengths relative to the train and ventilation system drafts and the operational efficiency requirements.

Revisions are necessary to provide consistent terminology and to eliminate sections that are not referenced elsewhere in the ROP.

Ballot Results: Affirmative: 27 Negative: 1 Number Eligible to Vote: 32 Explanation of Negative: KOFFEL, W.: I am voting negative on certain aspects of the Committee Action regarding the change from “enclosed exit” to “fire-separated exit”. The change, which occurs in several locations, should not be made. NFPA 130 requires the fire separation criteria for enclosed exits to be provided at each surface fire department connection and at each hose valve on the standpipe line. The time-of-tenability criteria for stations and tunnels are defined in 5.7.4.3.

Comment on Affirmative: LOCKE, H.: Further to Mr. Koffel’s and Mr. Nelson’s ballot comments regarding terminology related to fire separation vs. fire separation, the following amendments to the language proposed in ROC Comment 130-1 are required: 3.3.35: A point of safety is one of the following: (1) an enclosed enclosed trainway

For electrical substations and distribution rooms serving emergency ventilation systems where the local environmental conditions require the use of mechanical ventilation or cooling to maintain the space temperature below the ventilation equipment operating temperature, such mechanical ventilation or cooling systems shall be designed so that failure of any single air moving or cooling unit does not result in the loss of the electrical supply to the tunnel emergency ventilation fans during the specified period of operation.

An emergency procedure shall be developed to address specifically the various types of emergencies that might be experienced on the system and shall include, but be limited to, the following:

Fire and smoke emergency information and procedures to be provided, including the following:

(a) Location of train in tunnel-enclosed trainway and fire location on train
(b) Location of exit and other emergency exits
(c) Location of fire extinguishing equipment
(d) Location of means to communicate with emergency personnel
(e) Location where passengers are to assemble
(f) Location of fire command centers
(g) Location of means to control ventilation fans

The total evacuation time is the sum of the time-of-tenability criteria for stations and tunnels and the calculated egress time used to establish egress capacity in 5.5.6.
the station, trainway, or vehicle; (2) an at-grade point beyond the vehicle, enclosing station, or trainway; (3) any other approved location. 5.2.4.1: Stairs and escalators used by passengers shall not be required to be enclosed or separated by fire-resistive construction from the adjoining space. 5.3.5.5: For enclosed stations, at least one enclosed exit stair or exit passageway that is enclosed by fire-resistive construction shall provide continuous access from the platforms to the public way.

MARKOS: S. Thank you, Mr. Locke for your follow-up, to address this long-time concern over several cycles and willingness to provide the necessary effort to clarify the usage of the terms. Relating to Mr. Koepli's ROC vote comment, I agree that the issue he identified re change from "enclosed" to "fire-separated" for 3.3.35, 5.2.3.1.1* and 5.5.6.3.2.5 (3) accepted with renumbering for the latter 2 cases to be 5.2.4.1 and 5.3.5.5 should be addressed but NOT at the expense of not accepting all of the remainder of the Comment, the clarifications for which has been a LONG time coming in terms of the usage and meaning of "enclosed," "underground," "tunnel" etc., as used throughout the 2010 standard.

NELSEN: J. I think I appreciate the intent of this comment however in my opinion it is inappropriate to replace the term "enclosed" as it relates to exits and/or exit stairs with "fire-separated" as proposed. This proposed new terminology is not used in NFPA 101, NFPA 5000 or the IBC/IFC; in fact in the IBC "fire separation" refers to the physical distance between two buildings, a building and the public way or a building and the property line. In that regard, I am not sure that the proposed changes related to the term "enclosed" are consistent with the Committee Statement that the "Revisions are necessary to provide consistent terminology..."

Backup Proposal 130-115

130-115 Log #225 Final Action: Reject

(Chapter 6)

Submitter: Stephanie H. Markos, US Department of Transportation/Volpe Center

Recommendation: Review usage of terms underground, enclosed, and underwater as in this Chapter and Chapter 5

Substantive: While specific definitions for "enclosed" and "underground" as well as "elevated" stations are contained in the definitions section (3.4.44 AND 3.4.45), these terms are not defined for the guideway or trainway. There are numerous times that it is unclear as to why one or the other term or both is used. Sometimes "enclosed" is included in the requirement, along with "underground," while "underground" is used in 6.2.4.1.1 and 6.2.5.1.1. "Underground" is used in section 6.3.1.1.7.1, but u "underwater" is used in 6.3.1.1.7.2. Moreover, 6.3.3.1 has the heading title of Underground (Subways). But "enclosed" is used in several items, along with underground in the same sentence. Also note that "Underwater" is not necessarily "underground" if it is a trainway drilled through rock.

Committee Meeting Action: Reject

Committee Statement: The proposal does not contain any proposed language for change as required by the regulations governing committee projects.

Number Eligible to Vote: 30

Ballot Results: Affirmative: 25 Negative: 3

Ballot Not Returned: 2 Grizard, W., Weng, L.

Explanation of Negative: LOCKE, H.: Regardless of the Committee Statement, this proposal has validity in that it addresses a concern that has been raised in several recent cycles; therefore, the following NFPA 130 revisions are offered for consideration.

1.1.1 This standard shall cover life safety from fire and fire protection requirements for underground, surface, and elevated fixed guideway transit and passenger rail systems, including but not limited to stations, trainways, emergency ventilation systems, vehicles, emergency procedures, communications, control systems, and vehicle storage areas.

3.3.12 Critical Velocity. The minimum steady-state velocity of the ventilation airflow moving toward the fire within an enclosed trainway tunnel or passageway that is required to prevent backlayering at the fire site.

3.3.23 Guideway. That portion of the fixed guideway transit or passenger rail line system included within right-of-ways, outside lines of curbs or shoulders, underground tunnels and stations, cut or fill slopes, ditches, channels, and waterways, and including all appurtenant structures.

3.3.35 Point of Safety. A point of safety is one of the following: (1) an enclosed or fire-separated exit that leads to a public way or safe location outside the station, trainway, or vehicle; (2) an at-grade point beyond the vehicle, enclosing station, or trainway; (3) any other approved location.

5.2.3.1.1* Stair and Escalator Enclosure. Stairs and escalators used by passengers shall not be required to be enclosed or separated by fire-resistive construction from the adjoining space. 5.5.6.3.1.2* In computing the means of egress capacity available on platforms, corridors, and ramps, 300 mm (12 in.) shall be deducted at each sidewalk and 450 mm (18 in.) at open platform edges that are open to the trainway.

5.5.6.3.2.5 (3) For enclosed stations, at least one enclosed exit stair or exit passageway shall provide continuous access from the platforms to the public way.

5.7.4.3 Where underground enclosed stations include more than one platform level (such as crossover subway lines), there shall be a cross-connection pipe of a minimum size of 100 mm (4 in.) in diameter between each standpipe system, so that supplying water through any fire department connection will furnish water throughout the entire system.

6.1.1* Underground Enclosed Stairways shall be provided with a fire command center and a means of communicating with the fire command center.

6.5.7.2 The ventilation systems at adjacent tunnels or trainways and stations shall be permitted to be omitted from the controls of the fire command center.

6.2.2 Means of Egress Underground or Enclosed Trainways.

6.2.2.1 Within underground or enclosed trainways, the maximum distance between exits shall not exceed 762 m (2500 ft).

6.2.2.2 For exit stairs serving underground or enclosed trainways, the width of exit stairs shall not be required to exceed 1120 mm (44 in.).

6.2.2.3.1 Cross-passageways shall be permitted to be used in lieu of emergency exit passageways to the surface where trainways are tunnels are divided by a minimum of 2 hour-rated firewalls separations or where trainways are in twin bores.

6.2.2.3.2 Where cross-passageways are utilized in lieu of emergency exit passageways, the following shall apply:

(1) Cross-passageways shall not be farther than 244 m (800 ft) from the station or tunnel portal of the enclosed trainway.

(4) Openings in open Cross-passageways shall be separated from the trainway protected with self-closing fire door assemblies having a fire protection rating of 1½ hours with a self-closing fire door.

(6) A ventilation system for the contaminated tunnel incident trainway shall be designed to control smoke in the vicinity of the passengers.

6.2.2.4.2 Doors in the means of egress shall comply with the following:

(2) Be adequate to withstand positive and negative pressures caused by passing trains and tunnel ventilation systems.

6.2.2.4.3 The requirements of 6.2.2.2 through 6.2.2.3.2 shall apply to all underground or enclosed trainways that are greater than 30.5 m (100 ft) in length or 2 car lengths, whichever is greater.

6.2.7.1* Blue light stations shall be provided at the following locations:

(5) In underground or enclosed trainways as approved

6.2.8.1* Enclosed trainways greater in length than the minimum length of one train shall be provided with directional signs as appropriate for the emergency procedures developed for the fixed guideway transit or passenger rail system in accordance with Chapter 9.

6.2.8.2 Signs indicating station or portal directions shall be installed at maximum 25 m (82 ft) intervals on either side of the underground or enclosed trainways.

6.2.8.4 Points of exit from elevated and underground or enclosed trainways shall be marked with internally or externally illuminated signs.

6.3.1* Underground (Subways) Enclosed Trainways.

6.3.1.1.5.1 Rail ties used in underground or enclosed locations, except as permitted in 6.3.1.1.5.2 or 6.3.1.1.5.3, shall be noncombustible materials, which comply with the requirements of ASTM E 136.

6.3.1.1.5.3 Rail ties and tie blocks in underground or enclosed track sections shall be permitted to be of wood encased in concrete such that only the top surface is exposed.

6.3.1.1.7.2 Ancillary areas shall be separated from trainway areas within underground or enclosed trainways by a minimum of 2-hour fire-resistive construction.

6.3.2.2 Emergency ventilation meeting the tenability criteria for occupied areas shall not be required in storage track areas where the storage track does not open has no openings along its length to passenger track trainway areas and where an engineering analysis indicates that a fire on a train in the storage track area will not impact passengers or passenger areas.

6.3.3.1* Life safety and fire protection criteria for the subsystem installed in the trainway shall conform to the requirements for underground or enclosed trainways that are listed in 6.4.2.

6.3.3.2 Underground (Subways) Enclosed Trainways.

6.5.2.1* An approved fire standpipe system shall be provided in underground or enclosed fixed guideway transit and passenger rail systems where physical factors prevent or impede access to the water supply or fire apparatus, where required by the authority having jurisdiction.

6.5.4.1 Identification numbers and letters conforming to the system sectional identification numbers and letters of the fixed guideway transit or passenger rail systems shall be permitted to be provided at each surface fire department connection and at each hose valve on the standpipe lines.

6.5.4.2 Identifying signs shall be affixed to underground or enclosed trainway walls at each hose outlet valve or shall be painted directly on the standpipe in which outlets next to each hose outlet valve.

6.5.4.2* Exposed hose standpipe lines and identification signs shall be painted as required by the authority having jurisdiction.

6.5.3.1 Standpipe Installations in Tunnels Under Safeguards During Construction.

6.5.3.2* A standpipe system shall be installed in tunnels or enclosed trainways under construction in accordance with NFPA 241.

6.5.3.3.1 A standpipe system shall be installed before the tunnel enclosed trainway has exceeded a length of 61 m (200 ft) beyond any access shaft or
7.1.2.3 A mechanical emergency ventilation system shall not be required in the following locations:

(2) In a system underground or enclosed trainway that is greater in length than 305 m (1000 ft).

7.1.2.4 Where supported by engineering analysis, a nonmechanical emergency ventilation system shall be permitted to be provided in lieu of a mechanical emergency ventilation system in the following locations:

(1) Where the length of an underground or enclosed trainway is less than or equal to 61 m (200 ft).

7.2 Point-exit ventilation systems shall be permitted subject to an engineering analysis that demonstrates the system will confine the spread of smoke in the tunnel-enclosed trainway to a length of 150 m (500 ft) or less. The system shall be designed so that failure of any single air moving or cooling equipment shall cause the ventilation system to be reestablished and approved for the station. For stations, the station shall be greater than the calculated egress time used to establish egress capacity in 5.5.6.

7.3.1 The ventilation system fans that are designated for use in fire emergencies shall be capable of satisfying the emergency ventilation requirements to move tunnel trainways in any direction as required to provide the needed ventilation response.

7.7.9 For electrical substations and distribution rooms serving emergency ventilation systems where the local environmental conditions require the use of mechanical ventilation or cooling to maintain the space temperature below the electrical equipment operating limits, such mechanical ventilation or cooling systems shall be designed so that failure of any single air moving or cooling unit does not result in the loss of the electrical supply to the tunnel emergency ventilation fans during the specified period of operation.

8.5.1.2 Vehicles that travel through tunnel-enclosed trainways and have a roof that is constructed of a combustible material shall require a fire hazard analysis to demonstrate that rapid fire spread to passenger and crew compartments or local roof collapse is not possible during the exposure period.

8.6.1 General Construction. All motors, motor control, current collectors, and auxiliaries shall be of a type and construction suitable for use on fixed guideway transit and passenger rail vehicle systems.

8.11.1* General. The requirements of this section shall apply to fixed guideway and passenger rail vehicle systems designed to meet the engineering analysis option permitted by Section 8.2 and to meet the goals and objectives stated in Sections 4.2 and 4.3.

9.3 Emergencies. The emergency management plan shall address the following types of emergencies:

(7) Tunnel flooding from internal or external sources

9.4* Emergency Procedures. An emergency procedure shall be developed to address specifically the various types of emergency experienced on the system and shall include, but not be limited to, the following:

(8) Fire and smoke emergency information and procedures to be provided, including the following:

(b) Location of train in tunnel-enclosed trainway and fire location on train

A.6.2.2.2 Previous editions of NFPA 130 addressed this requirement by prescribing the maximum travel distance to an exit. The intent of this requirement was often misinterpreted. NFPA 101 requires, at a minimum, that two means of egress be provided within a building or structure and prescribes the maximum travel distance to an exit. This same requirement is applied in NFPA 101 when two means of egress and travel distance to an exit occurs at the midpoint. For example, in a building with two exits, in the event of a fire adjacent to an exit rendering that exit unavailable, NFPA 101 recognizes that an individual in proximity to the affected exit must travel twice the prescribed exit travel distance to the alternate exit. Since two means of egress are required at any one point in a tunnel-enclosed guideway, the exits cannot be more than twice the travel distance, or 762 m (2500 ft) apart.

A.7.1.1 Separate ventilation systems for tunnel-enclosed trainways and stations can be provided but are not required. Annex B provides information on emergency mechanical systems for normal and emergency ventilation of trainways and stations and information for determining a tenable environment.

A.9.4 Tunnel-enclosed trainways more than 610 m (2000 ft) in length should be equipped with emergency tunnel evacuation carts (ETECs) at locations to be determined by the authority having jurisdiction. ETECs should be capable of carrying a capacity of at least four stretchers and a total weight capacity of at least 453.5 kg (1000 lb). ETECs should be constructed of corrosion-resistant materials, be equipped with nonflammable brake, and safely operate on the rail tracks in the tunnel-enclosed trainway.

B.1 General. Current technology is capable of analyzing and evaluating all unique conditions of each property to provide proper ventilation for normal operating conditions and for pre-identified emergency conditions. The same ventilating devices might or might not serve both normal operating conditions and pre-identified emergency requirements. The goals of the subway emergency ventilation system for an enclosed trainway, in addition to addressing fire and smoke emergencies, are to assist in the containment and purging of hazardous gases and aerosols such as those that could result from a chemical/biological release.

B.3 Configurations. Enclosed stations and trainways might be configured with the following characteristics:

(1) High or low ceilings

(2) Open or doored entrances

(3) Open or screened platform edges

(4) End-of-station or mid-tunnel fan shafts

(5) End-of-station or mid-tunnel fan shafts

(6) Single, double, or varying combinations of tracks in tunnel-enclosed trainways

(7) Intersecting tunnel-enclosed trainways

(8) Multilevel stations

(9) Tunnel-enclosed trainways

(10) Varying depths below the surface

(11) Varying grades and curvatures of tracks and tunnel-enclosed trainways

(12) Varying blockage ratios of tunnels to tunnel-enclosed trainway cross-section

(13) Varying surface ambient conditions

(14) Varying surface ambient conditions

B.4.2 Draft control can be achieved by the placement of shafts along the tunnel length of the enclosed trainway between stations. Shafts can be arranged with the fan shafts at the ends of stations, with vent shafts mid-tunnel if required or with vent shafts at the ends of stations and fan shafts mid-tunnel. End-of-station shaft configurations should be related to the station geometries in the consideration of patron comfort in the station relative to train piston draft effects.

B.5.2 Temperature control and ventilation for ancillary areas housing special equipment should reflect the optimum operating conditions for the specific equipment to ensure the availability of critical equipment and should give consideration for intermittent occupancy by maintenance personnel. These systems should be separate from the emergency ventilation system for stations and tunnel-enclosed trainways and should be considered in the design of the emergency ventilation system.

B.7.1 The inclusion of platform edge screens is a design option that is effective for comfort control in stations as well as for smoke control in tunnel-enclosed trainways. When used, the screens should meet both fire resistivity and structural strengths relative to the train and ventilation system drafts and the operational efficiency requirements.

B.8 Nonfire Tunnel Ventilation for Enclosed Trainways. Where trains might be stopped or delayed in a tunnel-enclosed trainway for a period of time, the vehicle ventilation system should maintain an acceptable level of patron comfort. If not operating in a fire emergency scenario, the tunnel emergency ventilation fans can be used to augment the vehicle system capability. Velocities should consider the comfort levels of employees required to be in the tunnel-enclosed trainways.

C.1.4 Side-Platform Station Sample Calculation. The sample side-platform station is an enclosed station with a concourse above the platform level but below grade. (See Figure C.1.4.) The platform is 183 m (600 ft) long to approximate the train length. The vertical distance from grade to concourse is 8 m (26 ft). The concourse is 5.5 m (18 ft) above the platform.

D.1 Introduction. This annex provides additional information on the hazards associated with the burning vehicle and the impact of a burning vehicle on the evacuation of passengers and crew to a point of safety. Emergency evacuation from a vehicle containing a fire could include exiting a vehicle containing the fire to an adjacent vehicle, exiting the train into the operating environment (station, tunnel-trainway, etc.) where the train is located, and moving through the operating environment to a point of safety. Chapter 8 contains minimum prescriptive requirements that are intended to provide sufficient time for passengers and crew to safely evacuate from a train containing a fire. This annex provides guidance for designing and evaluating train fire performance. A fire involving a train will have an impact on the conditions in the operating environment, and the type of fire will affect the vehicles in operating environments. Chapters 5 through 7 provide requirements on design of the operating environment to ensure that passengers can safely egress to a point of safety.
release rates are expected after flashover occurs (i.e., post-flashover). The heat release rate during post-flashover is particularly important since many enclosed trainway and station smoke control system designs are based on the maximum expected heat release rate. The heat release rate of the vehicle fire will also affect the heat that passengers could be exposed to during evacuation. The magnitude of the heat release rate during post-flashover will be a function of the amount of air drawn into the vehicle, the material fire properties, and the potential heat release rate of the burning fuels inside of the vehicle.

D.4.3 The heat release rate of the train fire will also affect the amount of heat the passengers are exposed to during the evacuation. Larger heat release rate fires will produce longer flames that could extend out of the vehicle openings. If the vehicle is inside an enclosed trainway, these flames could impinge on the ceiling and extend down away from the burning vehicle. Radiation from these flames to nearby evacuating passengers could be significant.

E.3.3 Step 3: Evaluate Specific Vehicle Fire Scenarios. …

The location of the train must be also considered in the analysis. For example, the fire risk to occupants is greater if the train is located between stations or within an enclosed trainway.

MARKOS, S.: This is the second cycle that I have identified (see the actual proposal) the consistency issues and confusing unclear reasons by some review to underwater and of the use of the terms “enclosed,” “elevated” as well, as “underground,” and “underwater” win the various chapter of require a careful technical review by. Accordingly, I will provide the Committee the Proposal for 130-114, that contains the proposal for reordering Chapter 6 that contains a extra side column so you can better review and see and thus more clearly see and understand what my reasons were and are.

MIDDLEBROOK, T.: The TC should address this issue during this cycle. H. Locke has proposed language in his response to this log which should be considered by the TC at the ROC.
RETURN FOR FURTHER STUDY: Return a portion of a Report in the form of identifiable part(s) of a proposal and related comment(s).

130-1 Log #81  Final Action: Accept in Principle

(Entire Document)

Submitter: Harold A. Locke, Locke & Locke Inc.

Comment on Proposal No: 130-115

Recommendation: Revise text to read as follows:

1.1.1.1 This standard shall cover life safety from fire and fire protection requirements for underground, surface, and elevated fixed guideway transit and passenger rail systems, including but not limited to stations, trainways, emergency ventilation systems, vehicles, emergency procedures, communications, control systems, and vehicle storage areas.

3.3.12 Critical Velocity. In computing the means of egress capacity available on platforms, trainways, emergency ventilation systems, vehicles, emergency procedures, trainway protected compartments or local roof collapse is not possible during the exposure period.

5.5.6.3.2 In underground or enclosed trainways under construction in accordance with NFPA 241.

6.2.8.2 Ventilation and fans utilized for ventilation of enclosed trainways shall terminate at grade on any vehicle roadway.

6.2.2 Means of Egress Underground from Enclosed Trainways. (2) Be adequate to withstand positive and negative pressures caused by trainway air in either direction as required to provide the needed ventilation of enclosed trainways. (3) For enclosed stations, at least one enclosed fire-separated exit stair or exit passageway shall provide continuous access to the public way.

6.5.3.7 Illumination level in the tunnel shall be permitted to be provided in such numbers, sizes, and types and at such locations in tunnels enclosures as determined by the authority having jurisdiction.

7.2.6 Emergency ventilation meeting the tenability criteria for occupied surface is exposed.

7.3.1 Where supported by engineering analysis, a nonmechanical emergency ventilation system shall be permitted to be provided in lieu of a mechanical ventilation system in the following locations:

7.3.1.1 Where the length of an underground or enclosed trainway is less than or equal to 61 m (200 ft)

7.3.1.2 Mechanical ventilation system shall be permitted to be provided in lieu of a mechanical ventilation system in the following locations:

8.5.1.2.2 Where supported by engineering analysis, a nonmechanical emergency ventilation system shall be permitted to be provided in lieu of a mechanical ventilation system in the following locations:

6.3.1.5.3 Rail ties and tie blocks in underground or enclosed trainways shall be permitted to be of wood encased in concrete such that only the top surface is exposed.

6.3.1.7.2 Ancillary areas shall be separated from trainway areas within underground or enclosed trainways by a minimum of 2-hour fire-resistive construction.

6.3.2 Emergency ventilation meeting the tenability criteria for occupied areas shall not be required in storage track areas where the storage track does not have any doors or no openings along its length to passenger tracks or trainways and where an engineering analysis indicates that a fire on a train in the storage track area will not impact passengers or passenger areas.

6.3.1.2 Life safety and fire protection criteria for the subsystem installed in the trainway shall conform to the requirements for underground or enclosed trainways that are listed in 6-4.6.3.2

6.5.2.4 Identification numbers and letters conforming to the system sectional identification numbers and letters of the fixed guideway transit or passenger rail system trainways where physical factors prevent or impede access to the water supply or fire apparatus, where required by the authority having jurisdiction.

8.5.2.4 Exposed tunnel standpipe lines and identification signs shall be painted as required by the authority having jurisdiction.

6.5.3.3 Enclosed stations shall be provided with a fire command center in accordance with NFPA 72.

6.6.2 Vehicle Roadway Terminations. Vent or fan shafts utilized for ventilation of tunnel enclosures shall be permitted to be provided in such numbers, sizes, and types and at such locations in tunnels enclosures as determined by the authority having jurisdiction.

7.1.2.3 A mechanical emergency ventilation system shall be provided in underground or enclosed trainways as approved by the authority having jurisdiction.

7.1.2.1 A standpipe system shall be installed in tunnels and at each hose valve on the standpipe lines.

6.3.1.1.5.3 Rail ties and tie blocks in underground or enclosed trainways shall be permitted to be of wood encased in concrete such that only the top surface is exposed.

6.3.1.7.2 Ancillary areas shall be separated from trainway areas within underground or enclosed trainways by a minimum of 2-hour fire-resistive construction.

6.3.2 Emergency ventilation meeting the tenability criteria for occupied areas shall not be required in storage track areas where the storage track does not have any doors or no openings along its length to passenger tracks or trainways and where an engineering analysis indicates that a fire on a train in the storage track area will not impact passengers or passenger areas.

6.3.1.2 Life safety and fire protection criteria for the subsystem installed in the trainway shall conform to the requirements for underground or enclosed trainways that are listed in 6-4.6.3.2

6.5.2.4 Identification numbers and letters conforming to the system sectional identification numbers and letters of the fixed guideway transit or passenger rail system trainways where physical factors prevent or impede access to the water supply or fire apparatus, where required by the authority having jurisdiction.

6.5.3.3 Enclosed stations shall be provided with a fire command center in accordance with NFPA 72.

6.5.6.3.2 In computing the means of egress capacity available on platforms, corridors, and radiation tunnels, 12 in. (12 in.) shall be deducted at each sidewalk and 450 mm (18 in.) at open platform edges that are open to the trainway.

6.5.6.3.2.5 For enclosed stations, at least one enclosed fire-separated exit stair or exit passageway shall provide continuous access to the public way.

6.5.3.7 Where underground or enclosed stations include more than one platform level (such as crossover subway lines), there shall be a connection-connection pipe of a minimum length of 100 m (4 in.) in diameter between each standpipe system, so that supplying water through any fire department connection will furnish water throughout the entire system.

6.5.6.1 Where underground or enclosed trainways shall be provided with a fire command center in accordance with NFPA 72.

6.5.6.2 The ventilation systems at adjacent tunnels and stations shall be permitted to be omitted from the controls of the fire command center.

6.6.2 Means of Egress Underground from Enclosed Trainways. (2) Be adequate to withstand positive and negative pressures caused by trainway air in either direction as required to provide the needed ventilation of enclosed trainways. (3) For enclosed stations, at least one enclosed fire-separated exit stair or exit passageway shall provide continuous access to the public way.

6.6.2.2.2 For exit stairs serving underground or enclosed trainways, the width of exit stairs shall not be required to exceed 1120 mm (44 in.).

6.6.2.2.3 Cross-passageways shall be permitted to be used in lieu of emergency exit stairways to the surface where trainways in tunnels are divided by a minimum of 2-hour rated fire walls or where trainways are in twin bores.

6.6.2.3.2 Where cross-passageways are utilized in lieu of emergency exit stairways, the following shall apply:

6.6.2.4.2 Doors in the means of egress shall comply with the following:

6.6.2.4.3 Cross-passageways shall not be farther than 244 m (800 ft) from the station or tunnel portal of the enclosed trainway.

6.6.2.4 Cross-passageways shall be separated from the trainway protected with self-closing fire door assemblies having a fire protection rating of 1½ hours with a self-closing fire door assemblies having a fire protection rating of 1½ hours with a self-closing fire door or noncombustible materials, which comply with the requirements of ASTM E 136.
B.7 The inclusion of platform edge screens is a design option that is effective for control in stations as well as for smoke control in tunnels and enclosed trainways. When used, the screens should meet both fire resistivity and structural strengths relative to the train and ventilation system drafts and the operational efficiency requirements.

B.7.2 In a tunnel trainway-to-station evacuation scenario, access to the platform level from the trainway should be considered.

B.8 Nonfire Tunnel Ventilation for Enclosed Trainways

Where trains might be stopped or delayed in enclosed trainways for a period of time, the ventilation system should be capable of maintaining an acceptable level of patron comfort. If not operating in a fire emergency scenario, the tunnel emergency ventilation fans can be used to augment the vehicle system capability. Velocities should consider the comfort levels of employees required to be in the tunnel-enclosed trainways.

C.1.2 Calculating Evacuation Time. The total evacuation time is the sum of the walking travel time for the longest exit route plus the waiting times at the various circulation elements. The tunnel trainway can be considered as an auxiliary exit from the station under certain fire scenarios.

C.13.3.4 Single-Platform Station. The single-side-platform station is a subway an enclosed station with a concourse above the platform level but below grade. (See Figure C.1.4.) The platform is 183 m (600 ft) long to accommodate the train length. The vertical distance from grade to concourse is 8 m (26 ft). The concourse is 5.5 m (18 ft) above the platform.

D.1 Introduction. This annex provides additional information on the hazards associated with burning vehicles and the impact of a burning vehicle on the evacuation of passengers and crew to a point of safety. Emergency evacuation from vehicle containing a fire could include exiting a vehicle containing the fire to an adjacent vehicle, exiting the train into the operating environment (station or guideway, etc.), or exiting the train into the operating environment to the point of safety. Chapter 8 contains minimum prescriptive requirements that are intended to provide sufficient time for passengers and crew to safely evacuate from a train containing a fire. This annex provides guidance for designing and evaluating train fire performance. A fire emergency evacuation train will have a significant impact on the operating environment, and this type of fire is often used to design emergency systems in operating environments. Chapters 5 through 7 provide requirements on design of the operating environment to ensure that passengers can safely evacuate to a point of safety.

D.2 Vehicle Fire Heat Release Rate History. The heat release rate history of a vehicle fire should include the heat release rate during all stages of the fire. Fires inside of vehicles that are allowed to grow sufficiently large can reach flashover, where all of the items inside of the vehicle ignite. The largest heat release rates are expected after flashover occurs (i.e., post-flashover). The heat release rate during post-flashover is particularly important since many tunnel-enclosed trainway and station smoke control system designs are based on the maximum expected heat release rate.

The maximum heat release rate of the vehicle fire will also affect the heat that passengers could be exposed to during evacuation. The magnitude of the heat release rate during post-flashover will be a function of the amount of air drawn into the vehicle, the material fire properties, and the potential heat release rate of the burning fuels inside of the vehicle.

D.4.3 The heat release rate of the train fire will also affect the amount of heat that passengers are exposed to during low evacuation rates. High heat release fires will produce longer flames that could extend out of the vehicle openings. If the vehicle is inside a tunnel enclosed trainway, these flames could impinge on the ceiling and extend down away from the burning vehicle. Radiation from these flames to nearby evacuating passengers could be significant.

E.3.3 Step 3: Evaluate Specific Vehicle Fire Scenarios. … The location of the train must be also be considered in the analysis. For example, the fire risk to occupants is greater if the train is located between stations or within an enclosed trainway. Fire scenarios for evaluating fire performance are considered in the next sections.

E.3.3.3 Point of Safety. A point of safety is one of the following: (1) an fire-separated exit that leads to a public way or safe location outside of the station, trainway, or vehicle; (2) an at-grade point beyond the vehicle, enclosing station, or trainway; (3) any other approved location.

F.2.4.1-5.2.3-6.1-8.1 Stairs and Escalator Enclosure. Stairs and escalators used by passengers shall not be required to be fire-separated.
5.3.1.4 *5.4.6.3.* 5.3.1.2.3 In computing the means of egress capacity available on platforms, corridors, and ramps, 300 mm (12 in.) shall be deducted at each sidewalk and 450 mm (18 in.) at open platform edges that are open to the trainway.

5.3.5.5 *5.6.4.2.* 5.3.2.2.5 (3) For enclosed stations, at least one enclosed fire-separated exit stair or exit passageway shall provide continuous access from the platforms to the public way.

5.4.5.7 *5.7.6.* Where underground enclosed stations include more than one platform level (such as crossover subway lines), there shall be a common connection pipe with a size of at least 100 mm between each standpipe system, so that supplying water through any fire department connection will furnish water throughout the entire system.

5.4.1.1 *5.5.1.* Undermined Enclosed stations shall be provided with a fire command center in accordance with NFPA 72.

5.4.2.5 *5.6.5.* The ventilation systems at adjacent tunnel-trainways and stations shall be permitted to be omitted from the controls of the fire command center.

6.1.4 *6.2.2.* Within underground or enclosed trainways, the maximum distance between exits shall not exceed 2.5 m (200 ft).

6.2.3.3 *6.3.5.* For exit stairs serving underground or enclosed trainways, the width of exit stairs shall not be required to exceed 1120 mm (44 in.).

6.2.5.5 *6.3.7.* Cross-passageways shall be permitted to be used in lieu of emergency exit stairways to the surface where trainways are divided by a minimum of 2 hour fire-rated walls or where trainways are in twin bores.

6.1.6 *6.2.2.* Where cross-passageways are utilized in lieu of emergency exit stairways, the following shall apply:

(2)* Cross-passageways shall not be farther than 244 m (800 ft) from the station or tunnel entrance or enclosed trainway entrance.

(3)* Openings in open cross-passageways shall be separated from the trainway protected with self-closing fire doors assemblies having a fire protection rating of 1½ hours with a self-closing fire door.

(4)* A ventilation system for the contaminated tunnel incident trainway shall be designed to control smoke in the vicinity of the passengers.

3.3.10 *6.4.* Doors in the means of egress shall comply with the following:

(1) Be able to withstand positive and negative pressures caused by passing trains and the emergency ventilation system.

6.3.5.3 *6.4.6.* Sections of NFPA 130 are addressed to crossing the transition to the tunnel emergency ventilation fans during the specified period of operation.

6.3.5.3 *6.4.6.* Previous editions of NFPA 130 addressed the requirement to prescribe the maximum travel distance to an exit. The intent of this requirement was often misinterpreted. NFPA 101 requires, at a minimum, that two means of egress be provided within a building or structure and prescribes the maximum travel distance to an exit. This same requirement is applied in NFPA 130 for areas where two means of egress are required. Where the maximum travel distance to an exit occurs at the midpoint. For example, in a building with two exits, in the event of a fire adjacent to an exit rendering that exit unavailable, NFPA 101 recognizes that an individual in proximity to the affected exit must travel twice the prescribed exit travel distance to the alternate exit. Since two means of egress are required at any point in an enclosed trainway, the exits cannot be more than twice the travel distance, or 762 m (2500 ft) apart.

6.3.5.3 *6.4.6.* B.7.1 The inclusion of platform edge screens is a design option that is effective for comfort control in stations as well as for smoke control in enclosed trainways. When used, the screens should meet both fire resistivity and structural strength requirements for the train and ventilation system drafts and the operational efficiency requirements.

6.5.1.1 *6.5.4.* B.8 Non-Emergency Tunnel Ventilation for Enclosed Trainways.

Where trainways might be stopped or delayed in an enclosed trainway for a period of time, the vehicle ventilation system should be capable of maintaining an acceptable level of passenger comfort. If not operating in a fire emergency scenario, the tunnel emergency ventilation fans can be used to augment the vehicle system capability. Velocities should consider the comfort and structural requirements for the fire separation (fire resistance rating, continuity, etc.)?

3.4.3.5: A point of safety is one of the following: (1) an enclosed escape area partition which is a defined term in the IBC).

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 Backup Proposal 130-115

130-115 Log #225 Final Action: Reject (Chapter 6)

Submitter: Stephanie H. Markos, US Department of Transportation/Volpe Center

Recommendation: Review usage of terms underground, enclosed, and underwater as in this Chapter and Chapter 5

Substantiation: While specific definitions for "enclosed" and "underground" as well as "elevated" stations are contained in the definitions section (3.4.44 and 3.4.45), these terms are not defined for the guideway or trainway. There are numerous times that it is unclear as to why one or the other term or both is used. Sometimes "enclosed" is included in the requirement, along with "underground," and sometimes only "underground," or vice versa. This proposal suggests that these terms be clarified to reflect the usage of the terms. Relating to Mr. Koceff's ROCE comment, I agree that the issue he identified re change from "enclosed" to "fire-separated" for 3.3.35, 5.2.3.1.1* and 5.5.6.3.2.5 (3) accepted with renumbering for the latter 2 cases to be 5.2.4.1 and 5.3.5.5 should be addressed but NOT at the expense of not accepting all of the remainder of the Comment, the clarifications for which has been a LONG time coming in terms of the usage and meaning of "enclosed," "underground," "tunnel" etc., as used throughout the 2010 standard.

NELSEN, J.: I think I appreciate the intent of this comment however in my opinion it is inappropriate to replace the term "enclosed" as it relates to exits and/or exit stairs with "fire-separated" as proposed. This proposed new terminology is not used in NFPA 101, NFPA 5000 or the IBC/IFC; in fact in the IBC "fire separation" refers to the physical distance between two buildings, a building and the public way or a building and the property line. In that regard, I am not sure that the proposed changes related to the term "enclosed" are consistent with the Committee Statement that the "Revisions are necessary to provide consistent terminology..."
portals and shall be extended as work progresses to within 61 m (200 ft) of the most remote portion of the tunnel-enclosed trainway.

6.3.3.7* Illumination level in of enclosed trainways under construction shall not be less than 2.7 lx (0.25 ft-candles) at the walking surfaces.

6.4 Portable Fire Extinguishers. Portable fire extinguishers shall be provided in such numbers, sizes, and types and at such locations in tunnels enclosed guideways as determined by the authority having jurisdiction.

6.6.2 Vehicle Roadway Terminations. Vent or fan shafts utilized for ventilation of tunnels enclosed trainways shall not terminate at grade on any vehicle roadway.

7.1.1.1 For length determination, all contiguous enclosed trainway and underground system station segments between portals shall be included.

7.1.2.2 A mechanical emergency ventilation system shall be provided in the following locations:

(1) Where the length of the underground or enclosed trainway that is greater in length than 305 m (1000 ft) and greater than 61 m (200 ft).

7.1.2.3 A mechanical emergency ventilation system shall not be required in the following locations:

(2) In a system underground or enclosed trainway that is greater than 305 m (1000 ft).

7.1.2.4 Where supported by engineering analysis, a nonmechanical emergency ventilation system shall be permitted to be provided in lieu of a mechanical emergency ventilation system in the following locations:

(1) Where the length of the underground or enclosed trainway is less than or equal to 305 m (1000 ft) and greater than 61 m (200 ft).

7.2 Point-exit ventilation systems shall be permitted subject to an engineering analysis that demonstrates the system will confine the spread of smoke in the tunnel-enclosed trainway to a length of 150 m (500 ft) or less.

7.3.1 The ventilation system fans that are designated for use in fire emergencies shall be capable of satisfying the emergency ventilation requirements to move tunnel trainways in any direction as required to provide the needed ventilation response.

7.7.9 For electrical substations and distribution rooms serving emergency ventilation systems where the local environmental conditions require the use of mechanical ventilation or cooling to maintain the space temperature below the electrical equipment operating limits, such mechanical ventilation or cooling systems shall be designed so that failure of any single air moving or cooling system will not result in the loss of the electrical supply to the tunnel emergency ventilation fans during the specified period of operation.

8.5.1.2.2 Vehicles that travel through tunnels enclosed trainways and have a roof that is constructed of a combustible material shall require a fire hazard analysis to demonstrate that rapid fire spread to passenger and crew compartments or local roof collapse is not possible during the exposure period.

8.6.1 General Construction. All motors, motor control, current collectors, and auxiliaries shall be of a type and construction suitable for use on fixed guideway train and passenger rail system vehicles.

8.11.1* General. The requirements of this section shall apply to fixed guideway and passenger rail system vehicles designed to meet the engineering analysis option permitted by Section 8.2 and to meet the goals and objectives stated in Section 4.2.4.3.3 and 4.3.3.

9.3 Emergencies. The emergency management plan shall address the following types of emergencies:

(7) Tunnel flooding from internal or external sources

(9) Emergency Procedures. An emergency procedure shall be developed to address the specific types of emergencies experienced on the system and shall include, but not be limited to, the following:

(8) Fire and smoke emergency information and procedures to be provided, including the following:

(b) Location of train in tunnel-enclosed trainway and fire location on train

6.2.2.2 Previous editions of NFPA 130 addressed this requirement by specifying the maximum travel distance to an exit. The intent of this requirement was often misinterpreted. NFPA 101 requires, at a minimum, that two means of egress be provided within a building or structure and prescribes the maximum travel distance to an exit. This same requirement is applied in NFPA 130. Where means of egress and travel distance to an exit occurs at the midpoint. For example, in a building with two exits, in the event of a fire adjacent to an exit rendering that exit unavailable, NFPA 101 recognizes that an individual in proximity to the affected exit must travel twice the prescribed exit travel distance to the alternate exit. Since two means of egress are required from any one point in a tunnel-enclosed guideway, the exits cannot be more than twice the travel distance, or 762 m (2500 ft) apart.

A.7.1.1 Separate ventilation systems for tunnels and underground enclosed trainways and stations can be provided but are not required. Annex B provides information on emergency ventilation of trainways and stations and information for determining a tenable environment.

A.9.4 Enclosed trainways more than 610 m (2000 ft) in length should be equipped with emergency trainway evacuation carts (ETECs) at locations to be determined by the authority having jurisdiction.

ETECs should be capable of carrying a capacity of at least four stretchers and a total weight capacity of at least 453.5 kg (1000 lb). ETECs should be constructed of corrosion-resistant materials, be equipped with a powered hand brake, and safely operate on the rail tracks in the tunnel-enclosed trainway.

B.1 General...

Current technology is capable of analyzing and evaluating all unique conditions of each property to provide proper ventilation for normal operating conditions and for pre-identified emergency conditions. The same ventilating devices might or might not serve both normal operating conditions and pre-identified emergency requirements. The goals of the subway emergency ventilation system for an enclosed trainway, in addition to addressing fire and smoke emergencies, are to assist in the containment and purging of hazardous gases and aerosols such as those that could result from a chemical/biological release.

B.3 Configurations...

Enclosed stations and trainways might be configured with the following characteristics:

(1) High or low ceilings
(2) Open or doored entrances
(3) Open or screened platform edges
(4) End-of-station or tunnel-mounted fan shafts
(5) End-of-station or mid-tunnel ventilation systems
(6) Single, double, or varying combinations of tracks in tunnels
(7) Intersecting tunnels enclosed trainways
(8) Multilevel stations
(9) Multilevel tunnels enclosed trainways
(10) Varying depths below the surface
(11) Varying grades and curvatures of tracks and tunnels
(12) Varying blockage ratios of vehicles to tunnel-enclosed trainway cross-section
(13) Varying surface ambient conditions
(14) Varying tunnel ventilation and design requirements

B.4.2 Draft control can be achieved by the placement of shafts along the tunnel length of the enclosed trainway between stations. Shafts can be arranged with the fan shafts at the ends of stations, with vent shafts mid-tunnel if required or with vent shafts at the ends of stations and fan shafts mid-tunnel. End-of-station shaft configurations should be related to the station geometries in the determination of patron comfort in the station relative to train piston draft effects.

B.5.2 Temperature control and ventilation for ancillary areas housing special equipment should reflect the optimum operating conditions for the specific equipment to ensure the availability of critical equipment and should give consideration for intermittent occupancy by maintenance personnel. These systems should be separate from the emergency ventilation system for stations and tunnels enclosed trainways and should be considered in the design of the emergency ventilation system.

B.7.1 The inclusion of platform edge screens is a design option that is effective for comfort control in stations as well as for smoke control in tunnels enclosed trainways. When used, the screens should meet both fire resistivity and structural strengths relative to the train and ventilation system drafts and the operational efficiency requirements.

B.8 Nonfire Tunnel Ventilation for Enclosed Trainways.

Where trains might be stopped or delayed in a tunnel an enclosed trainway for a period of time, the vehicle ventilation system must maintain an acceptable level of patron comfort. If not operating in a fire emergency scenario, the tunnel emergency ventilation fans can be used to augment the vehicle system capability. Velocities should consider the comfort levels of employees required to be in the tunnel-enclosed trainways.

C.1.4 Side-Platform Station Sample Calculation. The sample side-platform station presents an enclosed station with a concourse above the platform level but below grade. (See Figure C.1.4) The platform is 183 m (600 ft) long to accommodate the train length. The vertical distance from grade to concourse is 8 m (26 ft). The concourse is 5.5 m (18 ft) above the platform.

D.1 Introduction. This annex provides additional information on the hazards associated with the burning vehicle and the impact of a burning vehicle on the evacuation of passengers and crew to a point of safety. Emergency evacuation from a vehicle containing a fire could include exiting a vehicle containing the fire to an adjacent vehicle, exiting the train into the operating environment (station, tunnel-trainway, etc.) where the train is located, and moving through the operating environment to a point of safety. Chapter 8 contains minimum prescriptive requirements that are intended to provide sufficient time for passengers and crew to safely evacuate from a train containing a fire. This annex provides guidance for designing and evaluating train fire performance. A fire involving a train will have an impact on the conditions in the operating environment, and this type of fire is addressed in this annex. Chapter 8 contains minimum prescriptive requirements that are intended to provide sufficient time for passengers and crew to safely evacuate from a train containing a fire. This annex provides guidance for designing and evaluating train fire performance. A fire involving a train will have an impact on the conditions in the operating environment, and this type of fire is addressed in this annex.
release rates are expected after flashover occurs (i.e., post-flashover). The heat release rate during post-flashover is particularly important since many enclosed trainway and station smoke control system designs are based on the maximum expected heat release rate. The heat release rate of the vehicle fire will also affect the heat that passengers could be exposed to during evacuation. The magnitude of the heat release rate during post-flashover will be a function of the amount of air drawn into the vehicle, the material fire properties, and the potential heat release rate of the burning fuels inside of the vehicle.

D.4.3 The heat release rate of the train fire will also affect the amount of heat the passengers are exposed to during the evacuation. Larger heat release rate fires will produce longer flames that could extend out of the vehicle openings. If the vehicle is inside an enclosed trainway, these flames could impinge on the ceiling and extend down away from the burning vehicle. Radiation from these flames to nearby evacuating passengers could be significant.

E.3.3 Step 3: Evaluate Specific Vehicle Fire Scenarios. …

The location of the train must be also considered in the analysis. For example, the fire risk to occupants is greater if the train is located between stations or within an enclosed trainway.

MARKOS, S.: This is the second cycle that I have identified (see the actual proposal) the consistency issues and confusing unclear reasons by some review to underwater and of the use of the terms “enclosed,” “elevated” as well, as “underground,” and “underwater” win the various chapter of require a careful technical review by. Accordingly, I will provide the Committee the Proposal for 130-114, that contains the proposal for reordering Chapter 6 that contains a extra side column so you can better review and see and thus more clearly see and understand what my reasons were and are.

MIDDLEBROOK, T.: The TC should address this issue during this cycle. H. Locke has proposed language in his response to this log which should be considered by the TC at the ROC.
The presiding officer will now proceed with the Certified Amending Motions.

MR. HARRINGTON: Thank you, Mr. Sandu. So we'll now proceed with the discussion on the Certified Amending Motions on NFPA 130.

MR. KOFFEL: Bill Koffel, Koffel & Associates, speaking for myself. I would like to move Certified Amending Motion 130-1 which is to return a portion of the report in the form of an identifiable part of Proposal 130-115 and related Comment 130-1.

A VOICE: Second.

MR. HARRINGTON: Second. You may proceed.

MR. KOFFEL: Thank you, Mr. Chairman. Before I proceed, a disclaimer. I sit on this Committee representing AFAA, but I am not here today representing AFAA. I also have some clients that would be affected by this, and that is the Glazing Industry Code Committee and the Fire Subcontractors International Association. Again, I am not representing either of those two organizations. My purpose today is merely correlation. NFPA 130 is often applied as an alternative method for compliance with the Building Code or the Life Safety Code. In fact, NFPA 130 references the Life Safety Code for means of egress requirements and
says comply with the Life Safety Code except as modified herein.

The purposes of this motion is in two paragraphs to retain the language of “enclosed exit”. That is a defined term in the Building Code and the Life Safety Code. The term “fire-separated” is not. By retaining enclosed exit, you get the fire-resistive rating. You get the continuity of the fire barriers. You get limitations on openings. You get how the openings are to be protected. You get how to protect penetrations; and you get limitations on the use of that exit and closure.

You get none of that with the word “fire-separated”.

Someone asked me why I did not change other paragraphs. I tried to be very careful and only apply this to the two specific paragraphs that I believe solely apply to enclosed exits. You will note, this is consistent with my negative ballot during the recirculation. Several Committee members added a comment supporting at least the concept, not necessarily the exact language, but the concept of my negative ballot comment including the original submitter of the comment.

I encourage you to support the motion.

MR. HARRINGTON: Thank you. Mr. Sandu, would you live to give the Committee’s position?

MR. SANDU: These issues were brought up in the
previous motion in 502 -- I don't.

MR. HARRINGTON: No comment? Thank you. So with that, we'll open up the floor for debate on the motion. Please provide your name and affiliation and whether you're going to speak in support of or against the motion. Microphone 2.

MR. CONRAD: James Conrad, RSCC Wire & Cable. I'm on the task group for NFPA 130 but not a voting member. Let me make that clear. We discussed this with several members, and we support the motion on the floor. Thank you.

MR. HARRINGTON: Thank you. Microphone 3.

MR. HIRSCHLER: Marcelo Hirschler, GBH International, for NAFRA. I support the motion.

Just to make clear, the term "fire-separated exit" is not used in any Code or the NFPA or IBC. Please support the motion.

MR. HARRINGTON: Is there any further discussion on Motion 130-1?

So seeing none, we'll move to a vote.

Before we vote, let me restate the motion. So the motion on the floor is to return a portion of a report in the form of an identifiable part of Proposal 130-115 and related Commented 130-1. Please record your vote, 1 in favor of the motion to accept or 2, opposed to the motion, reject. So voting starts. 5 seconds.
Maynard, Mary

Subject: UL Appeal - NFPA 130 Standard for Fixed Guideway Transit and Passenger Rail Systems

From: Ramirez, Alfredo M. [mailto:Alfredo.M.Ramirez@ul.com]
Sent: Wednesday, July 03, 2013 1:48 PM
To: Cronin, Amy
Cc: Fuller, Linda; Maynard, Mary; Lakomiak, Neil

Subject: UL Appeal - NFPA 130 Standard for Fixed Guideway Transit and Passenger Rail Systems

Ms. Cronin,

In accordance with the Regulations Governing Committee Projects, Section 1.6, Appeals to the Council, I am filing the following appeal:

1. Name, affiliation and address of applicant:

   Alfredo Ramirez
   Underwriters Laboratories
   333 Pfingsten Rd
   Northbrook, IL 60062

2. Particular action to which appeal relates:

   2013 Technical Session floor action on Certified Amending Motion 130-2

3. Arguments setting forth the grounds for the appeal:

   • Information related to NFPA 130 ROC #130-165
   • Information related to TIA 1080 for NFPA 130
   • Technical Session transcript relating to 2013 NFPA Technical Session, Certified Amending Motion 130-2
   • Additional information to be provided.

4. Precise relief requested:

   I am appealing to the Standards Council to overturn the actions taken by the NFPA 130 Technical Committee on A2013 ROC #130-165 and the Association Membership at the 2013 Technical Session regarding Certified Amending Motion 130-2

At this time, I am requesting a hearing on this appeal.

Regards

Al Ramirez
Regulatory Services Regional Manager

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UL LLC
333 Pfingsten Road
Northbrook, IL 60062-2096 USA
T: 847.664.2905
F: 847.313.2905
Ballot Results:
Affirmative: 28
Number Eligible to Vote: 32
Committee Meeting Action: Accept
Fire-resistant cable systems. NFPA 130 currently allows the use of fire resistive cable installed in a raceway, such as Type RHW-2, Type TC or Type CM armor, such as Type MI or Type MC, are installed without raceways. Cables that are exposed (not embedded in concrete) should be protected with a minimum 1-hour fire resistance rating in accordance with ANSI/UL 2196. The cables shall demonstrate functionality for no less than 1 hour as described in the ANSI/UL 2196 test standard. The cables and systems shall comply with the following:

a) Be tested as a complete system of conductors, cables and raceways, as applicable, using a sample no shorter than 3.0 m (9.84 ft).
b) For fire-resistant cables intended for installation in a raceway, be tested in the type of raceway in which they are intended to be installed.
c) Have installation instructions that describe the tested assembly and only the components included in the tested assembly are acceptable for installation.

When selecting a fire-resistant cable, it is important to understand how it will be installed and if it was tested as a complete system, including splices. Cables that are exposed (not embedded in concrete) should be protected using either a raceway or an armor/sheath (see 12.4.1). There are two basic configurations of fire-resistant cables. Cables enclosed by a metallic sheath or armor, such as Type MI or Type MC, are installed without raceways. Cables that are installed in a raceway, such as Type RHW-2, Type TC or Type CM are tested as a complete system. Regardless of the fire test standard used to evaluate fire-resistant cables that will be installed in a raceway, it is important to consider that the cables are only one part of the system. Other components of the system include but are not limited to: the type of raceway, the size of raceway, raceway support, raceway couplings, boxes, conduit bodies, splices, where used, vertical supports, grounds, and pulling lubricants. Each cable type should be tested to demonstrate compatibility. Only those specific types of raceways tested should be acceptable for installation. Each cable type that is intended to be used in a specific raceway should be tested in both a horizontal and vertical configuration while demonstrating circuit integrity.

Substantiation: The Technical Committee has taken this action to revise Sec. 12.5 in order to address the recent actions of UL pertaining to the listing of products tested to their standard UL2196. The UL has invalidated standard requirements for fire-resistant cables. The cables shall demonstrate functionality for no less than 1 hour as described in the ANSI/UL 2196 test standard. Recent fire testing has demonstrated failure modes such as hot-dipped galvanized coatings on the interior surface of the raceways potentially causing premature failure of copper fire-resistant cable systems. NFPA 130 currently allows the use of fire resistant cable listed in accordance with UL2196 Standard for Safety for Test for Fire Test for Fire Resistance Cables 2012. Committee Meeting Action: Accept
Number Eligible to Vote: 32
Ballot Results: Affirmative: 28
Ballot Not Returned: 4 Grizard, W., Middlebrook, T., Thomas, M., Weng, L.

Backup Proposal 130-209

130-209 Log #CC15 Final Action: Accept in Principle (Chapter 12 (New))

Submitter: Gil Shoshani, RSAC
Recommendation: Consolidate wiring requirements from Chapters 5, 6 and 7 to new Chapter 12.
In Chapter 5 the consolidation is from section 5.4 to 5.4.10. Section 5.4.11 renamed “Emergency Power” and the section was renumbered. (See attachment 2 - section 5.4 changes).
In Chapter 6 the consolidation is from section 6.3.3.1.3 to 6.3.3.2.10. Section 6.3.3 renamed “Emergency Power” and the section was renumbered. Deleted section 6.3.3.1.1 and 6.3.3.1.2 since they are already covered in section 6.4 “power traction” - (See attachment 3 - section 6.3.3 changes).
In Chapter 7 the consolidation is from section 7.7.2 to 7.7.8 and 7.7.10. Section 7.7 renamed “Emergency Power” and the section was renumbered.

Proposed New Chapter 12

Chapter 12 Wire and Cable Requirements

12.1 Wire and Cable. This applies to all chapters except of vehicle wiring found in chapter 8.

4.1 All wiring materials and installations other than traction power shall conform to the requirements of NFPA 70. 12.2 The additional requirements in 12.2 through 12.6 apply to all areas except non underground trainway.
12.2 Wiring Requirements.

2607

July 22, 2013
Supplemental Agenda July 29-August 1, 2013
Page 972 of 1861

2017
5.4.11 5.4.11.1 NFP A 70

6.3.3 Wiring Requirements.

5.4.11.1 NFP A 70

6.3.3.3.2.1 Power Supply for Emergency Ventilation Fans. See Chapter 7.

6.3.3.3.2.1 * Power Supply for Emergency Ventilation. See Chapter 7.

7.7 Emergency Power and Wiring.

7.7.1 The design of the power for the emergency ventilation system shall comply with the requirements of Article 700 of NFPA 70.

7.7.4 Conduct, raceways, ducts, boxes, cabinets, and equipment enclosures shall be constructed of noncombustible materials in accordance with the requirements of ASTM E 136.

7.7.5.3 6.3.3.1 6.3.2.1 All wires and cables used, other than traction power cables, shall be listed and have a minimum 1-hour fire-resistive rating in accordance with ANSI/UL 2196 and shall be installed per the listing requirements.

7.7.5.3 6.3.3 Emergency Power

7.7.5.4 6.3.3.1 Emergency Power. Enclosed trainways shall be such that, in the event of failure of the normal supply to, or within, the system, emergency power shall be provided with emergency power in accordance with Article 700 of NFPA 70, and Chapter 4 of NFPA 110. The supply system for emergency purposes, in addition to the normal services to the trainway, shall be one or more of the types of systems described in subsections 700.12(A) through 700.12(E) of NFPA 70.

7.7.5.4 6.3.3.2 The following systems shall be connected to the emergency power system:

(1) Emergency lighting
(2) Protective signaling systems
(3) Emergency communication system
(4) Fire command center

7.7.5.4 6.3.3.1 6.3.2.1 All wires and cables used, other than traction power cables, shall be listed and have a minimum 1-hour fire-resistive rating in accordance with ANSI/UL 2196 and shall be installed per the listing requirements.

7.7.5.4 6.3.3.2 Emergency Power

7.7.5.4 6.3.3.1 Emergency Power. Enclosed trainways shall be such that, in the event of failure of the normal supply to, or within, the system, emergency power shall be provided with emergency power in accordance with Article 700 of NFPA 70, and Chapter 4 of NFPA 110. The supply system for emergency purposes, in addition to the normal services to the trainway, shall be one or more of the types of systems described in subsections 700.12(A) through 700.12(E) of NFPA 70.

7.7.5.4 6.3.3.2 The following systems shall be connected to the emergency power system:

(1) Emergency lighting
(2) Protective signaling systems
(3) Emergency communication system
(4) Fire command center

7.7.5.4 6.3.3.1 6.3.2.1 All wires and cables used, other than traction power cables, shall be listed and have a minimum 1-hour fire-resistive rating in accordance with ANSI/UL 2196 and shall be installed per the listing requirements.

7.7.5.4 6.3.3 Emergency Power

7.7.5.5 6.3.3.1 Emergency Power. Enclosed trainways shall be such that, in the event of failure of the normal supply to, or within, the system, emergency power shall be provided with emergency power in accordance with Article 700 of NFPA 70, and Chapter 4 of NFPA 110. The supply system for emergency purposes, in addition to the normal services to the trainway, shall be one or more of the types of systems described in subsections 700.12(A) through 700.12(E) of NFPA 70.

7.7.5.5 6.3.3.2 The following systems shall be connected to the emergency power system:

(1) Emergency lighting
(2) Protective signaling systems
(3) Emergency communication system
(4) Fire command center

7.7.5.5 6.3.3.3 The emergency lighting and communications circuits shall be protected from physical damage by system vehicles or other normal system operations and from fire as described in 12.4.3

Proposed revisions to Section 7.7

7.7.2 All wiring materials and installations shall conform to the requirements of NFPA 70 and, in addition, shall satisfy the requirements of 7.7.2 through 7.7.8.

7.7.2.1 Conduct, raceways, ducts, boxes, cabinets, and equipment enclosures shall be constructed of noncombustible materials in accordance with the requirements of ASTM E 136.

7.7.2.2 All conductors shall be insulated.

7.7.2.3 Ground wire installed in a metallic raceway shall be insulated.

7.7.2.4 Other ground wires shall be permitted to be bare.

7.7.2.5 All wires and cables shall conform to NFPA 70 and shall be moisture- and heat-resistant types carrying temperature ratings corresponding to either of the following conditions:

(1) 75°C (167°F) for listed fire-resistive cables
(2) 90°C (194°F) for all other applications

7.7.2.6 All conductors and cables shall be listed for wet locations.

7.7.2.7 All wires and cables used in emergency ventilation circuits shall be listed as being resistant to the spread of fire and shall have reduced smoke emissions, by complying with 5.3.2.1.4 or 5.3.2.2.5.
7.7.6.1 All wires and cables shall comply with the FT4/IEEE 1202 exposure requirements for cable char height, total smoke released, and peak smoke release rate of ANSI/UL 1682.

7.7.6.2 Wires and cables listed as having adequate fire-resistant and low-smoke-producing characteristics, by having a flame travel distance that does not exceed 1.5 m (5 ft) and generating a maximum peak optical density of smoke of 0.50 and a maximum average optical density of smoke of 0.15 when tested in accordance with NFPA 262 shall be permitted for use instead of the wires and cables specified in 7.7.6.1.

7.7.7 The emergency ventilation circuits routed through the station public areas and trainway shall be protected from physical damage by fixed guideway transit or passenger rail vehicles or other normal operations and from fires in the system for a period of not less than 1 hour.

7.7.7.1 The circuits shall be protected from ASTM E 119 fire conditions by any of the following:
(1) Suitable embedment or encasement
(2) Routing of such conductors external to the interior underground portion of the system facility
(3) Diversity in system routing (such as separate redundant or multiple circuits separated by a 1-hour fire barrier so that a single fire or emergency event will not lead to a failure of the system
(4) Be a listed fire-resistive cable system with a minimum 1-hour rating in accordance with 7.7.10

7.7.7.2 Conductors in conduits or raceways shall be permitted to be embedded in concrete or to run in concrete electrical duct banks.

7.7.8 Overhead elements that are designed to protect conductors serving motors for both emergency fans and related emergency devices that are located in spaces other than the main electrical distribution system equipment rooms shall not depend on thermal properties for operation.

7.7.9 For electrical substations and distribution rooms serving emergency ventilation systems where the local environmental conditions require the use of mechanical ventilation or cooling to maintain the space temperature below the electrical equipment operating limits, such mechanical ventilation or cooling systems shall be designed so that failure of any single air moving or cooling unit does not result in the loss of the electrical supply to the tunnel ventilation systems where the local environmental conditions require the use of mechanical ventilation or cooling to maintain the space temperature below the electrical equipment operating limits, such mechanical ventilation or cooling systems shall be designed so that failure of any single air moving or cooling unit does not result in the loss of the electrical supply to the tunnel ventilation fans during the specified period of operation.

7.7.10 Fire-resistive cables shall be listed and have a minimum 1-hour fire-resistant rating in accordance with ANSI/UL 2196 and shall be installed per the listing requirements:

Substantiation: The new Wire and Cable Chapter 12 combines the wiring requirements from Chapter 5, 6 and 7 into one chapter for ease of use, eliminates redundancies and offers a single point of references for all wire and cable. The new Wire and Cable chapter excludes vehicle wiring found in chapter 8. The new chapter is a consolidation of the existing requirements with editorial changes made for clarity. No substantive changes have been made.

Committee Meeting Action: Accept in Principle

Revise text to read as follows:

Chapter 12 Wiring & Cable Requirements

12.1 Wire and Cable. This applies to all chapters except of vehicle wiring found in chapter 8.

12.1.1 All wiring materials and installations other than for traction power shall conform to the requirements of NFPA 70 except as herein modified in this standard.

12.1.2 The additional requirements in 12.2 through 12.6 apply to all areas except non underground trainways.

12.2 Ground Wires.

12.2.1 Ground wire installed in a metallic raceway shall be insulated. Other ground wires shall be permitted to be bare.

12.3 Insulated Wire and Cable Requirements.

12.3.1 All insulations shall conform to NFPA 70 and shall be moisture- and heat-resistant type carrying temperature ratings of 90°C (194°F).

12.3.2 All insulated conductors and cables shall be listed for wet locations.

12.3.3 Other than on station, all wires and cables used shall be listed as being resistant to the spread of fire and shall have reduced smoke emissions, by complying with 12.3.3.1 or 12.3.3.2.

12.3.3.1 All wires and cables shall comply with the FT4/IEEE 1202 exposure requirements for cable char height, total smoke released, and peak smoke release rate of ANSI/UL 1682.

12.3.3.2 Wires and cables listed as having adequate fire resistant and low-smoke-producing characteristics, by having a flame travel distance that does not exceed 1.5 m (5 ft) and generating a maximum peak optical density of smoke of 0.50 and a maximum average optical density of smoke of 0.15 when tested in accordance with NFPA 262 shall be permitted for use instead of the wires and cables specified in 12.3.3.1.

12.4 Wiring Installation Methods

12.4.1 Conduits, raceways, ducts, boxes, cabinets, and equipment enclosures shall be constructed of nonmetallic materials in accordance with the requirements of ASTM E 136. In stations, other materials when encased in concrete shall be acceptable.

12.4.2 All conductors, except radio antennas, shall be enclosed in their entirety in armor sheaths, conduits, or enclosed raceway boxes and cabinets.

12.4.2.1 Only wiring methods consisting of Type MI cable without an overall nonmetallic covering, Type MC cable employing a smooth or corrugated impervious metal sheath without an overall nonmetallic covering, electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, or rigid metal conduit without an overall nonmetallic covering shall be installed in supply and exhaust shafts that are part of the emergency ventilation air distribution system.

12.4.3 The emergency power, lighting and communications circuits shall be protected from physical damage by system vehicles or other normal system operations and from fires in the system for at least 1 hour, but not less than the time of tenability, when exposed to fire conditions corresponding to the time-temperature curve in the ASTM E 119 fire resistance test by any of the following:
(1) Circuits embedded in concrete or protected by a fire barrier system in accordance with UL 1724. The cables or conductors shall maintain functionality at the temperature within the embedded conduit or fire barrier system.

(2) Routing of circuits outside the underground portion of the system.

(3) Diversity in system routing (such as separate redundant circuits or multiple circuits separated by a fire barrier with a fire resistance rating so that a single fire or emergency event will not lead to a failure of the system.

(4) All circuits consist of listed fire-resistant cable systems with a fire resistance rating in accordance with 12.6.


12.6 Fire-resistive cables shall be listed and have a minimum 1-hour fire-resistant rating in accordance with ANSI/UL 2196 and shall be installed per the listing requirements.

Committee Statement: The Technical Committee agrees to consolidate all wire and cable requirements into a new revised Chapter 12 along with consolidation of Chapter 5, 6 & 7.

Number Eligible to Vote: 30

Ballot Results: Affirmative: 28

Ballot Not Returned: 2 Grizzard, W., Weng, L.

Comment on Affirmative: MONTFORT, R.: See comments on proposal 130-54 (Log #58).

July 22, 2013
Supplemental Agenda July 29-August 1, 2013
Page 974 of 1861
worked on the task group that worked on this issue. This is the same issue that we just dealt with in NFPA 502. The same arguments. I just want to clarify because you all brought up the issue about the National Electrical Code. The National Electrical Code for protection of systems calls for electrical circuit protective systems. In 130, we say follow the National Electrical Code except as amended herein.

We do not call these electrical circuit protective systems for a very specific reason. Electrical protective systems consists of two products. One are wraps, slow to heat transfer down into it; and the other one is fire-resistive cables. Wraps are not rated for tunnels, the wet environments that go along with the tunnels. So therefore, we do not recognize them in NFPA 130, just to clarify.

Again, I speak in opposition of the motion on the floor, and that is the Committee’s position. MR. HARRINGTON: Thank you for the Committee’s position. So, at this point, we’ll open up debate on the motion. Again, please provide your name and affiliation and whether you speak in support of or against the motion. Okay. Is there any discussion on Motion 130-2 to reject an identifiable part of Comment 130-165? Does not appear to be.
Do you have any final comments, Mr. Chair?

MR. SANDU: No, sir.

MR. HARRINGTON: Okay. So seeing none, we'll move on to the vote at this point. Before we vote, let me restate the motion that we're going to be addressing. The motion on the floor is to reject an identifiable part of Comment 130-165. Please record your vote, 1 in favor of the motion to accept, or 2, opposed to the motion to reject. The voting starts. Closing in 5 seconds.

 Voting closed. And that motion fails.

Do we have any further discussion on document NFPA 130? Seeing none, we'll move on to the next document. Thank you, Mr. Sandu.

MR. SANDU: Thank you.

MR. HARRINGTON: Before we begin the next document, I would like to introduce James Milke, member of the Standards Council, who will be the presiding officer for the last document of the day.

MR. MILKE: It is my pleasure to preside over the next report. That is the Technical Committee on Inspections, Testing and Maintenance of Water-Based Systems. Here to present the Committee report is Committee Chair William Koffel of Koffel & Associates, Columbia, Maryland. The Committee reports can be found in the blue 2013 Annual Revision Cycle ROP and ROC. The Certified Amending Motions are contained in the Motions Committee reports and behind me on the screen.
## TABLE A
Certified Amending Motions on Documents for the June 2013 Association Technical Meeting
(Note: The motions are presented in the order or presentation recommended by the Motions Committee)

<table>
<thead>
<tr>
<th>Document #4</th>
<th>NFPA 130, Standard for Fixed Guideway Transit and Passenger Rail Systems A2013</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Motion Seq #</th>
<th>NITMAM Log #</th>
<th>Section/Para</th>
<th>Person(s) Authorized to Make the Motion</th>
<th>Certified Amending Motion**</th>
<th>Motion Committee Notes and Comments**</th>
</tr>
</thead>
<tbody>
<tr>
<td>130-2</td>
<td>1114</td>
<td>12.5 and A.12.5</td>
<td>Alfredo M. Ramirez, UL LLC</td>
<td>Reject an Identifiable Part of Comment 130-165. The Identifiable Parts are Sections 12.6 (formerly 12.5.1), 12.5.2, 12.5.3, and Annex.</td>
<td>If successful, this motion seeks to retain ROC title 12.5, Fire Resistive Cables and return the remainder of Section 12.5 and associated annex material to ROP text.</td>
</tr>
</tbody>
</table>
Item 13-8-6
ASSOCIATION AMENDMENT BALLOT RESULTS

DATE: July 8, 2013

AMENDMENT (502-1)

Document: NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways

Motion: To Return a portion of a Report in the form of Proposal 502-42 and related Comment 502-12

TC FINAL Ballot Results

According to 4.7.1 in the NFPA (RGCP), the final results show this Amendment HAS achieved the necessary 2/3 majority vote. The number of affirmative votes needed to obtain a recommendation to issue the Amendment is 12 [26 (eligible to vote) – 7 (ballots not returned) – 2 (abstentions) = 17 × 0.66 = 11.22]

26 Eligible to Vote
7 Not Returned (Dix, Ingason, Kroboth, LeBlanc, Rohena, Ruiz, Sprakel)

17 Agree
0 Do Not Agree
2 Abstain (Fitzpatrick, Plotkin)

TC Action: PASS
Hi Kimberly,
Unfortunately, I'm rehabbing from surgery last month and still out of work. Don't think I'll be able to review and get you the feedback you're looking for.
Sorry.

Michael Fitzpatrick

On Fri, Jun 14, 2013 at 9:42 AM, Shea, Kimberly <kshea@nfpa.org> wrote:

Technical Committee on Road Tunnel and Highway Fire Protection:

Please find attached the one ballot for NFPA 502 on Amendment 502-1 that was issued at the June 13, 2013 Technical Session. This ballot has also been posted to your NFPA 502 Document Information Page (http://www.nfpa.org/502next).

Ballots are due back no later than Wednesday, June 26, 2013.

Kimberly Shea
Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
617-984-7953
NFPA 502
TC BALLOT FOR STANDARD FOR ROAD TUNNELS, BRIDGES, AND OTHER LIMITED ACCESS HIGHWAYS
JUNE 2013 ASSOCIATION AMENDMENT 502-1

Amendment: To Return a portion of a Report in the form of Proposal 502-42 and related Comment 502-12

NOTE: This Association Amendment ("Amendment") is being submitted for a ballot for the Technical Committee pursuant to section 4.7.1 of the Regulations Governing Committee Projects ("Reg's"). Under the Reg's, if an Amendment fails the ballot of the Technical Committee, the text affected by the Amendment returns to previous edition text. See Reg's at 4.7.1(c). Please note that the Amendment that is the subject of this ballot recommends new Section 4.5(7), associated annex material and reference be returned to previous edition text. Where no corresponding previous edition text exists, the text is deleted. In this case, the result is:

A.4.5(7) In addition to physical protection from incidents, the method of routing and providing protection to fire-life safety critical copper and fiber data communication cables and related components shall include in the design both the performance of the thermal protection and the thermal performance of the cable and other transmission related equipment.

A.4.5(7) Fire rating of separations in U.S. jurisdictions typically includes structural with fire and flame passage duration requirements. Thermal insulation performance is often omitted. Depending on manufacturer, fiber optics strands experience excessive attenuation at temperatures ranging from as low as 70°C (158°F) to possibly 200°C (392°F), and the fiber ceases to convey signal. No fire rated fiber optic cable is currently available. Similarly, no fire rated category copper Ethernet cable is currently available. It is critical to the continued life safety system function during an emergency that the communication system design considers the thermal insulation performance of fire rated separations for related components and of the cable, fire heat exposure, other means should be employed to maintain conditions within the thermal limits of the system cables and components.

A.12.1.2 The actual duration required for the circuits to be operative will depend upon the duration required for the circuits to be operative for the emergency evacuation and rescue phases — and, in some circumstances, incident management and structural protection. Factors such as the length of the tunnel, evacuation pathways, the use of fixed water-based fire suppression systems, and the proximity of the emergency services may influence this period of time. See also A.4.5(7).

This means that, whether this ballot agrees or disagrees with the Amendment, the default recommendation to the Standards Council will be to return to previous edition text. While the Standards Council generally defers to the default recommendation prescribed by the Reg's, that recommendation is not binding, and in the event of an appeal to the Standards Council, the Technical Committee ballot results will be reviewed and considered by the Council as part of its deliberations. It is important, therefore, that you provide your vote and reasoning for the consideration of the Council.

☐ Agree

☐ Do Not Agree*

X Abstain*
*Please give reasons for voting “Do Not Agree” or “Abstain”.

The proposed change to 502 was made in parallel with a nearly identical change to NFPA 130, which was in concurrent update cycle with 502.

For the 130 Standard, the nearly identical change content had been modified to meet the Amender’s identical concerns and was adopted as modified into 130.

In the 502 ROC, substantial time was absorbed by the ANSI/UL 2196 issue, and the corresponding modifications to this proposed 502 change did not occur.

Recognizing the modifications as adopted into 130, the 502 TC did not comment on the CAM.

The version of the proposed change adopted by 130 (as had been modified to meet the Amender’s concerns) should be incorporated in the next 502 cycle.

Signature:  

Name - Please Print: David M. Plotkin

Date: 17 June 2013

Please return as soon as possible, but no later than Wednesday, June 26, 2013 to:

Kim Shea, Administrator, Technical Projects
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
FAX: 617-984-7056
EMAIL: kshea@nfpa.org
502-12 Log #CC2
Final Action: Accept
(4.5, A.4.5)

Submitter: Technical Committee on Road Tunnel and Highway Fire Protection,
Comment on Proposal No: 502-42
Recommendation: Revise text to read as follows:
4.5(7)* In addition to physical protection from incidents, the method of routing and providing protection to fire-life safety critical copper and fiber data communication cables and related components shall consider include in the design both the performance of the thermal protection and the thermal rating performance of the cable and other transmission related equipment.

A.4.5(7)* Fire rating of separations in U.S. jurisdictions typically includes structural withstand and flame passage duration requirements. Thermal insulation performance is often omitted. Typically depending on manufacturer, fiber optic strands experience excessive attenuation at temperatures ranging from as low as 70°C (158°F) to possibly 200°C (392°F) to 257°F (125°C), and the fiber ceases to convey signal. No fire rated fiber optic cable is currently available. Similarly, no fire rated category copper Ethernet cable is currently available. It is essential to the continued fire-life safety system function during an emergency that the communication system design considers the thermal insulation performance of fire rated separations for related components and of the embedment for copper and fiber data communication cables. Where insulation performance is insufficient for the design fire heat exposure, other means should be employed to maintain conditions within the thermal limits of the system cables and components.

A.12.1.2 The actual duration required for the circuits to be operative will depend upon the duration required for the circuits to be operative for the emergency evacuation and rescue phase — and, in some circumstances, incident management and structural protection. Factors such as the length of the tunnel, evacuation pathways, the use of fixed water-based fire suppression systems, and the proximity of emergency services may influence this period of time. See also A.4.5(7).

Substantiation: These changes retain the intent of the original proposal while addressing the concerns of Comment 502-13 (Log #8).
Committee Meeting Action: Accept
Number Eligible to Vote: 26
Ballot Results: Affirmative: 24
Ballot Not Returned: 2 LeBlanc, D., Sturm, P.

Related Comment 502-13
502-13 Log #8
Final Action: Reject
(4.5(7), A.4.5(7), A.12.1.2)

Submitter: Marcello M. Hirschler, GBH International
Comment on Proposal No: 502-42
Recommendation: Revise text to read as follows:
4.5(7)* In addition to physical protection from incidents, the method of routing and providing protection to fire-life safety critical copper and fiber data communication cables and related components shall consider the thermal rating of the cable and other transmission related equipment.

A.4.5(7)* Fire rating of separations in U.S. jurisdictions typically includes structural withstand and flame passage duration requirements. Thermal insulation performance is often omitted. Typically, fiber optic strands experience excessive attenuation at temperatures ranging from as low as 70°C (158°F) to possibly 257°F (125°C), and the fiber ceases to convey signal. No fire rated fiber optic cable is currently available. Similarly, no fire rated category copper Ethernet cable is currently available. It is essential to the continued fire-life safety system function during an emergency that the communication system design considers the thermal insulation performance of fire rated separations for related components and of the embedment for copper and fiber data communication cables. Where insulation performance is insufficient for the design fire heat exposure, other means should be employed to maintain conditions within the thermal limits of the system cables and components.

A.12.1.2 The actual duration required for the circuits to be operative will depend upon the duration required for the circuits to be operative for the emergency evacuation and rescue phase — and, in some circumstances, incident management and structural protection. Factors such as the length of the tunnel, evacuation pathways, the use of fixed water-based fire suppression systems, and the proximity of emergency services may influence this period of time. See also A.4.5(7).

Substantiation: This proposal presents incorrect information, is misleading and is unenforceable.
1. Optical fiber cables are listed by UL to UL 1651 (Standard for Optical Fiber Cable), a standard that does not contain a specification for a temperature rating. In a quick search I have found one company that advertises two types of optical fiber cables intended for use at high temperatures (one for use at 150°C and one for use at 200°C). Another company offers various optical fiber cables suitable for use up to 302°F (i.e. 150°C). Clearly the statement that the cables have problems when used at temperatures of 158°F (70°C) is incorrect.
2. The only location in NFPA 502 (2011) where there is a requirement for any cables to have a particular temperature rating is in Section 12.2.1.1. It requires that the temperature ratings for the cables be consistent with the conditions of application. That covers everything that is needed with regard to all cables, without introducing new prejudices.
3. The proposed requirement in Section 4.5(7) is a blanket statement intended to prejudice users of cables.
4. The language is unenforceable as the statement “shall consider” is not something that an authority having jurisdiction can enforce.

Committee Meeting Action: Reject

Substantiation: This proposal presents incorrect information, is misleading and is unenforceable.
1. Optical fiber cables are listed by UL to UL 1651 (Standard for Optical Fiber Cable), a standard that does not contain a specification for a temperature rating and would automatically be prohibited from use in any application in the control and communication system, if the section were to be attempted to be enforced.
2. No Bellcore’s GR-20 (Generic Requirements for Optical Fiber and Optical Fiber Cable) standard, optical fiber cables are assessed for aging at 85°C for 168 hours as well as for aging with cycling of up to 70°C and down to -40°C several times.
3. The problem presented is of minor public interest — the fact that optical fiber cables are not tested at temperatures ranging from 70°C to 150°C to 200°C, or 257°F (125°C) is not an issue.
4. The only location in NFPA 502 (2011) where there is a requirement for any cables to have a particular temperature rating is in Section 12.2.1.1. It requires that the temperature ratings for the cables be consistent with the conditions of application. That covers everything that is needed with regard to all cables, without introducing new prejudices. Further, when the temperature ratings for the cables are required the temperature shall be the conditions of application.
5. The proposed requirement in Section 4.5(7) is a blanket statement intended to prejudice users of cables.
6. The language is unenforceable as the statement “shall consider” is not something that an authority having jurisdiction can enforce.

Committee Meeting Action: Reject

Substantiation: The information added for the original proposal is still valid and the Committee has added additional information to 4.5(7) and A.4.5(7) to address this comment. See Committee Comment 502-12 (Log #CC2) for further information.

Number Eligible to Vote: 26
Ballot Results: Affirmative: 23 Abstain: 1
Ballot Not Returned: 2 LeBlanc, D., Sturm, P.

Explanation of Abstention: MARINO, A.: I do not have the electrical knowledge to make an informed decision on this item.
within the physical limits of the cable material this effect is reversible on cooling, that is of no help during an incident. Currently no fire rated fiber optic cable is available.

2. Ethernet over copper typically uses Category 5 or Category 6 cable. The cable performance is dependent upon cable impedances, attenuation, cross talk and other electrical properties. Currently no fire rated Cat 5 or Cat 6 copper Ethernet cable is available.

3. US practice in regard to fire rated separations includes required durations for the separation to remain physically intact and for the prevention of passing flame. The thermal performance of the separation is not addressed. The protected non-incident side can contain fire life safety critical equipment with operating temperature limitations, such as critical electrical or communications rooms or the critical digital cables and components described above. In these cases, the rated separation’s thermal performance is critical. Either the thermal impedance (insulating value and thermal mass) need to be sufficient for the intended duration, or other means of maintaining temperatures below rated performance limits in the protected element(s) is required.

Committee Meeting Action: Accept
Number Eligible to Vote: 24
Ballot Results: Affirmative: 22
Ballot Not Returned: 2 Kroboth, III, J., LeBlanc, D.
Fiber optic strands experience excessive attenuation at temperatures ranging from 158°F (70°C) to 257°F (125°C), and the fiber ceases to convey signal. No fire rated fiber optic cable is currently available. Similarly, no fire rated category copper Ethernet cable is currently available. It is essential to the continued fire-life safety system function during an emergency that the communication system design considers the thermal insulation performance of fire rated separations for related components and of the embedment for copper and fiber data communication cables. Where insulation performance is insufficient for the design fire heat exposure, other means should be employed to maintain conditions within the thermal limits of the system cables and components.

A.12.1.2 The actual duration required for the circuits to be operative will depend upon the duration required for the circuits to be operative for the emergency evacuation and rescue phase — and, in some circumstances, incident management and structural protection. Factors such as the length of the tunnel, evacuation path ways, the use of fixed water-based fire suppression systems, and the proximity of emergency services may influence this period of time. See also A.4.5(7).

Substantiation: These changes retain the intent of the original proposal while addressing the concerns of Comment 502-13 (Log #8).

Committee Meeting Action: Accept
Number Eligible to Vote: 26
Ballot Results: Affirmative: 24
Ballot Not Returned: 2 LeBlanc, D., Sturm, P.

Related Comment 502-13

502-13 Log #88 Final Action: Reject
(4.5(7), A.4.5(7), A.12.1.2)

Submitter: Marcelo M. Hirschler, GBH International

Comment on Proposal No: 502-42
Recommendation: In addition to physical protection from incidents, the method of routing and providing protection to fire-life safety critical copper and fiber data communication cables and related components shall consider the thermal rating of the cable and other transmission related equipment.

A.4.5(7)* For Bellcore’s GR-20 (Generic Requirements for Optical Fiber and Optical Fiber Cable) standard, optical fiber cables are assessed for aging at 85°C for 2,000 hours. In a quick search I have found one company that advertises two types of optical fiber cables intended for use at high temperatures (one for use at 150°C and one for use at 200°C). Another company offers various optical fiber cables suitable for use up to 302°F (i.e. 150°C). Clearly the statement that the cables have problems when used at temperatures of 158°F (70°C) is incorrect.

4. Only the information added for the original proposal is still valid and the Committee has added additional information to 4.5(7) and A.4.5(7) to address this comment. See Committee Comment 502-12 (Log #CC2) for further information.

Number Eligible to Vote: 26
Ballot Results: Affirmative: 23 Abstain: 1
Ballot Not Returned: 2 LeBlanc, D., Sturm, P.

Explanations of Abstention: MARINO, A.: I do not have the electrical knowledge to make an informed decision on this item.

Backup Proposal 502-42

502-42 Log #CP31 Final Action: Accept
(4.5(7), A.4.5(7), and A.12.12.1 (New))

Submitter: Technical Committee on Road Tunnel and Highway Fire Protection,
Recommendation: Where insulation performance is insufficient for the design fire heat exposure, other means should be employed to maintain conditions within the thermal limits of the system cables and components.

A.12.1.2 The actual duration required for the circuits to be operative will depend upon the duration required for the circuits to be operative for the emergency evacuation and rescue phase — and, in some circumstances, incident management and structural protection. Factors such as the length of the tunnel, evacuation path ways, the use of fixed water-based fire suppression systems, and the proximity of emergency services may influence this period of time. See also A.4.5(7).

Substantiation: Emergency communications and control systems are increasingly relying upon high speed digital cables and components. The data cables used for communication are often required for high speed data transfer, and in many cases copper or fiber optic Ethernet, with fiber optic used for longer connection lengths. Several interrelated issues of concern arise from this shift.
1. Fiber optic strands are composed of a concentric glass layer over a glass center. This differing index of refraction is what retains the light signal within the fiber. The indices are affected by temperature rise. At a temperature of approximately 158°F (70°C), a shift in the refraction indices causes excessive attenuation, and the fiber ceases to convey signal. While
within the physical limits of the cable material this effect is reversible on cooling, that is of no help during an incident. Currently no fire rated fiber optic cable is available.

2. Ethernet over copper typically uses Category 5 or Category 6 cable. The cable performance is dependent upon cable impedances, attenuation, cross talk and other electrical properties. Currently no fire rated Cat 5 or Cat 6 copper Ethernet cable is available.

3. US practice in regard to fire rated separations includes required durations for the separation to remain physically intact and for the prevention of passing flame. The thermal performance of the separation is not addressed. The protected non-incident side can contain fire life safety critical equipment with operating temperature limitations, such as critical electrical or communications rooms or the critical digital cables and components described above. In these cases, the rated separation’s thermal performance is critical. Either the thermal impedance (insulating value and thermal mass) need to be sufficient for the intended duration, or other means of maintaining temperatures below rated performance limits in the protected element(s) is required.

Committee Meeting Action: Accept
Number Eligible to Vote: 24
Ballot Results: Affirmative: 22
Ballot Not Returned: 2 Kroboth, III, J., LeBlanc, D.
Tunnel and Highway Fire Protection is presented for adoption and can be found in the Report on Proposals and the Report on Comments for the 2013 Annual Meeting Revision Cycle.

The Technical Committee has published a report consisting of partial revision of NFPA 502, Standard for Road Tunnels, Bridges and Other Limited Access Highways. The report was submitted to letter ballot of the Technical Committee that consists of 26 voting members. The ballot results can be found on Pages 502-2 to 502-37 of the Report on Proposals and Pages 502-2 to 502-13 of the Report on Comments.

The presiding officer will now proceed with the Certified Amending Motions.

MR. HARRINGTON: Thank you, Mr. Connell. Let's now proceed with the discussion on the Certified Amending Motions on NFPA 502. Microphone 3.

MR. HIRSCHLER: Marcelo Hirschler, GBH International, for NAFRA, and I move to return a portion of a report in the form of Proposal 502-42 and related Comment 502-12.

MR. HARRINGTON: Thank you. So we have a motion on the floor to return a portion of a report in the form of Proposal 502-42 and related Comment 502-12. Is there a second?

A VOICE: Second.

MR. HARRINGTON: So we have a second. Go ahead and proceed.
MR. HIRSCHLER: First of all, let me clarify.

This has nothing to do with all the stuff about definitions. This is a purely technical issue.

It's an issue of particular interest of the National Electrical Code members.

What this is, the Committee has put together some wording that would have suggested that fiberoptic cable cannot be used for a variety of reasons and cannot be used at temperatures above 70 degrees C. As I point out extensively in my comment to that effect, which is Comment 502-13 on Pages 502-3 and 502-4 of the Report on Comments, they say this is incorrect because we can use fiberoptic cable up to 200 degrees C or more depending on the way the cable is listed.

The reason that this went through -- to give you a little bit of history -- is that NFPA 130 and NFPA 502 very often follow things -- have a consistent membership and do similar actions. I usually attend the meetings of NFPA 130. I rarely attend 502. 130 met after 502. 502 took this action. Next week -- 130 met, took appropriate action, and I have no objection what they did, and 130 is perfectly fine. What they did in 502 is incorrect and needs to be revised. Thank you.
MR. HARRINGTON: Thank you. Mr. Connell, would you like to give the Committee's position?

MR. CONNELL: No comment, Mr. Chairman.

MR. HARRINGTON: Thank you. So, at this point, we'll open up debate on the motion. Microphone 3.

MR. KAUFMAN: I'm Dr. Stanley Kaufman. I'm a member from CableSafe. I represent the Insulating Cable Engineers Association on Panel 16, and they have asked me to come here to support this motion. I also consult with the Communications Cable and Conductivity Association who likewise have asked me to come here to support this motion for a very simple reason.

What the text says that was passed by the panel is wrong. The statements about optical fiber cables are wrong. If they go forward, we'll have an NFPA Standard with wrong information. It says, these cables have excessive attenuation as low as 70 degrees C. Your standard, run-of-the-mill, everyday telephone optical fiber cable works at 70 degrees C. If it didn't, you would not have telephone service in Arizona.

So this needs to be supported so incorrect information does not go forward.

MR. HARRINGTON: Thank you. Any further discussion on Motion 502-1 to return a portion of the report in the form of Proposal 502-42 and
related comment 502-12?
Not seeing any, Mr. Chair, do you have any final comments?
MR. CONNELL: No, Mr. Chairman, I do not.
MR. HARRINGTON: Okay. So before we take our vote, let me restate the motion that we're going to be dealing with. The motion on the floor is to return a portion of a report in the form of Proposal 502-42 and related Comment 502-12.
So please record your vote, 1 in favor of the motion, accept, or 2, opposed to the motion, reject. Voting starts now. Voting closes in 5 seconds.
The balloting is closed. And that motion passes. Motion passes.
Now we're going to proceed with the discussion on Certified Amending Motion 502-2.
Microphone 2.
MR. RAMIREZ: Hello. My name is Al Ramirez with UL. I would like to speak in support of Motion 502-2.
A VOICE: Second.
MR. HARRINGTON: We have a second, proceed.
MR. RAMIREZ: If successful, this motion will reject an identifiable part of Comment 502-27. The identifiable parts are the revisions to Section 12.1.2 and associated new annex material.
As it was mentioned during the discussion at the NEC, I think the Code Committee for 502 was
## Floor Action on Certified Amending Motions

Documents for the June 2013 Association Technical Meeting

|-------------|------------------------------------------------------------------------------------------|

<table>
<thead>
<tr>
<th>Motion Seq #</th>
<th>NITMAM Log #</th>
<th>Time</th>
<th>Section/Para</th>
<th>Person(s) Authorized to Make the Motion</th>
<th>Certified Amending Motion**</th>
<th>Floor Action</th>
</tr>
</thead>
</table>
Ms. Cronin,

In accordance with the Regulations Governing Committee Projects, Section 1.6, Appeals to the Council, I am filing the following appeal:

1. Name, affiliation and address of applicant:

   Alfredo Ramirez  
   Underwriters Laboratories  
   333 Pfingsten Rd  
   Northbrook, IL  60062

2. Particular action to which appeal relates:

   2013 Technical Session floor action on Certified Amending Motion 502-2

3. Arguments setting forth the grounds for the appeal:

   • Information related to NFPA 502 ROC #502-27  
   • Information related to TIA 1083 for NFPA 502  
   • Technical Session transcript relating to 2013 NFPA Technical Session, Certified Amending Motion 502-2  
   • Additional information to be provided.

4. Precise relief requested:

   I am appealing to the Standards Council to overturn the actions taken by the NFPA 502 Technical Committee on A2013 ROC #502-27 and the Association Membership at the 2013 Technical Session regarding Certified Amending Motion 502-2

At this time, I am requesting a hearing on this appeal.

Regards

Al Ramirez  
Regulatory Services Regional Manager  
------------------------------------------
UL LLC  
333 Pfingsten Road  
Northbrook, IL 60062-2096 USA  
T: 847.664.2905
502-27 Log #53/C11  Final Action: Accept
(12.1.2, A.12.1.2 (1))

Submitter: Technical Committee on Road Tunnel and Highway Fire Protection.

Comment on Proposal No: 502-109
Recommendation: Revise the existing text as follows:

12.1.2* Emergency circuits installed in a road tunnel and ancillary areas shall remain functional for a period of not less than 1 hour, for the anticipated fire conditions and fire-resistance of the following methods:

(1)* Fire-resistive cables shall be certified or listed as having been listed for 2 hours in accordance with ANSI/UL 2196 or other equivalent internationally recognized standards to 950°C (1742°F) when approved by the AHJ; tested in a totally wetted fire using the ASTM E-119 time temperature curve and which demonstrate functionality for no less than 2 hours as described in the ANSI/UL 2196 test standard as follows:

a) Tested as a complete system of conductors, cables and raceways as applicable, using a sample no shorter than 3.0 m (9.8 ft).

b) Fire-resistive cables intended for installation in a roadway are tested in the type of roadway in which they are intended to be installed.

c) Each fire-resistive cable system have installation instructions that outline the test procedure and only the components stated in the test report are acceptable for actual installations.

(2) Circuits embedded in concrete are protected by a 2-hour fire barrier system in accordance with UL 1724. The insulation for cables or conductors shall be thermostat and shall be suitable to maintain functionality at the temperature within the embedded conduit or fire barrier system.

(3) Routing external to the roadway

(4) Diversity in system routing as approved (such as separate redundant or multiple circuits separated by a 1-hour fire barrier) so that a single fire or emergency event will not lead to a failure of the system.

Add the following annex text as follows:

A.12.1.2
The actual duration required for the circuit to be operative will depend upon the duration required for the circuit to be operative for the emergency, evacuation and rescue phase and, in some circumstances, incident management and structural protection. Factors such as the length of the tunnel, evacuation pathways, the use of fixed water-based fire suppression systems, and the proximity of emergency services may influence this period of time. See also A.12.1.2

(1) When selecting a fire-resistive cable, it is important to understand how it will be installed and if it was tested as a complete system, including splices. Cables that are exposed (not embedded in concrete) should be protected using either a metallic raceway or an armor/sheath (see 12.1.2.1). There are two basic configurations of fire-resistive cables. Cables enclosed by a metallic sheath or armor, such as Type MI or Type MC, are installed without raceways. Cables that are installed in a raceway, such as Type RHW-2, Type TC or Type CM are tested as a complete system. Regardless of the fire test standard used to evaluate fire-resistive cables that will be installed in a raceway, it is important to consider that the cables are only one part of the system. Other components of the system include but are not limited to: the type of raceway, the size of raceway, raceway support, raceway couplings, boxes, conduit bodies, splices, where used, grounds, jointing lubricants. Each cable type should be tested to demonstrate compatibility.

Only those specific types of raceways tested should be acceptable for installation. Each cable type that is intended to be installed in a raceway should be tested in both a horizontal and vertical configuration while demonstrating circuit integrity.

Substantiation: The Technical Committee has taken this action to revise Sec. 12.1.2* in order to address the recent modification of UL pertaining to their standard UL2196. The UL action has invalidated standard requirements in Chapter 12 by making the listing requirements unattainable as written. Specifically, as of Sept 12, 2012, UL has withdrawn all cable certifications (listings) to this test standard. Recent fire testing has demonstrated failure modes such as hot-dipped galvanized coatings on the interior surface of the raceways potentially causing premature failure of copper fire-resistive cable systems. NFPA 502 currently allows the use of fire resistive cable listed in accordance with UL2196 Standard for Safety for Test for Fire Resistive Cables 2012.

Backup Proposal 502-109

502-109 Log #36  Final Action: Accept in Principle
(Chapter 12)

Submitter: Ed Morel, Genesis Transportation Lighting

Recommendation: In NFPA 502-2008 there is the following:

11.3 Materials
12.3.1 Materials that are manufactured for use as conduits, raceways, ducts, cabinets, and equipment enclosures and their surface finish materials, as installed, shall be capable of being subjected to temperatures up to 316°C(600°F) for 1 hour without supporting combustion and without loss of structural integrity.

Substantiation: Is there anything in the current 2011 issue that replaces this? I have looked but have not seen anything.

In NFPA 502-2011 Chapter 12, Electrical Systems, there appears to be conflicts and contradictions regarding the wiring used in a tunnel. There have been installations that utilize electrical cord with quick disconnect type connectors (Brad Harrison or TPC). This is to facilitate both the ease of installation of the lighting system and if necessary, for maintenance reasons, the removal of a luminaire.

However, 2002-2011 is not specific to this type of wiring and if it will be acceptable. Many agencies and design engineers are concerned about the legalities and safety of such wiring and would like to see it addressed more specifically.

Committee Meeting Action: Accept in Principle

The technical committee accepts the following new language:

12.1.2* Emergency circuits installed in a road tunnel and ancillary areas shall remain functional for a period of not less than 1 hour for the anticipated fire condition, meeting one of the following methods:

(1) A fire-resistive cable listed for 2 hours in accordance with ANSI/UL 2196 or other equivalent internationally recognized standards to 950°C (1742°F) when approved by the AHJ.

(2) Circuits embedded in concrete or protected by a 2-hour fire barrier system in accordance with UL 1724. The cables or conductors shall be thermosto and shall be suitable to maintain functionality at the temperature within the embedded conduit or fire barrier system.

(3) Routing external to the roadway

(4) Diversity in system routing (such as separate redundant or multiple circuits separated by a 1-hour fire barrier) so that a single fire or emergency event will not lead to a failure of the system.

Committee Statement: The proposal does not reference the current standard. The technical committee has considered the concern stated and has addressed it in the proposed text.

Number Eligible to Vote: 24
Ballot Results: Affirmative: 22
Ballot Not Returned: 2 Kroboth, III, J., LeBlanc, D.

Comment on Affirmative:

NELSEN, J.: In my opinion the annex note should refer the reader to NFPA 1620, Standard for Pre-Incident Planning rather than NFPA 1600, Disaster/Emergency Management and Business Continuity Programs or at least perhaps both.
Mr. Connell: No, Mr. Chairman, I do not.

Mr. Harrington: Okay. So before we take our vote, let me restate the motion that we're going to be dealing with. The motion on the floor is to return a portion of a report in the form of Proposal 502-42 and related Comment 502-12.

So please record your vote, 1 in favor of the motion, accept, or 2, opposed to the motion, reject. Voting starts now. Voting closes in 5 seconds.

The balloting is closed. And that motion passes. Motion passes.

Now we're going to proceed with the discussion on Certified Amending Motion 502-2.

Mr. Ramirez: Hello. My name is Al Ramirez with UL. I would like to speak in support of Motion 502-2.

A Voice: Second.

Mr. Harrington: We have a second, proceed.

Mr. Ramirez: If successful, this motion will reject an identifiable part of Comment 502-27. The identifiable parts are the revisions to Section 12.1.2 and associated new annex material.

As it was mentioned during the discussion at the NEC, I think the Code Committee for 502 was...
pressed with the issue that when we released our public notice and de-listed some products, they took some action assuming other things might happen; but Standard UL 2196 which was used to evaluate those cables are still active, being worked on. So I think the work was based on that assumption. I don't think they did anything wrong, but we did go and continue with a different path.

The reason for retaining the current language in the identified sections of 502 is to maintain a level of safety that was originally established in 502. If this motion is not successful, the following proposed editorial points would likely reduce the safety, performance of emergency circuits.

The word "certified" that is included in the revised Section 12.1 of 502 is not currently defined by the Code and may be misunderstood or cause confusion in the application of the impacted Code sections. Introducing a new product in the evaluation process without defining it and making it an NFPA official term listed that appears in the subject 502 may be misused or misapplied and possibly reduce the safety of the overall installation and assessment of the cable's compliance. The sole use of the term "listed" is appropriate for the nature of this product.

Removing the phrase in accordance with
UL 2196 will only require fire endurance testing to E119. The additional hose and electrical conductor tensile strength test of UL 2196 will be omitted. The hose stream as referenced in 2196 is intended to subject the system and impact cooling effects.

In summary, if you agree to reject identified Proposal 502, the section improvised, it would become inconsistent with the requirements of NFPA Codes that include critical safety circuit insulation requirements, like 70, 101 -- 72, pardon me, et cetera. The latest edition of NEC, by the way, was recently completed, and the critical electrical insulation requirements were left intact including references to UL 2196. Thank you.

MR. HARRINGTON: Thank you. Mr. Connell, would you like to give the Committee's position?

MR. CONNELL: Yes. Thank you, Mr. Chair.

Fire-resistive cable requirements within NFPA 502 pertain specifically to road tunnel life safety systems including emergency tunnel ventilation, emergency lighting, and emergency communication systems. Per the requirements of this standard, these systems are required to remain operational for a period of at least one hour during design fire conditions that are typically in the order of 100 megawatts or above.

Because of the severity of these potential fires, all emergency circuits are required to be rated for two hours to temperatures up to
1850 degrees Fahrenheit. The support tunnel life safety systems, significantly long runs of life safety critical power and communication circuits are necessary. In addition, these circuits must be physically protected from the severe environmental and operational conditions that are commonly found in road tunnels which is typically accomplished by installing these emergency circuit and metallic raceways.

Back in July of 2011, a leading cable manufacturer identified a deficiency experienced in their fire-resistive cable product testing at UL. During this testing, a circuit failure mode was determined to be caused by the interaction of the copper conductor with the galvanized coating of the conduit. When the galvanized conduit was exposed to temperatures greater than 800 degrees Fahrenheit, the melting temperature of zinc, the molten zinc reacted with the copper conductor forming brass plugs basically resulting in a premature failure of the test circuit.

Six months later in January of 2012, the 502 Technical Committee convened for their Report on Proposals meeting at which the significance and impact of this issue was discussed in great detail. But with still no information or guidance provided by UL at that time, the Committee was unable to take any action and, instead, agreed to reconsider...
the issue at their ROC meeting later in the year

assuming some guidance would be available by that time.

In June of 2012, UL finally issued public information regarding the validation test findings and, in addition, issued a revision to the FHIT guide information indicating that all conduit and conduit fittings that come in contact with fire-resistive cables should have an interior coating free of zinc.

In September of 2012, UL withdrew all of its issued listings for electrical circuit protective systems comprised of fire-resistive cables regardless of their intended conduit system installation and also, at that time, announced they were no longer offering certification to ANSI/UL 2196. Per this action by UL, manufacturers were no longer allowed to apply the UL listing mark to their product.

However, ANSI/UL 2196 was not withdrawn and remained a valid test standard without any modification. And UL also allowed cable manufacturers prior to that date to maintain its listing and ultimately be installed.

Finally, on September 17th of 2012,
UL announced the availability of an interim certification program for fire-resistant cables. This new program again offered cable manufacturers certification to their fire-resistant cables in accordance with testing pre ANSI/UL 2196. However, as a part of this action, UL also acknowledged that the interrelationship between all variables of the cable and/or system construction are not understood by all or addressed in the current test standards and, therefore, introduced a new set of guidelines so that the testing is conducted specific to the intended cable and system construction.

MR. HARRINGTON: Mr. Connell, if you could wrap things up shortly. Thank you.

MR. CONNELL: Yes, Mr. Chairman.

To address the complexity of this issue, the TC has proposed revisions to 502 that are consistent with the additional UL 2196 test requirements implemented by UL under their proposed Interim Testing Program and, most importantly, to ensure that the newly identified testing variables are fully understood and accounted for when testing products internationally.

MR. HARRINGTON: I think we're going to have to stop at this point, Mr. Connell. Thank you for the Committee's position.

MR. CONNELL: Mr. Chairman, could I state the Committee's position?

MR. HARRINGTON: I believe you did. You've had
your allotted time. Thank you. We can come back later as a wrap up.

With that, we'll open up debate on the motion. Please provide your name and affiliation and whether you're speaking in support of or against the motion. So Microphone 4.

MR. CONRAD: James Conrad, RSCC Wire & Cable. I speak in opposition of the motion on the floor. I am a 502 Committee member as well.

Let me just read you a little bit what is in the UL Interim Test Program. In their test program under sample selection, it says, "In general, since the interrelationship between all variables of the cables and the system constructions are not understood by all and addressed in the standard" -- that's UL 2196 Standard -- "it will not be possible to conduct representative testing at this time." And then they give a whole laundry list of items that need to be tested if you go to UL Interim Program.

Now, remember, what the 502 Committee did is we reworded it, that takes some of these requirements and add it into the 502 language. We say -- 502 is an international standard. We have members from eight different countries. And to say "test in accordance with UL 2196" could be very, very dangerous because let me just read a couple things quickly why you don't want to go 2196 just
In 2196, 4, Sample Selections, 4-1, each design of cable, multiple conductor versus single, twisted versus straight lace, shielded versus unshielded, bare ground versus insulated ground, stranded versus solid conductor, lowest voltage versus highest voltage. An additional selection you may go in to look at shall include smallest conductor, minimum number of conductors, minimum installation thickness, minimum installation between conductors, and minimum installation between the conductors in the jacket.

Has anybody heard how to test cables in a raceway or a conduit in this Committee here today? No. We cannot say today "in accordance with 2196".

Mind you that UL even says it in their program. What the 502 Committee has done is we said we want to identify the length of the sample. We want to tell you to test it in the raceway that will be used. Follow 2196 protocol, the whole standard, not just the fire portion.

We never amended it. You do the fire. You do the hose stream, and you do the tensile strength testing. Without these additional requirements in the 502 identifiable standard, we are going to leave people out there in the dark without a properly tested program, especially our international partners.

Again, Mr. Chairman, I move in opposition
on this and urge the body to do the same. Thank you.

MR. HARRINGTON: Thank you. Microphone 3.

MR. HIRSCHLER: Marcelo Hirschler, GBH International, speaking for NAFRA, and in support of the motion.

My reasoning for supporting this motion is that I invite -- my expertise is in the area of fire testing. We sit around in the NFPA Fire Test Committee. We sit around in the ASME Fire Standards Committee, and we spend numerous hours discussing the exact details of how we write test methods and with exact details of how test methods should be run.

What this language in 502, and we'll see the same in 130 because they're consistent, all it says is tested in a totally enclosed furnace using the E119 temperature curve, and that's it. That's not enough. It is not appropriate for a Committee whose expertise is not in testing to develop and write two or three lines and those two or three lines should represent a proper fire test or any other type of test. That's why we send that to the appropriate Committee.

I urge you to approve the motion and disapprove the change that Committee 502 made. Thank you.

MS. RUIZ: I am Ana Ruiz from TD&T, LLC. I'm a member of Technical Committee 502. I'm against the motion. I'm an international member, and I really think that this thing should be done for the international standards for all over the world, not just the way it's being done right now. I'm against the motion. That's it.

MR. HARRINGTON: Thank you. Microphone 1.

MR. WALTON: Thank you. Ed Walton, representing Pristiem (phonetic). I'm against the motion. I'm against the motion because it would return the language back to where UL is the only reference laboratory, and the use of words "certified" and "listed" would almost make them a sole source.

I am impressed with the work that the Committee did by expanding the testing criteria from a cable to a system which is exactly what was resolved, which found the problem in the first place and has resolved that problem in the future. So I'm against the motion. Thank you.

MR. HARRINGTON: Thank you. Microphone 2.

MR. RAMIREZ: Yes, I just want to ask first the Committee --

MR. HARRINGTON: Could you identify yourself?

MR. RAMIREZ: Al Ramirez with UL.

MR. HARRINGTON: And speaking for the motion?

MR. RAMIREZ: I'm speaking for the motion.

I didn't hear if the Committee was for the
Chair's testimony.

MR. HARRINGTON: I know I did have to cut him off as he ran out of his allotted time. I'm going to give him time to wrap up later.

MR. RAMIREZ: Okay.

MR. HARRINGTON: Since you raised that question, maybe it's a good time now for the benefit of the body to do that. Mr. Chair, back to you.

MR. CONNELL: Well, I guess knowing what we know now about demonstrated fire-resistive cable failures during fire testing conditions when installed in a steel conduit with zinc interior coatings, about the lack of any test standards that specifically address this issue, and that UL themselves will not follow the current ANSI/UL 2196 without their own modifications similar to those now being proposed by 502, that as Chairman of the Technical Committee, I believe we would be irresponsible to revert to the language of the ROP as proposed which was developed six months prior to any of these issues or critical actions by UL without any acknowledgment of any of the testing concerns included in that ROP document, and I ask...
for your vote in opposition to this motion.

MR. HARRINGTON: Thank you. Sorry for cutting you off earlier. Microphone 3.

MR. HIRSCHLER: Marcelo Hirschler, GBH International, and I am in support of the motion.

I just want to clarify one thing that was stated by one of the opponents in that this would make UL the only lab. That is incorrect. I don't work for UL. I have no contract with UL or anything like that, but the fact that you list two UL standards, any nationally certified testing lab can institute a UL standard. You don't have to be UL to list UL standards.

So in response to comment from Ms. Ruiz that she's in favor of using internationally recognized data, in fact, in that case, she should have been on the side that supports the motion because that's what this language says, and that is the part that gives me some heartache because I'm against that language, but I'm more against the language produced by the Committee to invent a test method on the fly, and I hope you support the motion. Thank you.


MR. CONRAD: James Conrad, RSCC Wire & Cable, member of 502. I speak in opposition of the motion.
I just want to make sure that everybody has seen the wording that the Committee has drafted during the comment stage. Marcelo mentioned that it says demonstrate functionality as described in .196, test of tone codes furnace to E119; and then we go on to say, test as a complete system of conductors, cables, and raceways as applicable using a sample no shorter than around the 10 feet. B, fire-resistant cables intended to be installed in a raceway are to be tested in the type of raceway in which they are intended to be installed. Remember what created this whole issue. We found out when you took cables that were pre-released tested and the EMT and you installed them in rigid metal conduit, they failed. They failed 100 percent of the time. And then we go on to say, C, each fire-resistant cable system shall have installation instructions that outline the test procedures and only the components stated in these test reports are acceptable for actual installation.

I should read it again what UL says in their Interim Program. They say that they don’t understand the interrelationship between the cables and the conduits and the systems. Again, 2196 doesn't even tell you how to mention or how to test a cable in a raceway. It only mentions a raceway four times; once in the scope, one about Cl cable, once in the observation, and once for this vertical
tensile strength test.

There is no guideline in UL 2196. And to leave it to say "test in accordance with 2196" and think that another lab somewhere else in the world will get a good product that will pass a test in the field under real fire conditions is misleading and it’s absolutely wrong. I urge the body to vote against this motion. Thank you, Mr. Chairman.

MR. HARRINGTON: Thank you. Microphone 2.

MR. RAMIREZ: Al Ramirez with UL speaking in favor of the motion.

Again, the document that Jim refers to is out there in the public and people are going to be able to use it. It does define how we -- UL determined systems that we're looking at, make sure that we do identify the other components as the Chair mentioned. I think it is very complete in nature.

We also do list products. We have listed two products currently to you all, 2196, under the Interim Certification Program, and that could be found in our on-line certification directory under FHIT.

The standard, again as I stated before, should be used in its entirety because, as you heard the readings, the proposed text of this part of Section 12.1, it's incomplete because it just refers to that fire test, that E119 test. And it
doesn't cover the other parts of UL 2196 which are very important to also apply to those critical systems. Thank you.

MR. HARRINGTON: Thank you. Microphone 1.

MR. WALTON: To quickly clarify the point.

Ed Walton against the motion.

When I said before any lab can test the UL 2196 before the test, but only UL can offer an UL listing or UL certification to that document.

Thank you.

MR. HARRINGTON: Thank you. Microphone 2.

MR. JAMES: Bob James, Underwriters Laboratories. Just to address two points, and I am for the motion.

The last point is definitions for listing and certification come from NFPA. We just happen to use that term as well, but other labs can use their own terminology. But the listing definition to be listed is part of NFPA's definitions, not something that we created.

The other piece was that there was a criticism to the test criteria and what we follow based on components not being identified in the testing. And the reality is that the manufacturers, when they come to us with their products, will tell us how they're going to install it. That way, we're not limiting the manufacturer to have to put it in conduit or not.

So, again, we're being flexible so the
manufacturing community can come to us for their certifications. Thank you.


MR. CONRAD: James Conrad, RSCC Wire & Cable again, member of NFPA 502.

I was on the task group that worked on this extensively. I was part of the research team that discovered the whole zinc issue. We have no intention of short-cutting 2196. It is probably the most stringent fire test in the world in our opinion. That is why we retained 2196 in there.

We don't take exception to any part of it. If you read 2196 in the scope, it talks about demonstrating functionality. We took words from that. And I have issues with UL trying to convince you that we are short-cutting it. I will quote what we wrote, "Demonstrate functionality for no less than two hours as described in ANSI/UL 2196 test standard."

We have not modified anything in there except we added requirements that are not currently in there that UL -- and I applaud them for their Interim Test Program. I agree 100 percent with their Interim Test Program.

The trouble is this is an international standard. Go to a lab around the world, handle 2196. If they don't have an Interim Test Program, you're going to get a cable that will not survive a
fire. Thank you, Mr. Chair. I speak in opposition of the motion.


MR. LALOCA: Steve Laloca (phonetic), representing myself. I would like to move -- request or call the vote.

A VOICE: Second.

MR. HARRINGTON: We have a second. Calling the question is not a debatable motion. So at this time, we'll take a vote on that. You can record your vote as 1 in favor of the motion to call the question, and 2, opposed to the motion of calling the question. We're just dealing with the call of the question item at this point. The voting starts now. Closing in 5 seconds.

Balloting closed. And that motion passes to call the question.

So at this point, we'll move on to the vote. So now you're voting on the motion in front of you which is 502-2 to reject an identifiable part of Comment 202-27. Again, you're going to record your vote, 1 in favor of the motion to accept or 2, opposed to the motion, reject. Voting starts. Closing in 5 seconds.

Voting closed. And that motion fails.

Any discussion on 502? Seeing none, we'll
### TABLE A
Certified Amending Motions on Documents for the June 2013 Association Technical Meeting
(Note: The motions are presented in the order or presentation recommended by the Motions Committee)

<table>
<thead>
<tr>
<th>Motion Seq #</th>
<th>NITMAM Log #</th>
<th>Section/Para</th>
<th>Person(s) Authorized to Make the Motion</th>
<th>Certified Amending Motion**</th>
<th>Motion Committee Notes and Comments**</th>
</tr>
</thead>
</table>
| 502-2        | 1113         | 12.1.2(1) and A.12.1.2 | Alfredo M. Ramirez, UL LLC | Reject an Identifiable Part of Comment 502-27. The Identifiable Parts are the revisions to Section 12.1.2(1) and associated new annex material. | If successful, this motion seeks to return to ROP text for Section 12.1.2(1) to read as follows:  
**12.1.2** Emergency circuits installed in a road tunnel and ancillary areas shall remain functional for a period of not less than 1 hour for the anticipated fire condition, meeting one of the following methods:  
(1) A fire-resistant cable listed for 2 hours in accordance with ANSI/UL 2196 or other equivalent internationally recognized standards to 950°C (1742°F) when approved by the AHJ. |
AMENDMENT (801-1)


Motion: To Accept Comment 801-16

TC FINAL Ballot Results

According to 4.7.1 in the NFPA (RGCP), the final results show this Amendment HAS achieved the necessary 2/3 majority vote. The number of affirmative votes needed to obtain a recommendation to issue the Amendment is 16 [28 (eligible to vote) – 3 (ballots not returned) – 1 (abstention) = 24 \times 0.66 = 15.84]

28 Eligible to Vote
3 Not Returned (Kassawara, Najafi, Richter, Jr.)

23 Agree
1 Do Not Agree (Davis)
1 Abstain (Bolliger)

TC Action: PASS
NFPA 801
TC BALLOT ON THE STANDARD FOR FIRE PROTECTION FOR FACILITIES HANDLING RADIOACTIVE MATERIALS
JUNE 2013 ASSOCIATION AMENDMENT 801-1

Amendment: Accept Comment 801-16

☐ Agree If you agree with this amendment, the recommendation will be to revise Chapter 7 Special Hazards in Nuclear Facilities

See the attached Comment 801-16 that contains the proposed text of new Chapter 7.

☒ Do Not Agree* If you do not agree with this amendment, the recommendation is to return to previous edition text.

☐ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I do not agree with the amendment. The Committee Action and Committee Statement on Comment 801-16 are valid.

________________________________________

Signature: Stanford E. Davis

Name - Please Print: Stanford E. Davis

Date: 06/25/2013

Please return as soon as possible, but no later than Wednesday, June 26, 2013 to:

Joanne Goyette, Administrator, Technical Projects
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
EMAIL: jgoyette@nfpa.org
FAX: 617-984-7110
NFPA 801
TC BALLOT ON THE STANDARD FOR FIRE PROTECTION FOR
FACILITIES HANDLING RADIOACTIVE MATERIALS
JUNE 2013 ASSOCIATION AMENDMENT 801-1

Amendment: Accept Comment 801-16

☐ Agree

If you agree with this amendment, the recommendation will be to revise Chapter 7 Special Hazards in Nuclear Facilities

See the attached Comment 801-16 that contains the proposed text of new Chapter 7.

☐ Do Not Agree*

If you do not agree with this amendment, the recommendation is to return to previous edition text.

☑ Abstain*

*Please give reasons for voting "Do Not Agree" or "Abstain":

I abstain from this vote as I was not able to participate in the teleconference during which this item was discussed. However, my comments are as follows:

To retain the intent of the previous edition of the standard it would be better to set an expected level of protection but allow for a lesser level of protection where it can be shown that the fire protection objectives can still be met. That is, instead of stating "As determined by the Fire Hazard Analysis..." it would be better to state "XXX shall be provided unless the elimination of such protection is justified by the fire hazards analysis.". Although I agree with some of the recommended changes I do not feel that this particular aspect of the proposal improves the standard. If this proposal is accepted, additional information on the expectations on the depth and rigor of the FHA, as well as the competencies of the of the person(s) preparing the FHA should be provided. However, at the end of the day, it is very difficult for an AHJ to not accept an FHA based on the preparers qualifications (provided that they are at least somewhat qualified).

Signature: [Signature]

Name - Please Print: Ivan Bouicier

Date: 25 June, 2013

Please return as soon as possible, but no later than Wednesday, June 26, 2013 to:

Joanne Goyette, Administrator, Technical Projects
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
As determined by fire hazards analysis, fire suppression shall be provided in all hot cells, caves, and glove boxes and hoods.

A.7.1.4.2 The selected method of automatic suppression has to be compatible with the fire hazards and consider interaction between the suppression agent and materials that are present (e.g., reactive metals). The selection of a fire suppression system must address the potential for the spread of radioactive materials due to pressurization of the enclosure or by the flooding of the enclosure with liquid fire suppression methods such as water.

Accessibility for inspection, maintenance, and testing in radiation control environments must also be considered in the design. Selected systems should be a means of automatic sprinkler system, although other methods of suppression can also be permitted when installed in accordance with the applicable NFPA standard. Refer to Section 5.10 for drainage provisions.

A.7.1.4.3 Hot Cells and Caves.

A.7.1.4.3.1 Hot cells and caves shall be of noncombustible construction. Where combustible shielding is necessary for the radiation hazard, appropriate fire protection features shall be installed as determined by fire hazards analysis.

A.7.1.4.3.2 The number of gloves shall be limited to the minimum necessary to perform the operation.

A.7.1.4.4* Glove Boxes and Hoods.

A.7.1.4.4.1 The glove boxes, including windows, and hoods shall be of noncombustible construction. Where combustible shielding is necessary for the radiation hazard, appropriate fire protection features shall be installed as determined by fire hazards analysis.

A.7.1.4.4.2* When the gloves are not being used, they shall be withdrawn and secured outside the box if fire hazards are present inside the box.

A.7.1.4.4.3 Securing of the gloves outside the box positions them such that fixed fire suppression in the room can be more effective and that they do not contribute to the fuel loading in the glovebox or provide a source of ignition to other fuels in the glovebox. Positioning them outside also reduces potential for gloves contributing to fires inside the glovebox.

A.7.1.4.4.4* When the gloves are no longer needed for operations, they shall be removed and glove port covers installed if fire hazards are present inside the box.

A.7.1.4.4.5 Gloves should be removed if work has been completed and no additional work requiring access to the glovebox via use of the specific gloves is identified, the glove box will not remain in-service, or fire hazards remaining in the glovebox dictate that the gloves be removed. Gloves should not be removed strictly because immediate or short term use is unnecessary. Unnecessary removal of gloves creates unnecessary generation of radioactive wastes as well as potential exposures to radioactive materials during change-out activities.

A.7.1.4.4.6 Doors shall remain closed when not in use.

A.7.1.4.4.7 The concentration of combustibles shall be limited to the quantity necessary to perform the immediate task.

A.7.1.4.4.8* Fixed inerting systems shall not be utilized in lieu of fire suppression system.

A.7.1.4.4.9 Fire suppression should be considered in addition to fixed inerting systems to address potential concerns during glovebox maintenance or failure of inerting systems.

A.7.1.4.4.10 If fixed extinguishing systems are utilized, the internal pressurization shall be calculated in order to prevent gases from failing or being blown off of effects of system discharge on glovebox integrity shall be considered in evaluating the design of the system.

A.7.1.4.4.11 As determined by fire hazards analysis, means shall be provided to restrict the passage of flame between glove boxes and hoods that are connected.

A.7.1.4.5 Hoods.

A.7.1.4.5.1* Fume hoods containing radioactive materials shall meet the requirements of NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals. Lining materials shall be compatible with the chemical environment, and capable of decontamination.

A.7.1.4.5.2* Fume hoods shall be designed to contain the radioactive material in a manner that is as safe as practical for the user and to prevent spillage or release of radioactive material into the environment.

A.7.1.4.5.4* A means shall be provided in all hot cells, caves, and glove boxes and hoods to contain radioactive material in a manner that is as safe as practical for the user and to prevent spillage or release of radioactive material into the environment.

A.7.1.4.5.6* As determined by fire hazards analysis, hot cells, caves, and glove boxes and hoods shall be designed to contain radioactive material in a manner that is as safe as practical for the user and to prevent spillage or release of radioactive material into the environment.

A.7.1.4.5.8* As determined by fire hazards analysis, means shall be provided to prevent or control the spread of fire.
The FHA concludes that the amount of radioactive material is inconsequential.

7.4.2 In some cases, gloveboxes and hoods unless otherwise justified in the design.

7.3.1 General. Special hazards related to protection from fire shall be controlled by a defense in depth strategy that utilizes a combination of the following:

1. Location and separation
2. Safe operating procedures
3. Fixed detection and suppression systems
4. Inerting
5. Any other methods acceptable to the AHJ

7.4.3 Laboratories.

7.4.1* The requirements of Sections 7.1 through 7.3.1 are applicable to laboratories where the requirements of NFPA 45 do not provide sufficient fire protection and control of the material hazards or when determined by fire hazards analysis.

7.4.4* Laboratories, such as those involved in research and development, laboratory operations involving concentrations of hazardous and radioactive materials as well as associated laboratory equipment, which are required for the confinement in support of constantly changing projects. These changing conditions and the quantities of materials present do not lend themselves to the controls specified in Sections 7.1 and 7.3 for gas and vapor analyzers, safety controls and interlocks, control of solvents, and control of handling and storage of combustible metals. NFPA 45 provides adequate controls for most laboratory operations involving concentrations of hazardous and radioactive materials.

7.4.5 Vital activities shall be capable of performing the necessary functions in the event of a fire.

7.5 Research and Production Reactors.

7.5.1 Reactivity control shall be capable of inserting negative reactivity to achieve and maintain subcritical conditions in the event of a fire.

7.5.2 Inventory and pressure control shall be capable of controlling coolant level such that fuel damage as a result of a fire is prevented.

7.5.3 Decay heat removal shall be capable of removing heat from the reactor core such that fuel damage as a result of fire is prevented.

7.5.4 Vital activities shall be capable of providing the necessary indications in the event of a fire.

7.6 Facilities Handling Waste (Reserved)

7.7 Accelerators (Reserved)

7.8 Process Facilities (Reserved)

7.9 Irradiation Facilities (Reserved)

Substantiation: The term facilities as applicable to NFPA 801 refers to the specific facility and hazard protection needs and the fire hazards analysis becomes paramount in designing the appropriate level of protection for the hazards and configurations specific to the facility. The importance of the FHA and flexibility in the application of requirements for the variability in nuclear facility hazards is the primary basis for the proposed changes and this approach is consistent with Chapter 4 and 6 of this standard. Additional discussion of the specific facility and hazard protection needs and the fire hazards analysis becomes paramount in designing protection against combustible gases and vapors that do not involve the complexities of installing and maintaining analyzers. The standard is not clear as to what constitutes an analyzer that is necessary. Automatic detection systems are currently not required unless otherwise justified in the design.

Section 7.1.1.8.2 is revised to provide flexibility to implement appropriate level of control if necessary. “Approved” as defined in this implies the AHJ must accept the limits that are established, which is not consistent with typical practice. Controls and limits on use solvent is typically established in user procedures. The exception may be where permitting is required for quantities that exceed fire code or other similar regulatory thresholds.

Section 7.1.1.8.4 is revised to allow flexibility. Arbitrarily establishing a 3-hour separation does not allow for the consideration of the unique characteristics of the hazard.

The fire protection needs for these applications should be based on the fire hazards analysis. The committee’s substantiation for the significant change to require “ALL” hot cells, caves, and gloveboxes to have automatic fire suppression systems when there is no value added. Spread of radioactive materials associated with the activation of a fire suppression system also has to be considered in the selection of an automatic fire suppression system. Sections 7.1.4.3.1 and 7.1.4.4.1 are revised to note that combustible shielding may be necessary in some applications, particularly where neutron shielding is necessary. Fire protection for these applications should be based on the fire hazards analysis.

Section 7.1.4.2 is deleted because regulating the necessary number of caves is impractical and isn’t considered in an integrated manner with the other fire hazards that are present. Gloveboxes are generally designed to place gloves where they are needed. This level of control should be left to the operating entity as part of overall fire hazards management.

Sections 7.1.4.4.2 (renumbered) and Section 7.4.3 are similarly revised to provide a more practical level of control for gloves. Not all gloveboxes necessarily have significant fire hazards.

Section 7.1.4.4.7 (renumbered) is revised to focus the requirement on evaluating the extinguishing system effects on glovebox integrity, namely overall system pressurization. Under fire conditions, glove boxes need to be isolated prior to system actuation so glove failure from over-pressurization is not necessarily governing. The extinguishing system is designed according the hazard present and the appropriate rate of application of agent. The objective to extinguish the fire and thereby support the objective of protecting the box, but the impacts on box integrity should be understood and the design should consider these impacts appropriately.
Section 7.1.4.8 (renumbered) is revised to base the design of restrictions between gloveboxes on the fire hazards analysis. Gloveboxes come in all sizes and connection restrictions are not always necessary relative to the hazards present. There is usually an air lock with 2 doors between the glovebox and any other connected hoods, so proper operation of the air lock would prevent direct passage of flames.

Section 7.1.4.5 is a new proposed section on hoods. Hoods in the context of radioactive material handling and use are significantly different than hot cells, gloveboxes, and cabs. Hoods provide no shielding or significant confinement capability. Equipment work with radioactive materials and the hazards associated with radioactive materials in hoods are generally dominated by the hazards of the chemicals. Hoods are designed and tested to remove vapors and not to confine radioactive materials. On this basis, NFPA 45, which has extensive requirement for hoods, should be updated in agreement with the current standard. Where additional protection is necessary, the fire hazards analysis required elsewhere in this standard will govern the determination. The placement of detection and/or fire suppression in most fume hoods has not been established as being necessary unless operations with open containers of flammable liquids are performed. Due to the nature of the operations that are typically performed in fume hoods, there are no specific types of fire detection or fire suppression that would provide reliable detection and/or suppression for all types of hazardous materials that are typically used in fume hoods. NFPA 45.8.10 does not require automatic fire suppression for fume hoods unless there is a hazard present that warrants automatic fire suppression. Section 7.4.1 and A.7.4.1 are revised to identify NFPA 45 as the governing standard for fire protection in laboratories using chemicals in the presence of radioactive materials as opposed to the requirements in Sections 7.1.1 and 7.1.3 unless NFPA 45 is not sufficient in its requirements or additional protection is specified by a fire hazards analysis. Protection against the chemical hazardous environments should also be considered in the design. Selected requirements should be in an automatic sprinkler system, although other methods of suppression can also be permitted when installed in accordance with the application of NFPA 13. Refer to Section 7.4.1 for drainage provisions.

7.1.1.8.2 If fixed extinguishing systems are utilized, the internal pressure shall be calculated in order to prevent gloves from failing or being blown off. Effects of system discharge on glovebox integrity shall be considered in evaluating the design of the system.

7.4.1.4.7 Some system discharge variables to be considered are enclosure pressures during a non-fire discharge, potential fire size, heat output created by the fire event, the latent heat of the suppression agent, potential impact to the ventilation system, evaporation rate of the suppression agent, and expansion ratio of the agent. Additional information can be found in the Guide to Estimating Enclosure Pressure and Pressure Relief Vent Area for Applications Using Clean Agent Fire Extinguishing Systems by the Fire Suppression Systems Association.

7.1.5 Fume Hoods

7.1.5.1 Fume hoods containing radioactive materials shall meet the requirements of NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals.

7.1.5.1.1 Lining materials shall be compatible with the chemical environment and capable of decontamination.

7.1.5.1.2 Fume hoods shall be compatible with the radiation exposure limits of the contamination environments. Where applicable, radiation protection requirements shall be determined in accordance with NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals.

7.1.5.2 Combustible materials shall not be stored in fume hoods and should be minimal to support the work activity. Where applicable, radiation protection requirements shall be determined in accordance with NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals.

7.1.5.3 Radioactive contaminated combustible waste shall not be stored or allowed to accumulate in fume hoods.

801-47 Log #38 Final Action: Accept in Principle (Chapter 7)

Submitter: William B. Till, Jr., Savannah River Nuclear Solutions, LLC

Recommendation: Revise text to read as follows:

Chapter 7 Special Hazards in Nuclear Facilities

7.1 General

7.1.1 Flammable and combustible liquids shall be stored and handled in accordance with NFPA 30, Flammable and Combustible Liquids Code.


7.1.3 Solid and liquid oxidizing agents shall be stored and handled in accordance with NFPA 481, Code for the Storage of Liquid and Solid Oxidizing Agents.

7.1.4 Combustible metals shall be stored and handled in accordance with NFPA 454, Standard for Combustible Metals.

7.1.5 Fire protection for laboratories involved with radioactive materials shall be in accordance with the requirements of NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals.

7.1.6 Ovens, furnaces, and incinerators involved with radioactive materials shall be in accordance with the requirements of NFPA 82, Standard on Incinerators and Waste and Linen Handling Systems and Equipment, and NFPA 68, Standard for Explosion-Proof Enclosures for Electrical Equipment.

7.1.7 Combustion and safety controls and interlocks shall be tested after maintenance activities, and at other intervals in accordance with the equipment manufacturer’s recommendations.

Backup Proposal 801-47
7.1.8 Accident Involving Fissionable Materials. Fissile materials shall be used, handled, and stored with provisions to prevent the accidental assembly of fissile material into critical masses.

7.2 Hospitals

7.2.1 The appropriate form of fire protection for areas where radioactive materials exist in hospitals shall be based on the fire hazard analysis.

7.2.2 Precautions shall be taken, as required, if the radioactive materials are stored or used in ways that cause them to be more susceptible to release from their containers or equipment.

7.3 Uranium Enrichment, Fuel Fabrication, and Fuel Reprocessing Facilities

7.3.1 General. Special hazards related to fire problems shall be controlled by at least one of the following:

1. Location
2. Safe operating procedures
3. Fixed protection systems
4. Inerting
5. Any other methods acceptable to the AHJ

7.3.2 Flammable and Combustible Liquids and Gases

7.3.2.1 Flammable and combustible liquids in enclosed spaces in which vapors have the potential to accumulate outside of the storage vessels, piping, and utilization equipment shall be installed with combustible vapor analyzers that are designed for the specific gas to be installed.

7.3.2.2 In enclosed spaces in which combustible gas could accumulate outside of the storage vessels, piping, and utilization equipment, combustible gas analyzers shall be installed.

7.3.3 Solvents

7.3.3.1 Where a flammable or combustible solvent is used, it shall be handled in a system that does not allow unrestricted release of vapor.

7.3.3.2 Approved operating controls and limits shall be established.

7.3.3.3 An approved fixed fire extinguishing system shall be installed or its absence justified to the satisfaction of the AHJ.

7.3.3.4 Solvent distillation and recovery equipment for flammable or combustible liquids shall be isolated from areas of use by 3-hour fire barriers.

7.3.3.5 In order to ensure the operation of process evaporators, such as solvent distillation and recovery equipment for flammable or combustible liquids, the analyzer shall be set to alarm at a concentration no higher than 25 percent of the lower explosive limit.

7.3.3.6 Safety controls and interlocks for combustible, flammable liquids and flammable gases and their associated delivery systems shall be tested on a predetermined schedule and after maintenance operations.

7.3.3.7 Hydraulic fluids used in press or other hydraulic equipment shall be the fire-resistant fluid type.

7.3.3.8 Solvents

7.3.3.8.1 Where a flammable or combustible solvent is used, it shall be handled in a system that does not allow unrestricted release of vapor.

7.3.3.8.2 Approved operating controls and limits shall be established.

7.3.3.8.3 An approved fixed fire extinguishing system shall be installed or its absence justified to the satisfaction of the AHJ.

7.3.3.8.4 Solvent distillation and recovery equipment for flammable or combustible liquids shall be isolated from areas of use by 3-hour fire barriers.

7.3.3.8.5 In order to ensure the operation of process evaporators, such as solvent distillation and recovery equipment for flammable or combustible liquids, the analyzer shall be set to alarm at a concentration no higher than 25 percent of the lower explosive limit.

7.3.3.8.6 Safety controls and interlocks for combustible, flammable liquids and flammable gases and their associated delivery systems shall be tested on a predetermined schedule and after maintenance operations.

7.3.3.8.7 Flammable and Combustible Liquids in Enclosed Spaces

7.3.3.8.7.1 Flammable and combustible liquids in enclosed spaces in which vapors have the potential to accumulate outside of the storage vessels, piping, and utilization equipment shall be isolated from areas of use by 3-hour fire barriers.

7.3.3.8.7.2 Safety control systems for combustible, flammable liquids and flammable gases and their associated delivery systems shall be tested on a predetermined schedule and after maintenance operations.

7.3.3.8.7.3 Flammable and combustible liquids in enclosed spaces in which vapors have the potential to accumulate outside of the storage vessels, piping, and utilization equipment shall be installed with combustible vapor analyzers that are designed for the specific gas to be installed.

7.3.3.8.7.4 In enclosed spaces in which combustible gas could accumulate outside of the storage vessels, piping, and utilization equipment, combustible gas analyzers shall be installed.

7.3.3.8.7.5 Solvent distillation and recovery equipment for flammable or combustible liquids shall be isolated from areas of use by 3-hour fire barriers.

7.3.3.8.7.6 Safety controls and interlocks for combustible, flammable liquids and flammable gases and their associated delivery systems shall be tested on a predetermined schedule and after maintenance operations.

7.3.4 Pyrophoric Materials

7.3.4.1 Operating controls and limits for the handling of pyrophoric materials shall be established to the satisfaction of the AHJ.

7.3.4.2 A supply of an extinguishing medium shall be available in all areas where fires and cuttings of pyrophoric materials are present. (See Section 7.4.4)

7.4 Hot Cells, Caves, Glove Boxes, and Hoods

7.4.1 Where gloves or glove boxes are installed in the cell or cave, and its ventilation system have the potential to cause a breach of the hot cells, glove boxes, hoods, or hatches, a means shall be provided to restrict the passage of flame between the hot cells, glove boxes and hoods that are connected.

7.4.2 Fire suppression shall be provided in all hot cells, caves, glove boxes and hoods that are connected.

7.4.3 All hot cells, caves, glove boxes, and hoods shall be provided with a fixed extinguishing system.

7.4.4 Fire suppression shall be provided in all hot cells, caves, glove boxes, and hoods that are connected.

7.4.5 Research and Production Reactors

7.4.5.1 Reactivity control systems shall be capable of preventing negative reactivity to achieve and maintain subcritical conditions in the event of a fire.

7.4.5.2 Inventory and pressure control shall be capable of controlling coolant level such that fuel damage as a result of a fire is prevented.

7.4.5.3 Decay heat removal shall be capable of removing heat from the reactor core in the event that fuel damage as a result of a fire is prevented.

7.4.5.4 Vital auxiliary systems shall be capable of performing the necessary functions in the event of a fire.

7.4.5.5 Process monitoring shall be capable of providing the necessary indication in the event of a fire.

Replace with the following Chapter 7 Facilities, Processes, and Special Hazards

7.1 General

7.1.1 Flammable and Combustible Liquids and Gases

7.1.1.1 Flammable and combustible liquids shall be stored and handled in accordance with NFPA 30, Flammable and Combustible Liquids Code.

7.1.1.2 Flammable and combustible gases shall be stored and handled in accordance with NFPA 54, National Fuel Gas Code; NFPA 55, Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks; and NFPA 58, Liquefied Petroleum Gas Code.

7.1.1.3 In enclosed spaces in which combustible gas could accumulate outside of the storage vessels, piping, and utilization equipment, combustible-gas analyzers that are designed for the specific gas shall be installed.

7.1.1.4 Flammable and combustible liquids in enclosed spaces in which vapors have the potential to accumulate outside of the storage vessels, piping, and utilization equipment shall be installed with combustible-vapor analyzers appropriate for the vapor generated.

7.1.1.5 The analyzer specified by 7.1.1.3 or 7.1.1.4 shall be set to alarm at a concentration no higher than 25 percent of the lower explosive limit.

7.1.1.6 Safety controls and interlocks for combustible, flammable liquids and flammable gases and their associated delivery systems shall be tested on a predetermined schedule and after maintenance operations.

7.1.1.7 Hydraulic fluids used in press or other hydraulic equipment shall be the fire-resistant fluid type.

7.1.1.8 Solvents

7.1.1.8.1 Where a flammable or combustible solvent is used, it shall be handled in a system that does not allow unrestricted release of vapor.

7.1.1.8.2 Approved operating controls and limits shall be established.

7.1.1.8.3 An approved fixed fire extinguishing system shall be installed or its absence justified to the satisfaction of the AHJ.

7.1.1.8.4 Solvent distillation and recovery equipment for flammable or combustible liquids shall be isolated from areas of use by 3-hour fire barriers.

7.1.1.8.5 In order to ensure the operation of process evaporators, such as solvent distillation and recovery equipment for flammable or combustible liquids, the analyzer shall be set to alarm at a concentration no higher than 25 percent of the lower explosive limit.

7.1.1.8.6 Safety controls and interlocks for combustible, flammable liquids and flammable gases and their associated delivery systems shall be tested on a predetermined schedule and after maintenance operations.

7.1.1.8.7 NFPA 115, Standard for Laser Fire Protection shall apply to processes and systems utilizing lasers.

7.1.1.8.8 In order to ensure the operation of process evaporators, such as solvent distillation and recovery equipment for flammable or combustible liquids, the analyzer shall be set to alarm at a concentration no higher than 25 percent of the lower explosive limit.

7.1.1.8.9 Safety controls and interlocks for combustible, flammable liquids and flammable gases and their associated delivery systems shall be tested on a predetermined schedule and after maintenance operations.

7.1.2 Specialized Processes and Equipment

7.1.2.1 Furnaces or Ovens used in facilities handling radioactive materials shall comply with the applicable requirements of NFPA 86, Standard for Ovens and Furnaces, 86C, Standard for Industrial Furnaces using a Special Processing Atmosphere or 86D, Standard for Industrial Furnaces using Vacuum as an Atmosphere appropriate.

7.1.2.2 NFPA 115, Standard for Laser Fire Protection shall apply to processes and systems utilizing lasers.

7.1.2.3 Incinerators shall be in accordance with NFPA 82, Standard on Incinerators and Waste and Linen Handling Systems and Equipment.

7.1.3 Special Materials

7.1.3.1 Combustible metals shall be stored and handled in accordance with NFPA 484, Standard for Combustible Metals.

7.1.3.2 Operating controls and limits for the handling of pyrophoric materials shall be established to the satisfaction of the AHJ.

7.1.3.3 A supply of an appropriate extinguishing medium shall be available in all areas where fines and cuttings of pyrophoric materials are present.

7.1.3.4 Solid and liquid oxidizing agents shall be stored and handled in accordance with NFPA 430, Code for the Storage of Liquid and Solid Oxidizers.

7.1.3.5 Fissile materials shall be used, handled, and stored with provisions to prevent the accidental assembly of fissile material into critical masses.

7.1.3.6 Fissile materials shall be arranged such that neutron moderation and reflection by water shall not present a criticality hazard.

7.1.3.7 For locations where fissile materials might be present and could create a potential criticality hazard, combustible materials shall be excluded.

7.1.4 Hot Cells, Caves, Glove Boxes, and Hoods

7.1.4.1 All hot cells, caves, glove boxes, and hoods shall be provided with fire detection in accordance with NFPA 72.

7.1.4.2 Fire suppression shall be provided in all hot cells, caves, glove boxes, and hoods.

7.1.4.3 Hot Cells and Caves

7.1.4.3.1 Hot cells and caves shall be of noncombustible construction.

7.1.4.3.2 Where hydraulic fluids are used in master slave manipulators, fire-resistant fluids shall be used.
Chapter 7 Facilities, Processes, and Special Hazards

7.1* General.

7.1.1 Flammable and Combustible Liquids and Gases

7.1.1.1 Flammable and combustible liquids shall be stored and handled in accordance with NFPA 30, Flammable and Combustible Liquids Code.

7.1.1.2 Flammable and combustible gases shall be stored and handled in accordance with NFPA 54, National Fuel Gas Code; NFPA 35, Compressed Gases and Cryogenic Fluids Code; and NFPA 58, Liquefied Petroleum Gas Code.

7.1.1.3* In enclosed spaces in which combustible gas could accumulate outside of the storage vessels, piping, and utilization equipment, combustible-gas analyzers that are designed for the specific gas shall be installed.

7.1.1.4 Flammable and combustible liquids in enclosed spaces in which vapors have the potential to accumulate outside of the storage vessels, piping, and utilization equipment shall be installed with combustible-vapor analyzers appropriate for the vapors generated.

7.1.1.5 The analyzer specified by 7.1.1.3 or 7.1.1.4 shall be set to alarm at a concentration no higher than 25 percent of the lower explosive limit.

7.1.1.6 Safety controls and interlocks for combustible, flammable liquids and flammable gases and their associated delivery systems shall be tested on a predetermined schedule and after maintenance operations.

7.1.1.7 Hydraulic fluids used in presses or other hydraulic equipment shall be the fire-resistant fluid type.

7.1.1.8 Solvents.

7.1.1.8.1* Where a flammable or combustible solvent is used, it shall be handled in a system that does not allow uncontrolled release of vapors.

7.1.1.8.2 Approved operating controls and limits shall be established.

7.1.1.8.3 An approved fixed fire-extinguishing system shall be installed or the appropriate emergency responders not initiate the correct response of the combustible agent or the AHJ.

7.1.1.8.4* Solvent distillation and recovery equipment for flammable or combustible liquids shall be isolated from areas of use by 3-hour fire barriers.
7.1.1.8* In order to ensure the operation of process evaporators, such as Plutonium Uranium Reduction and Extraction (PUREX), means shall be provided to prevent entry of water-soluble solvents into the evaporators.

7.1.2 Specialized glove boxes and equipment shall be designed to withstand pressures of at least 9 psi and shall be constructed of noncombustible or fire retardant materials.

7.1.3 特殊材料

7.1.2.2 NFPA 115, as appropriate.

7.1.1.8.5* NFPA 484, Standard for Laser Fire Protection

7.1.3 Special Materials. Incinerators and Waste and Linen Handling Systems and Equipment

7.1.2.3 Incinerators shall be in accordance with NFPA 82, Standard for Incinerators and Waste and Linen Handling Systems and Equipment.

7.1.3.1 Combustible metals shall be stored and handled in accordance with NFPA 484, Standard for Combustible Metals.

7.1.3.2* Operating controls and limits for the handling of pyrophoric materials shall be established to the satisfaction of the AHJ.

7.1.3.3 As a supplementary precaution, an extinguishing medium shall be available in all areas where fines and cuttings of pyrophoric materials are present.

7.1.3.4 Solid and liquid oxidizing agents shall be stored and handled in accordance with NFPA 430, Code for the Storage of Liquid and Solid Oxidizers.

7.1.3.5 Fissile materials shall be used, handled, and stored with provisions to prevent the accidental assembly of fissile material into critical masses.

7.1.3.5.1 Fissile materials shall be arranged such that neutron moderation and reflection by water shall not present a criticality hazard.

7.1.3.5.2* For locations where fissile materials might be present and could create a potential criticality hazard, combustible materials shall be excluded.

7.1.4 Hot Cells, Caves, Boxes, and Hoods

7.1.4.1* All hot cells, caves, glove boxes, and hoods shall be provided with fire detection in accordance with NFPA 72.

7.1.4.1.4* Fire suppression shall be provided in all hot cells, caves, glove boxes, and hoods.

7.1.4.2* The preferred method of suppression is an automatic sprinkler system, although other methods of suppression can also be permitted when installed in accordance with the applicable NFPA standard. Refer to Section 10.11 for fire protection provisions.

7.1.4.3 Hot Cells and Caves

7.1.4.3.1 Hot cells and caves shall be of noncombustible construction.

7.1.4.3.2* Where hydraulic fluids are used in master slave manipulators, fire-resistant fluids shall be used.

7.1.4.3.3 Combustible materials inside the cells and caves shall be kept to a minimum.

7.1.4.3.4 If explosive concentrations of gases or vapors are present, an inert atmosphere shall be provided, or the cell or cave and its ventilation system shall be designed to withstand pressure excursions.

7.1.4.4* Glove Boxes and Hoods

7.1.4.4.1 The glove box, windows, and hoods shall be of noncombustible construction.

7.1.4.4.2* The number of gloves shall be limited to the minimum necessary to perform the operations.

7.1.4.4.2* Gloves are typically the most easily ignitable component of gloveboxes and, therefore, should be minimized. When gloves fail, potential loss of confinement can result.

7.1.4.4.3* When the gloves are not being used, they shall be withdrawn and secured outside the box.

7.1.4.4.3 Securing of the gloves outside the box positions them such that fixed fire suppression in the room can be more effective and that they do not contribute to the fuel loading in the glovebox or provide a source of ignition to other fuels in the glovebox. Positioning them outside also reduces potential for gloves contributing to fires inside the glovebox.

7.1.4.4.4 When the gloves are no longer needed for operations, they shall be removed and glove port covers installed.

7.1.4.4.5 Doors shall remain closed when not in use.

7.1.4.4.6 The number of combustibles shall be limited to the quantity necessary to perform the immediate task.

7.1.4.4.7* Fixed inerting systems shall not be utilized in lieu of fire suppression systems.

7.1.4.7* Fire suppression should be considered in addition to fixed inerting systems to address potential concerns during glovebox maintenance or failure of inerting systems.

7.1.4.8* If fixed extinguishing systems are utilized, the internal pressurization shall be calculated in order to prevent gloves from failing or being blown off.

7.1.5 Construction, Demolition, and Renovation

7.1.5.1* Construction, demolition, and renovating activities that conform to the requirements of NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations, such as the following:

(a) Scaffolding, formworks, decking, temporary enclosures, and partitions used in buildings shall be of noncombustible or fire retardant treated.

(b) If wood is used, it shall be one of the following:

(i) Treated, pressure-impregnated fire retardant lumber.

(ii) Treated with a listed fire retardant coating.

(iii) Timbers 15.2 cm × 15.2 cm (6 in. × 6 in.) or larger.

(iv) Tarpaulins (fabrics) and plastic films shall be certified to conform to the weather-resistant and flame-resistant materials described in NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

A.7.1.5.4.3(9)* The use of noncombustible or fire retardant concrete formwork is especially important for large structures (e.g., reactor buildings and turbine generator buildings) where large quantities of forms are used.

5.10 for drainage provisions.

7.4 Laboratories

7.4.3 Laboratory enclosures shall comply with the requirements for gloveboxes and hoods unless the FHA concludes that the amount of radioactive material is inconsequential.

7.9 Irradiation Facilities

7.9.1* Facilities handling waste (Reserved)

7.9.2* Facilities Handling Waste (Reserved)

8.7* Accelerators (Reserved)

7.8 Process Facilities (Reserved)

8.7.1 Accelerators (Reserved)

8.7.2 Process Facilities (Reserved)

8.7.3* Irradiation Facilities (Reserved)

Committee Statement: The committee agreed with the suggested changes, but made editorial corrections and some technical revisions. Separation was added to 7.3.1(1) to clarify the intended use of location as a means of separating special hazards. The cross reference in 7.4.2 that pointed to 7.4.7 was corrected to refer to 7.1.3. Annex notes were added to 7.1.1.3 and 7.1.1.4 to clarify enclosed spaces. An annex note was added to 7.1.4.4.2 to express the reason why the number of gloves in a glovebox are required to be at the minimum necessary for operations. An annex note was added to 7.1.4.4.3 to explain the reason for withdrawing and securing gloves from a glovebox when not in use. A reference was added to 7.1.4.2 for drainage requirements. An annex note was added to 7.1.4.1 to indicate that sprinklers can be used as a possible means of fire detection. An annex note was added to 7.1.4.4.7 to indicate the use of fixed suppression to provide a mitigation function that is in addition to fixed inerting systems. Scaffolding requirements were removed from 4.3.9 to be addressed as part of the special hazards provisions, rather than be included as a broad sweeping general requirement.

The committee recognized that there are facilities that handle radioactive materials that are not addressed by the standard and added reserved sections for possible inclusion. Interested parties are encouraged to submit comments that add appropriate requirements for those particular facility sections in Chapter 7 (Sec. 7.6 through 7.9 of 801-77 (Log #38).

Number Eligible to Vote: 26

Ballot Results: Affirmative: 22 Negative: 2
Comment on Proposal No:

Submitter:

________________________________________________________________

(7.1.3.5.2)

________________________________________________________________

Revise the and A7.1.3.5, A7.1.3.5.3, A7.1.3.5.4 as follows: 7.1.3.5 Notice: Fissile materials shall be used, handled, and stored with provisions to prevent the accidental assembly of a critical mass. In many cases, the areas are critically safe even when completely submerged in water. Emergency planning should include the effects of fire-fighting water on critically safe areas, assuming disruption of the contents by the accident or by fire hoses. If manual fire fighting poses a potential hazard under the worst conditions, then it is essential that any required fire-extinguishing capability be self-contained and automatic in operation.

Committee Statement: The committee moved the annex A7.1.2 (2008) from Section 7.1.3.5.2 to A7.1.3.5, as it was moved in the ROP, as the more appropriate associated paragraph. Section 7.1.3.5.2 was not deleted, but was revised to remove some ambiguity and allow for some amount of combustibles in use with fissile material.

Number Eligible to Vote: 28

Ballot Results: Affirmative: 26

Ballot Not Returned: 2 Kassawara, R., Najafi, B.

801-24 Log #20  Final Action: Accept in Principle in Part (7.1.4.2)

Submitter: Wayne Holmes, Burlington, NC

Comment on Proposal No: 801-47

Recommendation: Revise text to read as follows:

7.1.4.2* Fire suppression shall be provided in all hot cells, caves, glove boxes, and hoods as determined by the FHA.

Substantiation: Not all enclosure need fire suppression. In some cases, it may be necessary to prohibit fire suppression in some enclosures. The need for detection depends on the degree of hazard. Fire suppression should be provided for enclosures based on the hazard as determined by the FHA.

Committee Meeting Action: Accept in Principle in Part

Reject the submitted change and revise A7.1.4.2 as follows:

A7.1.4.2* The preferred method of suppression is an automatic sprinkler system, although other methods of suppression can also be permitted when installed in accordance with the applicable NFPA standard. Refer to Section 5.10 for drainage provisions.

Small hot cells, caves, gloveboxes, and hoods containing limited amounts of combustibles, minimal potential for ignition, and limited quantities of radioactive materials, can be analyzed to demonstrate an equivalent level of safety.

Committee Statement: The committee did not agree with deferring to the FHA as the default position. The committee recognizes that there may be situations where fire suppression is not necessary and cites some considerations in the annex. Relief from this requirement can be obtained through AHJ under the equivalency rule of 1.5 (2008).

Number Eligible to Vote: 28

Ballot Results: Affirmative: 26

Ballot Not Returned: 2 Kassawara, R., Najafi, B.

801-25 Log #30 Final Action: Accept in Principle in Part (7.1.4.2)

Submitter: Neal T. Hara, Idaho National Laboratory

Comment on Proposal No: 801-47

Recommendation: Comment to Accept in Principle and revise proposed new Section 7.1.4.2 as follows:

"7.1.4.2* Fire suppression shall be provided in all hot cells, caves, glove boxes, and hoods as determined by the fire hazard analysis"

Substantiation: Per the accepted ROP 801-52, a Fire Hazards Analysis (FHA) will be required to analyze hazards associated with all hot cells, caves, glove boxes, and hoods. The FHA determines what type of suppression is necessary for those enclosures. This same analysis should also be allowed to determine if internal suppression is necessary. The requirement for providing fire suppression for the inside of an enclosure as proposed in the ROP 801-52 is overly conservative.

Application of the rigid requirement has and will continue to result in substantial costs for systems that may only provide a negligible increase in protection, especially for those small systems with minimal amounts of radioactive materials or other fire hazards.

The committee’s stance concerning the intention that all glove boxes, caves, hot cells, and hoods require fire suppression systems is highly prescriptive and requires application of the requirements without an allowance to evaluate the risk to personnel and facilities from fire and/or release of radioactive materials. The following two existing sections indicate that it is the intent of the standard to base the protection on risk and not a prescriptive requirement:

4.2.5 The evaluation shall consider acceptable means for separation or control of hazards, the control or elimination of ignition sources, and the suppression of fires.

Related Comments 801-22, 801-24, 801-25, 801-27, 802-29, and 801-32

801-22 Log #18 Final Action: Accept in Principle (7.1.3.5.2)

Submitter: Wayne Holmes, Burlington, NC

Comment on Proposal No: 801-47

Recommendation: Delete Section 7.1.3.5.2 in its entirety.

Substantiation: The requirement expressed in Section 7.1.3.5.2 is an absolute. All combustible materials must be excluded where fissile material might be present. This is not necessary, is difficult to achieve, and, in many cases might be impossible. The intent of this paragraph is adequately covered by other requirements in NFPA 801 and will be addressed in any FHA that evaluates requirements for protection of combustible materials.

Committee Meeting Action: Accept in Principle

Revise the and A7.1.3.5, A7.1.3.5.3, A7.1.3.5.4 as follows: 7.1.3.5* Fissile materials shall be used, handled, and stored with provisions to prevent the accidental assembly of fissile material into critical masses.
6.7.1* Fire suppression systems and equipment shall be provided in all areas of a facility as determined by the fire hazards analysis. The following newly proposed and accepted section 6.1.1 also indicates that a graded approach commensurate with the hazard is appropriate (ROP 801-40): 6.1.1 A fire hazards analysis shall be performed to determine the fire protection requirements for the facility, using a graded approach based on the hazard presented by the facility. The substantiation supporting this section goes on to state that a one-size-fits-all approach is not the best approach for facilities that span a wide spectrum of risk. This same approach should be used for hot cells, caves, glove boxes and hoods.

The committee stance is also not consistent with many other portions of the standard that base the level of protection on the risk as analyzed by the FHA. Other annexes within the current version of NFPA 801, where fire protection features are determined by the fire hazard analysis, include but are not limited to the following sections 5.4, 5.7.2, 5.9.2.1, 5.9.3.3, 5.9.4.2, 5.9.4.3, 5.9.5.5, 5.9.5.9, 5.9.5.12, 6.1.1.6, 6.1.2, 6.1.3, 6.2.2, 6.4.1, 6.4.2, 6.5.1, and 6.8.2.

Committee Action: Accept in Principle in Part

Reject the submitted change and revise A.7.1.4.2 as follows:

A.7.1.4.2 The preferred method of suppression is an automatic sprinkler system, although other methods of suppression can also be permitted when installed in accordance with the applicable NFPA standard. Refer to Section 5.10 for drainage provisions.

Small gloveboxes, caves, glove boxes, and hoods containing limited amounts of combustibles, minimal potential for ignition, and limited quantities of radioactive materials, can be analyzed to demonstrate an equivalent level of safety.

Committee Statement: The committee did not agree with deferring to the FHA as the default position. The committee recognizes that there may be situations where fire suppression is not necessary and cites some considerations in the annex. Relief from this requirement can be obtained through AHJ under the equivalency rule of 1.5 (2008).

Number Eligible to Vote: 28
Ballot Results: Affirmative: 26
Ballot Not Returned: 2 Kassawara, R., Najafi, B.

801-27 Log #CC1 Final Action: Accept (7.1.4.3.4.1)

Submitter: Technical Committee on Fire Protection for Nuclear Facilities, Comment on Proposal No: 801-66
Recommendation: Revise 7.1.4.3.4 of ROP 801-66 as follows:

7.1.4.3.4 During normal or abnormal operating conditions, if there is potential for combustible gases or vapors to be present in excess of 25 percent of the lower flammability limit, then an inerting atmosphere shall be provided.

7.1.4.3.4.1 During normal or abnormal operating conditions involving hot cells, hoods, or caves, if there is potential for combustible gases or vapors to be present in excess of 25 percent of the lower flammability limit, then ventilation shall be permitted as an alternative method to 7.1.4.3.4.

Substantiation: This editorially corrects the cross reference as it appears in ROP 801-66.

Committee Meeting Action: Accept
Number Eligible to Vote: 28
Ballot Results: Affirmative: 26
Ballot Not Returned: 2 Kassawara, R., Najafi, B.

801-29 Log #CC2 Final Action: Accept (7.1.4.4.4.1)

Recommendation: Revise 7.1.4.4.1 and add a new annex note as follows:

7.1.4.4.1* The glove box, windows, and hoods shall be of noncombustible construction.

7.1.4.4.1 The potential number of considerations for glovebox construction, based on the process, the materials, and associated hazards are vast and complex, involving both internal and external hazards, fire protection scenarios, and associated protection measures. Because of this, detailed analysis would be required to use alternative measures. The user should refer to the NFPA Research Foundation document, "Glovebox Fire Protection: A Literature Review" in regards to the detailed analysis. The link for the report can be found here: http://www.nfpa.org/assets/files/PDF/Research/RFLiteratureReview.pdf

Substantiation: The committee added clarifying annex material that addresses the nature and historical perspective with regards to the nature of combustible and noncombustible materials.

Committee Meeting Action: Accept
Number Eligible to Vote: 28
Ballot Results: Affirmative: 26
Ballot Not Returned: 2 Kassawara, R., Najafi, B.

801-32 Log #CC3 Final Action: Accept (7.4.4.8)

Submitter: Technical Committee on Fire Protection for Nuclear Facilities, Comment on Proposal No: 801-3
Recommendation: Revise 7.1.4.4.7 and create new 7.1.4.4.7.1 as follows:

7.1.4.4.7.1 If fixed extinguishing systems are utilized, the internal protection shall be engineered in order to prevent gloves from being blown off. Effects of system discharge on glovebox integrity shall be considered in evaluating the design system.

7.1.4.4.7.1 The activation of the system shall not create a positive or negative enclosure pressure that will compromise enclosure containment integrity; this includes but is not limited to: failure to the enclosure structure, the gloves or glove attachment points, ventilation system or enclosure pressurization system.

Substantiation: The committee chose the additional wording to further address the enclosure integrity in relation to the fire suppression system activation. The change to 7.1.4.4.7 coordinates the action taken under Log #36.

Committee Meeting Action: Accept
Number Eligible to Vote: 28
Ballot Results: Affirmative: 26
Ballot Not Returned: 2 Kassawara, R., Najafi, B.

**Backup Proposals 801-66, 801-2, 801-3**

801-66 Log #57 Final Action: Accept in Principle (7.4.4.9 and 7.4.4.9.1 (New))

Submitter: Neal T Har, Idaho National Laboratory
Recommendation: Insert new steps 7.4.4.9 and 7.4.4.9.1. Renumber existing 7.4.4.9 and associated Annex to 7.4.4.10:

7.4.4.9 If explosive concentrations of gases or vapors are present in a glove box, an inert atmosphere shall be provided.

7.4.4.9.1 Alternate fire protection measures may be used if documented in a fire hazards analysis and approved by the AHJ.

Substantiation: There have been past events where explosions or deflagrations have occurred within glove boxes, resulting in potential hazards to personnel. A similar step, for explosive atmospheres, currently exists for hot cells and caves (step 7.4.3.5) and should also be applied to glove boxes. Also, this allowance for the fire hazard analysis to dictate protection is also consistent with many other requirements described in NFPA 801.

Committee Meeting Action: Accept in Principle

Further revise 7.1.4.3.4 from 801-47 (Log #38) to read as follows:

7.1.4.3.4 During normal or abnormal operating conditions, if there is potential for combustible gases or vapors to be present in excess of 25 percent of the lower flammability limit, then an inerting atmosphere shall be provided.

7.1.4.3.4.1 During normal or abnormal operating conditions involving hot cells, hoods, or caves, if there is potential for combustible gases or vapors to be present in excess of 25 percent of the lower flammability limit, then ventilation shall be permitted as an alternative method to 7.1.4.3.4.

Committee Meeting Action: Accept

Further modify paragraph 7.1.4.3.4 to incorporate the suggestions being presented here. 7.1.4.3.4, as revised here, will be inserted in 7.1.4.3 of 801-47 (Log #38) and subsequent paragraphs will be renumbered. 7.1.4.3.4 of 801-47 (Log #38) will be deleted.

Number Eligible to Vote: 26
Ballot Results: Affirmative: 24
Ballot Not Returned: 2 Holmes, W., Najafi, B.

801-2 Log #CP4 Final Action: Accept (Entire Document)

Submitter: Technical Committee on Fire Protection for Nuclear Facilities, Recommendation: Revise throughout the standard:

Pre-Incident Fire Plan

Substantiation: The committee revised the term to be consistent with NFPA 1620, Standard for Pre-Incident Planning.

Committee Meeting Action: Accept
Number Eligible to Vote: 28
Ballot Results: Affirmative: 24
Ballot Not Returned: 2 Holmes, W., Najafi, B.

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**Supplemental Agenda July 29-August 1, 2013**

**Page 1023 of 1861**
The objectives of this standard are to reduce personal hazards, provide protection from property damage, and minimize process interruption resulting from fire.

Annex A: Explanatory Material A.1.1.1 The objectives of this standard are to reduce personal hazards, provide protection from property damage, and minimize process interruption resulting from fire.

1.3 Goals.
   1.3.1 Nuclear Safety Goal. The nuclear safety goal shall be to provide reasonable assurance that a fire during any operational mode and plant configuration will not prevent the plant from achieving and maintaining the fissionable material in a safe and stable condition.

1.3.2 Radioactive and Hazardous Material Release Goal. The radioactive and hazardous material release goal shall be to provide reasonable assurance that a fire will not result in the release of radiological or hazardous material that adversely affects the public, plant personnel, or the environment.

1.3.3 Life Safety Goal. The life safety goal shall be to provide reasonable assurance that loss of life in the event of fire will be prevented for facility occupants.

1.4 Performance Objectives.
   1.4.1 Nuclear Safety Objectives. In the event of a fire during any operational mode and plant configuration, the plant nuclear safety objectives shall be as follows:

   (1) Reactivity control — capable of achieving and maintaining subcritical conditions

   (2) Cooling — capable of achieving and maintaining decay heat removal

   (3) Fission product boundary — capable of maintaining fundamental fuel geometry

   (4) Heat transfer medium inventory control — capable of maintaining the necessary quantity of heat transfer medium

   1.4.2 Radioactive and Hazardous Material Release Objective. The radiological and hazardous material release objective shall be to prevent exposure, uncontrolled release, or unacceptable dispersion of hazardous substances, nuclear material, or radioactive material, due to fires.

   1.4.3 Life Safety Objectives. The life safety objectives shall be to protect occupants not intimate with the initial fire development from loss of life and improve the survivability of those who are intimate with the fire development, as well as to provide protection for Personnel required to carry out manual actions to achieve the nuclear safety objectives and emergency personnel.

Substantiation: It is recommended that goals and objectives be added to the administration section of NFPA 801 so that they are clear and unambiguous for the responsible persons (Sentence 1.2.2) and to facilitate the proposal and review of equivalencies (Sentence 1.5).

Modifying the goals and objectives from the current Annex note reflects the current practice of NFPA 805 and 806.

It is recommended that the radioactive release goal and objective be modified to include other hazardous materials as it is often the case that the use or modification of radioactive materials (such as at mines, mills, conversion facilities and processing facilities) involves sufficient quantities of other hazardous materials (such as hydrogen, hydrofluoric acid, propane, kerosene, etc). These additional hazardous materials should also be considered in relation to the fire protection goals and objectives of the Standard and within the fire hazard analysis.
proceed with the discussion on the Certified Amending Motion on NFPA 801. Microphone 6, please.

MR. MINISTER: My name is Andrew Minister, Battelle Pacific Northwest National Laboratories, and I move to accept Comment 801-16.

MR. BRADLEY: Thank you. There's a motion on the floor to accept Comment 801-16. Is there a second?

A VOICE: Second.

MR. BRADLEY: We have a motion and we have a second. Please proceed with the discussions on the motion.

MR. MINISTER: I've been a protection fire engineer for 38 years, and I have worked in the nuclear fire protection industry for 32 years including the analysis and design of special hazards and nuclear facilities.

This motion seeks to incorporate changes to the ROP revisions that were made to Chapter 7 by approving my comments that were made on the ROP. These were very extensive changes made to Chapter 7, and if you look at the ROP and the ROC, they cover more than a page of that very fine print.

ROP 801-47 was written to revise major portions of Chapter 7. Chapter 7 addresses special hazards in nuclear facilities. In the ROP revision, the Committee made major changes to the
content of Chapter 7 and to the basis of how fire protection is applied to special hazards in nuclear facilities.

The special hazards that my motion primarily addresses are hot cells, glove boxes, hoods, and caves. The 2008 edition and previous editions of NFPA 801 evaluate the hazards of hot cells, glove boxes, hoods, and caves from a deterministic perspective in which a fire hazard analysis is used to determine the hazard and apply the appropriate levels of fire protection and fire suppression based on the hazards that will be present in them.

The ROP changed the fire protection for hot cells, glove boxes, hoods, and caves from a deterministic analysis to prescriptive requirements for the use of combustible gas analyzers, installation of three-hour fire-rated barriers for solvent distillation of recovery equipment, and installation of automatic fire suppression in all hot cells, glove boxes, hoods, and caves with no regard to whether a hazard exists that would require this type of protection or not.

The term "nuclear facilities" as applicable to 801 represents an extremely broad spectrum of facilities with tremendous variations in mission, function, design, operations, hazardous chemicals, radioactive material, inventories, fire risks, and protection needs. The types of
facilities covered by NFPA 801 and the requirements of this chapter may include small research and development laboratories, large processing facilities, or nuclear non-powered reactors. The fire protection needs of these facilities are as varied as the facilities themselves. For this reason, inflexible prescriptive fire protection requirements do not meet the specific facility and hazard protection needs, and the fire hazards analysis becomes paramount in defining and evaluating the appropriate level of protection of hazards and configurations unique to these facilities.

The importance of the FHA and flexibility of the application of requirements for the variability and nuclear facility hazards is the primary basis for the proposed changes, and this approach is consistent with other requirements for performance-based firehouse analysis.

MR. BRADLEY: Your time is up. Will you please finish?

MR. MINISTER: -- 5, 6 of the standard. I urge you to vote in favor of this motion.

MR. BRADLEY: Mr. Till, would you like to offer the Committee's position?

MR. TILL: Yes, sir. Thank you. The Committee as part of the 2013 Revision of NFPA 801 considered a complete revision of Chapter 7 of the previous
edition of the document to correct numerous errors and to incorporate directly relatable research on the subject. In fact, nearly 25 percent of the public input on the document was on Chapter 7.

It should be noted that the Committee used its input to this revision of NFPA 801, the NFPA Research Foundation Project Report on Glove Box Fire Protection. This project was initiated at the request of the Technical Committee to ensure that all available research on the subject of fire protection and, particularly, glove boxes, but also including many of the facilities under the purview of NFPA 801 was identified to support the technical arguments within the standard.

The report was completed in September of 2010 and includes lessons learned from numerous incidences in these types of facilities. The Committee, with no descending votes, adopted the specific portions of the comment and this was reaffirmed not once, but twice, the latest being the meeting in April of the Technical Committee.

Specifically, the issue of NFPA 801 applicability was previously resolved via a task group appointed expressly for that purpose. The task group reported its recommendation during this revision Cycle, and as the speaker has noted, the wide applicability of the document from hospitals to nuclear research production reactors, indeed, illustrates how broad the document is applied
across the area of facilities handling radioactive materials.

The requested flexibility of a performance-based approach based on results of fire hazards analysis was rejected on the grounds that it was noted previously that the scope of 801 is, indeed, broad; and there were concerns on the parts of the regulatory authorities on the ability to reach appropriate technical conclusions especially in light of the fact that the authority having jurisdiction does not generally review nor approve these documents.

The common approach of allowing the AHJ to approve deviations was deemed sufficient for those cases where the requirements may be stringent based on the risk. This approach ensures adequate analysis acceptable to the AHJ.

The proposed language applicable to hoods specifically deviates from the type addressed in the document. A new definition was added as part of resolution of the motion submitter's comment.

The adoption of these changes would require substantial revision of the documents specifically with regard to deviation of requirements based on fire hazards analysis determination.

The Committee respectfully recommends
rejection of the motion, and thanks you for the
support of the Technical Committee’s efforts.

MR. BRADLEY: Thank you, Mr. Till. With that,
we will open the debate on the motion. Please
provide your name and affiliation and whether you
are speaking in support or against the motion.
Microphone Number 6.

MR. MINISTER: Andrew Minister, Battelle
Pacific Northwest National Laboratories in favor of
the motion.

In the substantiation provided in the ROP
and the rejection of my comment in the ROC, the
Committee did not provide any substantive evidence
that there were needs for the change to go to a
prescriptive requirement from the deterministic
perspective.

Fire hazards analysis has been used very
successfully for many, many years to analyze the
hazards and apply appropriate levels of control.
Fire hazards analysis has proven to be very
effective in the fact that the number of fires
related to glove boxes, hot cells, caves, and hoods
has gone down since the major fires the DOE had in
the ‘60s and ‘70s, and there has not been any

serious fires or serious events with radioactive
releases or contaminations in the last ten years
that would justify such a significant change.

MR. BRADLEY: Microphone Number 3, please.

Provide your name and affiliation and whether
you’re speaking in support or against the motion.

MS. MAKEY: Nancy Makey, Battelle, Idaho

National Lab, speaking for the motion.

We are a national nuclear research
facility. We deal with this Code all the time.
The firehouse's analysis is our methodology for
determining the proper suppression and control
methodology we are going to implement.
Prescriptive, giving us specifics that we have to
follow is not productive because we deal with so
many diverse materials, one size does not fit all.

We have to do this analysis anyway to be
able to determine what is appropriate. Sometimes
it's gaseous suppression systems. Sometimes it's a
manual suppression such as a dry powder. Sometimes
it's a combination of lots of things, controlling
combustibles, inert atmospheres. We use what is
appropriate for the material that we are dealing
with.

Telling us to use sprinklers creates
problems for us that sometimes makes things worse
than the fire we’re trying to protect against.

Water in the nuclear world can often cause
criticalities. That is not something we like to
see. Also, water can create pressure in a very
small area such as a glove box. You get leaks, you

Page 63
now have contamination spread where you don't want it.

Prescribing to us that we have to follow a specific set of rules deviates from a philosophy and a methodology that has been proven by history to work. So why are we changing now because somebody has decided it's a good idea?

I ask you, please support this motion.

There is no basis that we can find that supports that we should go back to a prescriptive methodology. Thank you.

MR. BRADLEY: Thank you. Microphone 6, please.

State your name, affiliation, whether you're speaking for or against the motion.

MR. BARILO: My name is Nick Barilo from the Pacific Northwest National Laboratory, speaking in favor of the motion. I also would like to say that I've been a fire protection engineer for nuclear and radiological facilities for 28 years.

Currently, NFPA 801 requires a documented fire hazards analysis to be performed for new and existing facilities handling radioactive materials to ensure that fire prevention and fire protection requirements have been evaluated. The FHA is used in the standard to determine fire separation distances, control of hazards, including the storage and use of radioactive materials as they, under fire or explosion conditions, can result in...
severe hazards, the control or elimination of
ignition sources, ventilation control, and
suppression of fires.

In general, NFPA 801 as currently
supported by the Committee gives broad latitude to
using the FHA to determine requirements. NFPA 801
specifies that the FHA shall be used to determine
fire area separation, protection of combustible
shielding, fire rating of ducts, filter fire
protection, fire detection and suppression of HEPA
filter systems, smoke control methods, drainage
volume, facility fire protection, facility
sprinkler protection, fixed fire protection, water

supply, water supply means, and hydrants, stand
pipes, fire detection systems, and fire suppression
system generally.

I would urge that everyone vote in favor
of this proposed amendment. Thank you.

MR. BRADLEY: Thank you. Microphone Number 6,
please state your name, affiliation and whether
you're speaking for or against the motion, please.

MR. WALKER: Shakur Walker, Browns Ferry
Nuclear Facility. For those of you who know about
fire protection and about fire, you might have
heard about Browns Ferry before.

I'll be brief. This is my first
conference, and I've been reviewing this. Being
that TBA and Browns Ferry is becoming NFPA
compliant, from where we're coming from, from where
Page 65
the Browns Ferry fire kind of started, it makes sense to support this motion.

So I understand that it is a bit broad, but you are dealing with a lot of facilities that are pretty much custom jobs. You have 81,000s that are coming out now that are more standardized and, in time, we might be able to revisit this and debate on it again. But for right now, I suggest humbly to support this motion. Thank you.

MR. BRADLEY: Is there any further discussion?

Yes, I see Microphone Number 4, please. State your name, affiliation and whether you're for or against the motion.

MR. DUNCAN: My name is Ken Duncan. I am with Performance Design Technologies, and I'm speaking in support of the motion even though I'm standing by a red microphone.

It seems to me that our entire industry has been working for the last two decades to develop a better performance way of doing our fire protection so that we do just enough, not too little and not too much. And it seems to me that going back to a more prescriptive approach as this latest revision in 801 has done is a step backward rather than a step forward.

I agree wholeheartedly with the comment made that one size fits all does not apply to the wide range of nuclear power -- not nuclear power,
excuse me -- the radioactive materials or radiation risks that are associated with the wide variety of facilities that 801 is intended to cover. So I wholeheartedly support the motion.

MR. BRADLEY: Thank you. Is there any further discussion on Motion 801-1?
Chair, do you have any final comments?
MR. TILL: I do, sir. A key component of performance-based design approaches is research of which there is very little of late in the literature for facilities of this type. However, the most recent research done on this subject has validated the approach the Technical Committee is taking.
A key component of an adequate FHA is the knowledge of the specific hazard. There were several examples available to the Technical Committee where preparation of FHAs for some facilities under the scope of NFPA 801 were not prepared by such persons. Research in this area by such notable parties as Factory Mutual supported the conclusions and the approach taken in this edition of the standard.
And again, in closing, the Committee again had no dissenting votes after considerable discussion and review of this approach.
MR. BRADLEY: Thank you, Mr. Chair. Before we vote, let me restate the motion. The motion on the
floor is to accept Comment 801-16. Please record your vote 1 in favor of the motion to accept or 2, oppose the motion, reject. Please record your votes. 5 seconds.

The balloting is closed. Thank you. The results of the vote are in favor, 95; opposed, 61. The motion carries.

Is there any further discussion on NFPA 801? Seeing none, we'll move on to the next document. Thank you, Mr. Till.

The next report under consideration this afternoon is that of the Technical Committee on Pyrotechnics. Here to present the Committee report is Standards Council member Michael Snyder. The Committee reports can be found in the blue 2013 Annual Revision Cycle ROP and ROC. The Certified Amending Motions are contained in the Motions Committee report and behind me on the screen.

We'll proceed in the order of the motion sequence number presented. Mr. Snyder.

MR. SNYDER: Good afternoon, Mr. Chair, ladies and gentlemen. The report of the Technical Committee on Pyrotechnics is presented for adoption and can be found in the Report of Proposals and the Report of Comments for the 2013 Annual Meeting Revision Cycle. The Technical Committee has
Item 13-8-8
July 2, 2013

National Fire Protection Association
Standards Council
1 Batterymarch Park
Quincy, MA 02169-7471

Please accept the following appeal on behalf of APCO International.

(1) **Name, affiliation, and address of the appellant**

Crystal McDuffie
Communications Center and 9-1-1 Services Manager
APCO ANSI Secretariat
APCO International
351 N Williamson Ave.
Daytona Beach, FL 32114

(2) **Statement identifying the particular action to which the appeal relates**

a. NITMAM 1061-1 /Log 1057: NFPA Modify the title of the 1061 document to be limited to the position of telecommunicator.

b. NITMAM 1061-2 / Log 1058 & 1059 (combined): NFPA revert the technical committee scope and purpose for standard 1061 to its original scope and reference the appropriate APCO American National Standards for qualifications of positions outside of telecommunicator.

c. NITMAM 1061-14 / Log 1078: Return Entire Report and standard to previous edition text.

(3) **Argument setting forth the grounds for the appeal**

The intent of our appeal is to assist with the original, agreed upon path that was decided after the first joint meeting of this committee, APCO Standards Development Committee and APCO Communications Center Standards Committee. The goal was to align 1061 with Public Safety Telecommunicator and for each standard to compliment the other. APCO has invested numerous hours of research into our standards in the form of Occupational Analysis, which are conducted throughout the country. The resulting profile charts were provided to NFPA in a good faith effort to collaborate and ensure NFPA
was aware of APCO’s work for other positions in the communications centers.

As standards writing entities, it is important that we consider the impact of conflicting and/or duplicating standards. The goal of both organizations should be to provide the public safety community with solid and universally accepted standards.

The position of APCO is that the addition of Communications Training Officer, Communications Training Coordinator, Quality Assurance Coordinator, Supervisor and Manager are beyond the original intended scope of 1061 and duplicates of existing APCO ANS. While APCO and NFPA conducted broad discussions on a range of topical subjects, full collaborative efforts were limited to Public Safety Telecommunicator.

During the process of NITNAM, one of the major factors provided to the membership to understand the issues was that the further review and update of the document would delay the release of the document. We believe that the rush to get out a document should not penalize the public safety community with conflicting standards.

Another argument made in the public discussion was that the current document is written in NFPA style, and can be used by the ProBoard. We feel that this is not adequate reason to penalize the public safety community with conflicting standards.

As indicated by the timeline below, APCO has made continued efforts to collaborate with NFPA on the 1061 Standard.

**Dec. 18, 2008:** Conference Call with NFPA. Topics included First line Supervisor, PST v. 1061 and 1221.

**February 17, 2009:** APCO and NFPA met in Orlando Florida – representatives from SDC and CCSC present at the meeting. Discussion was limited to aligning 1061 and PST.

**February, 2012:** Comments filed on NFPA 1061 Report on Proposals indicating duplication and conflict with PST.

**March 23, 2012:** Call held with NFPA 1061 Committee to discuss comments filed. The committee rejected the majority of comments.

**October 2012:** NITMAM’s filed with NFPA (Notice of Intent to make a motion at an Association Technical Meeting)
**June 2013:** APCO representatives attended the Technical Meeting and made the motions indicated in the NITMAM’s – All were voted down.

(4) **Statement of the precise relief requested**
   a. Request the document be returned to its original scope and content.
   b. NFPA remove positions other than telecommunicator from 1061.
   c. Allow for collaboration between APCO and NFPA for revisions to 1061

(5) **Whether a hearing on the appeal is being requested**
   Yes. A hearing is requested on this matter.

Sincerely,

Crystal McDuffie
Secretariat to APCO Standards Development Committee
mcduffiec@apcointl.org
919-625-6864
Comment 1061-2 (Title) Accept

1061-2 Log #7 PQU-PST Final Action: Reject (Title)

Submitter: Crystal McDuffie, APCO International
Comment on Proposal No: 1061-2
Recommendation: Revise text to read as follows:
NFPA 1061 Standard for Professional Qualifications for Public Safety Telecommunicator Telecommunications Personnel.
Substantiation: The change in title is beyond the scope of NFPA 1061. Recommend change back to Public Safety Telecommunicator to maintain scope of document. APCO ANS and Candidate ANS already exist for proposed additional positions identified (Core Competencies and Minimum Training Standards for each of the following positions: Public Safety Communications Training Officer (CTO), Quality Assurance Evaluator (QAE), Training Coordinator (TC), and Supervisor and Core Competencies for Public Safety Communications Manager/Director). Expanding the scope of this document duplicates APCO’s scope of standards development.
While APCO and NFPA conducted broad discussions on a number of topical subjects, full collaborative efforts were limited to Public Safety Telecommunicator.
Committee Meeting Action: Reject
Committee Statement: The scope of this standard was expanded by the SC at the August 2011 meeting, therefore the Committee believes it is appropriate to leave the levels as proposed.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 6 Negative: 1
Ballot Not Returned: 1 Phelps, S.
Explanation of Negative:
ADAMS, C.: I believe the changes are beyond the scope of NFPA 1061. The expansion into additional public safety communication positions are outside of the Public Safety Telecommunicator’s qualifications and thereby causes a duplication with an existing ANS supported through APCO. Although the original intent was to collaborate and harmonize with existing and developing standards, it is not occurring and, instead, is creating a liability of duplication. By doing so, NFPA 1061 is developing new and/or making revisions that are outside its scope. NFPA 1061 revisions were conducted by the technical committee in June 2011 without any comprehensive process to identify the appropriate qualifications for the positions upon which it has expanded its standard. The “scope” of NFPA 1061 was not addressed or changed until August 2011 and, therefore, I do not believe the committee had the proper authority to make revisions based upon the existing scope nor based upon its procedure for the development of its standards as JPRs are conducted without well-rounded input of individuals performing the task(s) as are those developed within the scope of the ANSI accredited, APCO International’s Standards Development Committee which utilizes a nation-wide occupational analysis process inclusive of high performing individuals specific to the position for which the standard addresses.

Backup Proposal 1061-2

1061-2 Log #CP3 PQU-PST Final Action: Accept (Title)

Submitter: Technical Committee on Public Safety Telecommunicator Professional Qualifications,
Recommendation: Revise text to read as follows:
NFPA 1061 Standard for Professional Qualifications for Public Safety Telecommunicator Telecommunications Personnel.
Substantiation: The committee has chosen to change the title of this document to reflect changes in the industry since the inception of this document, as well as to address changes to the various levels of qualifications within this document.
Committee Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 6
Ballot Not Returned: 2 Adams, C., Vinciguerra, R.
Comment 1061-3 (1.1 Scope) Accept

Submitter: Crystal McDuffie, APCO International

Comment on Proposal No: 1061-3

Recommendation: Revise text to read as follows:

1.1 Scope.
This standard identifies the minimum job performance requirements for personnel working in public safety telecommunications.

Substantiation: The proposed change is beyond the scope of NFPA 1061. Recommend change back to Public Safety Telecommunicator to maintain scope of document. APCO ANS and Candidate ANS already exist for proposed additional positions identified [APCO ANS 3.101.1-2007 and candidate APCO ANS 3.101.2-201x: Core Competencies and Minimum Training Standards for Communications Training Officers (CTO); APCO candidate ANS 3.102.1-201x: Core Competencies and Minimum Training Standards for Public Safety Supervisors; APCO candidate ANS 3.104.1-201x: Core Competencies and Minimum Training Standards for Public Safety Communications Training Coordinators; APCO ANS 1.106.1-2009: Core Competencies for Public Safety Communications Manager/Director, APCO candidate ANS 3.106.1-201x: Core Competencies and Minimum Training Standards for Public Safety Communications Quality Assurance Evaluator (QAE)].

While APCO and NFPA conducted broad discussions on a number of topical subjects, full collaborative efforts were limited to Public Safety Telecommunicator. Expanding the scope of this document duplicates APCO’s scope of standards development as filed with ANSI.

Committee Meeting Action: Reject

Committee Statement: The scope of this standard was expanded by the SC at the August 2011 meeting, therefore the Committee believes it is appropriate to leave the levels as proposed.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 6 Negative: 1

Ballot Not Returned: 1 Phelps, S.

Explanation of Negative:
ADAMS, C.: The changes to NFPA 1061 creates a duplication with existing APCO standards developed and/or currently in development. This addition to NFPA 1061 is beyond the scope of the standard. The expansion of the scope in August 2011 occurred after the technical committee’s meeting and, therefore, the technical committee was developing work outside its scope at the time. That scope should remain in effect to allow for harmonization and to prevent duplication which is occurring with other standards (in particular, APCO standards). I also do not believe the Submitter’s comments were addressed.

Backup Proposal 1061-3

Submitter: Technical Committee on Public Safety Telecommunicator Professional Qualifications,

Recommendation: Revise text to read as follows:

1.1 Scope.
This standard identifies the minimum job performance requirements for personnel working in public safety telecommunications.

Substantiation: This change was made due to the fact that this document addresses other qualifications other than the public safety telecommunicator and how this document and committee is looking at the industry from a holistic perspective.

Committee Meeting Action: Accept

Number Eligible to Vote: 8

Ballot Results: Affirmative: 6

Ballot Not Returned: 2 Adams, C., Vinciguerra, R.
### Comment 1061-4 (1.2 Purpose) Accept

1061-4 Log #9 PQU-PST Final Action: Reject
(1.2)

**Submitter:** Crystal McDuffie, APCO International  
**Comment on Proposal No:** 1061-4  
**Recommendation:** Revise text to read as follows:  

1.2 Purpose.  
The purpose of this standard is to ensure that persons meeting the requirements of this standard are qualified to serve as public safety Telecommunicatorscenters.  

**Substantiation:** The proposed change is beyond the scope of NFPA 1061. Recommend change back to Public Safety Telecommunicator to maintain scope of document. APCO ANS already exist for proposed additional positions identified. Expanding the scope of this document duplicates APCO's scope of standards development. This document should address various functional positions (not rank) of Telecommunicator (calltaker, emergency services dispatcher, fire services dispatcher and law enforcement dispatcher). While APCO and NFPA conducted broad discussions on a number of topical subjects, full collaborative efforts were limited to Public Safety Telecommunicator.

**Committee Meeting Action:** Reject  
**Committee Statement:** The sentence was worded to the persons working in the centers, not the centers themselves.

**Number Eligible to Vote:** 8  
**Ballot Results:** Affirmative: 6 Negative: 1  
**Ballot Not Returned:** 1 Phelps, S.

**Explanation of Negative:**  
ADAMS, C.: The changes to NFPA 1061 creates a duplication with existing APCO standards developed and/or currently in development; does not allow for harmonization within the original scope of NFPA 1061. This addition to NFPA 1061 is beyond the scope of the standard. The expansion of the scope in August 2011 occurred after the technical committee’s meeting and, therefore, the technical committee was developing work outside its scope at the time. That scope should remain in effect to allow for harmonization and to prevent duplication which is occurring with other standards (in particular, APCO standards). The committee statement that, “[the] sentence was worded to the persons working the centers, not the centers themselves” does not address the comment that the change is beyond the scope, that other standards exist for the positions identified and the scope of the document duplicates another ANSI standards developer whose scope is public safety communications. I also do not believe the Submitter’s comments were addressed.

### Backup Proposal 1061-4

1061-4 Log #CP12 PQU-PST Final Action: Accept
(1.2)

**Submitter:** Technical Committee on Public Safety Telecommunicator Professional Qualifications,  
**Recommendation:** Revise text to read as follows:  

1.2 Purpose.  
The purpose of this standard is to ensure that persons meeting the requirements of this standard are qualified to serve as public safety Telecommunicators centers.

**Substantiation:** The committee has made this change to reflect that this document will now address various levels or qualifications of personnel that serve in public safety communications centers.

**Committee Meeting Action:** Accept  
**Number Eligible to Vote:** 8  
**Ballot Results:** Affirmative: 6  
**Ballot Not Returned:** 2 Adams, C., Vinciguerra, R.
Mr. Chair, ladies and gentlemen of the Jury, the report of the Correlating Committee on Professional Qualifications and the Technical Committee on Public Safety Telecommunicator Professional Qualifications is presented for adoption and can be found in the Report on Proposals and the Report on Comments for the 2012 Fall Meeting Revision Cycle.

The Technical Committee and Correlating Committee has published a report consisting of a partial revision of NFPA 1061 Standard of Professional Qualifications for Public Safety Telecommunicator. The report was submitted to letter ballot of both the Technical Committee that consists of seven voting members and the Correlating Committee that consists of seven members. The ballot results can be found on Pages 1061-4 to 1061-17 of the Report on Proposals and Pages 1061-2 to 1061-35 of the Report on Comments.

The presiding officer will now proceed with the Certified Amending Motion.

MR. OWEN: Thank you, Ms. Kilby-Richards. Let's now proceed with the discussion on Certified Amending Motion on NFPA 1061. Would the maker of the motion -- first motion please come to the microphone, please?

MS. McDUFFIE: Crystal McDuffie with APCO International, speaking in favor of the motion.

Thank you for the opportunity to address the
16 committee. APCO strives for a continued --
17 MR. OWEN: Just one moment, ma'am. We need to
18 have the motion seconded. So we have the motion.
19 Do we have a second? This is to approve 1061-1.
20 Do we have a second?
21 A VOICE: Second.
22 MR. OWEN: We have a motion and a second. Now
23 please proceed.
24 MS. McDUFFIE: Okay. Crystal McDuffie with

APCO International speaking in favor of the motion.
Thank you for the opportunity to address the
committee.

APCO strives for a continued, cohesive,
and positive working relationship with NFPA. This
proposed change in title to include communications
personnel outside of just the telecommunicator
position allows for duplication and conflict with
existing and/or candidate APCO American National
Standards. APCO American National Standards and
Canada American National Standards already exist
for proposed additional positions identified, core
competencies and minimum training standards for
training coordinator, supervisor, communications
training officer, quality assurance evaluator, and
manager director.

While APCO and NFPA conducted broad
discussions on a number of topical subjects, full
collaborative efforts were limited to public safety
telecommunicator. Expanding the scope of this document duplicates APCO’s scope of standards development. APCO asks that the title be returned to the original title of 1061, Public Safety Telecommunicator.

MR. OWEN: Thank you. Ms. Kilby-Richards, would you like to offer the committee’s position, please?

MS. KILBY-RICHARDS: Yes, sir. Mr. Chair, ladies and gentlemen of NFPA, over the course of the past several years, the Technical Committee on Public Safety Telecommunicators Professional Qualification has been working to revise the 2007 edition of NFPA 1061 Standard for Professional Qualifications for Public Safety Telecommunicator to ensure that persons serving as public safety telecommunication personnel at each level or position within the field have the opportunity to be qualified to a nationally recognized professional qualification standard.

This includes the addition of communications training officer, communications supervisor, quality assurance, improvement personnel, communications training coordinator, communications center manager and logistics section communication unit leader.

The Technical Committee met in Dallas on June 14 to 15, 2010, for the ROP under the Fall 2011 Revision Cycle. While no public comments were

Page 24
 proposals were received, the Technical Committee refined the three existing chapters and developed a broad range of new chapters consistent with a more inclusive series of positions currently used in telecommunications facilities.

The Technical Committee included a representative from the Association of Public Safety Communication Officials International, commonly referred to as APCO, which was a principal member. The ROP ballot results of both the Technical Committee and the Technical Correlating Committee unanimously supported these revisions, but the APCO representative did not return the ballot. The document received several public comments; not one from APCO or its principal representative of the Technical Committee.

The Technical Committee met in Denver on March 11, 2011, for the ROC. The TC made 14 revisions based on public committee comments. The APCO representative was present for the meeting. The APCO representative to the TC voted to accept the TC’s ROC revisions. Almost two months after the ROC ballot, NFPA staff received a letter from APCO regarding NFPA 1061 citing concerns for duplication of standards, scope, and title and...
development process. Staff sent the letter to me. At the June 2011 meeting, I asked the Technical Chair Committee to slip cycle NFPA 1061 so that APCO's concerns should be addressed in hopes of continuing harmonization and co-branding of the standard. The TCC was balloted and agreed to slip-cycle to Fall 2012 Revision of the NFPA 1061 so that the concerns of APCO could be addressed through the submission of public comment. The Standards Council approved the slip-cycle NFPA 1 to the Fall 2012 Revision.

MR. OWEN: Ms. Richards, could you complete your comments here? You're done with your time.

MS. KILBY-RICHARDS: On behalf of the Technical Committee on Public Safety Telecommunicators Professional Qualifications, I would urge you to support the work of the Technical Committee. I ask for your support on the Committee actions. Thank you for your time, Mr. Chair.

MR. OWEN: Thank you, Ms. Kilby-Richards. Now we will open debate on the motion. Please provide your name and affiliation and whether you're speaking in support of or against the motion.

Do we have any speakers? Any further discussion? Any discussion on Motion 1061-1 to accept Comment 1061-2? Ms. Kilby-Richards, any final commentary at all? There wasn't really anything to rebut.
MS. KILBY-RICHARDS: I ask the membership to please keep in mind that the majority of the Technical Committee believes that both the challenges to the scope and purpose of NFPA 1061 are a result of the uniqueness of the document. If this motion is accepted, the document scope will revert to the current document scope and the entire revised document would be in conflict. I would ask the membership to vote against the motion. Thank you.

MR. OWEN: All right. Thank you, Ms. Chair. Before we vote, let me restate the motion. The motion on the floor is to accept Comment 1061-2. Please record your vote, 1 in favor of the motion, accept, or two, opposed to the motion, reject. Please vote now. 5 seconds. The balloting is closed.

The results of the vote are 143 to reject, 29 to accept. The motion has failed.

Let's now proceed with the discussion on Certified Amending Motion 1061-2. Would the maker of the motion please come and make -- repeat her motion. Microphone 6, please.

MS. McDUFFIE: I move that 1061-2 move forward to include accepting Comment 1061-3.

MR. OWEN: We have a motion. Now this is a group amending motion on the floor, to accept Comment 1061-3 and accept Comment 1061-4. Is there a second?
A VOICE: Second.

MR. OWEN: I hear a second. Please proceed with your discussion on the motion.

MS. McDUFFIE: Crystal McDuffie, APCO International, speaking in favor of the motion.

In addition to my previous comments regarding duplication of existing APCO American National Standards, our intention is to assist with the original agreed-upon path which was decided at the first joint meeting of APCO Standards Development, APCO Call Center Standards, and NFPA 1061 Leadership and Staff which took place in February of 2009 in Orlando, Florida.

The goal from that meeting was to align 1061 and public safety telecommunicator minimum training standards to complement each other. It was agreed that APCO would take the lead on the training for telecommunicators and NFPA would maintain the qualifications piece and scope of 1061.

APCO believes it is also important to recognize that conflicting or duplication standards create confusion for the public safety communication centers that both of our memberships serve. APCO requests that NFPA return the scope and purpose of 1061 to its original scope and purpose and reference APCO ANS for position qualifications outside those for public safety.
MR. OWEN: Thank you. Ms. Kilby-Richards, would you like to offer the committee's position on this?

MS. KILBY-RICHARDS: I ask that the membership understand that this motion goes beyond returning the document to its original text. It eliminates existing text to the current document referenced in Chapter 4 and creates a new topic, Public Safety Call-Taker. With no job performance requirements or JPRs, the TC was intentional in its endeavors to take a global or universal approach when addressing Public Safety Telecommunicator I rather than a limiting title.

The TC stands by its work to establish a professional qualifications style document which is uniquely written to JPR format. The changes and deletions requested by the submitter would render the chapter unusable by the end user.

I would ask the membership to vote against the motion. Thank you.

MR. OWEN: Thank you, Ms. Kilby-Richards. With that, we will open up debate on the motion. Please provide your name and affiliation and whether you're speaking in support of or against the motion. Microphone 3, please.

MR. HIRSCHLER: Marcelo Hirschler, GBH International. I'm standing at a mic that says for the motion, but I don't know. I mean I think...
This issue is an issue that goes beyond the membership. It's an issue of correlation between standards development organizations, and I would recommend that the Standards Council deal with this by addressing the APCO organization and getting an agreement on whose jurisdiction it is.

Apparently, the APCO standards and American National Standard, I'm assuming, are also an American National standard. The debate, whether the scope is right, whether we are encroaching into someone else's purview is way beyond what the membership here can discuss. So I think this is something that needs to be addressed by the Board or Standards Council and in conjunction with the other standards of the organization. Thank you.

MR. OWEN: Thank you for your input. Is there any discussion? Any further discussion on Group Amending Motion 1061-2 to accept Comment 1061-3 and 1061-4? Seeing none, we'll move to a vote.

I'm sorry, Ms. Chair. Did you have anything further on that? I apologize.

MS. KILBY-RICHARDS: I would ask the membership to vote against the motion and stand by the work of the Technical Correlating -- Technical Committee. Thank you.

MR. OWEN: Thank you, Ms. Chair. Before we vote, let me restate the motion. The group --
MR. DUNCAN: Just a question. You said 3 and 4. Are we voting on two motions at one time?

MR. OWEN: Yes, it’s a Group Amending Motion. They grouped those two together. It’s Comment 1061-3 and 1061-4. Those are grouped together. The Group Amending Motion on the floor is to accept Comment 1061-3 and accept Comment 1061-4.

Please record your vote, 1 in favor of the motion to accept or 2 to oppose the motion, reject. 5 seconds. Okay.

Balloting is closed. Results are on the screen. 149 reject, 23 accept. The motion has failed.

Let’s now proceed with discussion on Certified Amending Motion 1061-3. Microphone 6, please. Please identify yourself and make your motion.

MS. McDUFFIE: Crystal McDuffie with APCO International. APCO does not wish to pursue Motions 3 through 17 and would like to move forward with Motion 18.

MR. OWEN: All right. Just so it gets on the record. You do not want to pursue which numbers again?
MS. McDUFFIE: Motions Number 3 through 17.

MR. OWEN: Motions 3 through 17 and proceed to 18. Since they are the makers of these motions, this is proper. Bear with me for a moment, please. Is everybody ready? That was quite a jump.

Let's proceed with the discussion on Certified Amending Motion 1061-18. Microphone 6, again, please. Identify yourself and state your motion.

MS. McDUFFIE: Crystal McDuffie with APCO International. APCO makes a motion to return the document to allow for collaboration.

MR. OWEN: All right. Thank you. There's a motion on the floor to return the entire report. Is there a second?

A VOICE: Second.

MR. OWEN: I heard a second. Please proceed with your discussion on the motion.

MS. McDUFFIE: Approving the revision of 1061 allows for duplication and conflict of existing standards either at the time of writing or at the time of future revisions. By allowing this, both memberships will be impacted, not only fire and EMS agencies, but law enforcement and emergency management operations centers as well.

The very intent of a national standard is that the public safety communications industry can look to one nationally accepted and accredited document for guidance on the various aspects of the
critical services they provide. APCO has agreed to work collaboratively with NFPA to support the public safety communications providers and users. It is the goal of APCO to work with NFPA and all other associations and like organizations to fashion standards which provide all disciplines of the public safety community with solid and universally accepted practices. We must also consider any associated training that may need to be developed based upon these standards and associated liability.

APCO has invested numerous hours of broad-based research into our standards. With direct access to over 15,000 subject matter experts, our occupational analysis process is conducted nationally to ensure that we are not limited by geographical area.

It should also be noted that the APCO representative on the NFPA Technical Committee expressed concerns that the change and scope of 1061 was in direct conflict with the ANSI-approved scope of APCO. This representative continued to express concerns of duplication and conflict of standards.

By returning 1061 to its original version, you provide time for further collaboration and a cohesive effort between our two organizations to
ensure that all disciplines of public safety communications are provided with solid, nonconflicting standards. APCO is committed to supporting and promoting public safety communications.

On behalf of APCO International and the APCO Standards Development Committee, I thank you for your time and consideration of our position to bring resolution to the alignment process for 1061.

MR. OWEN: Thank you, Ms. Kilby-Richards, would you like to offer the Committee's position on this?

MS. KILBY-RICHARDS: Yes, sir. I would ask the membership to vote against this motion. To return the document would not be beneficial to the end user who has waited an extended period of time for this document to be issued. If returned, it could be as much as three or more years added onto the revision Cycle before the telecommunications community sees this document. Coupled with the original revision Cycle and the slip-cycle, the document could be eight to ten years in revision.

With the process already, the Technical Committee has worked to ensure that persons serving as public safety telecommunications personnel could be qualified to a nationally recognized standard through NFPA. I don't see a majority of the Technical Committee members willing to revert to the 2007 text.
Our goal from the 2011 ROP phase was to revise NFPA 1061 to a grade where it was already part of a quality document and develop a broad range of new chapters consistent with a more inclusive series of positions and levels currently used in communications facilities. We feel that we have accomplished that goal.

Our sister standards development organization was represented at all phases of the original revision Cycle from ROP to ROC, worked on many of these revisions and balloted on them. It wasn't until after the Technical Committee ROC ballot was processed that leadership at APCO sent its letter of concerns to the NFPA staff. The TC and CC made recommendations, while unusual, to slip-cycle the process.

There is a difference in how NFPA 1061 and APCO documents are used. NFPA 1061 is a professional qualifications document designed to identify the minimum job performance requirements of public safety telecommunications personnel uniquely written in JPR format to distinguish tasks used to qualify individuals for levels and positions within the public safety telecommunications community. NFPA 1061 is not an organizational training or certification document.

On behalf of the majority of the Technical Committee on Public Safety Telecommunications
Professional Qualifications, I would ask you to support the Committee actions. Once again, I would ask the membership to vote against this motion. I thank you for the time, Mr. Chair, and to the NFPA members for listening.

MR. OWEN: Thank you, Ms. Kilby-Richards.

With that, we'll open up debate on the motion. Please provide your name and affiliation and whether you're speaking in support of or against the motion. Microphone 4, please.

MR. PETERSON: Thank you, Mr. Chair.

William Peterson, Chair of the Professional Qualifications Correlating Committee speaking against the motion.

As Chair of the Correlating Committee, we spent many hours and many months and years with this issue trying to work with APCO. We do not believe that the work of the Technical Committee duplicates what APCO is doing. We believe it complements the training that they deliver to telecommunications personnel.

We also believe that adoption of this standard will open up an additional market for APCO by allowing Department of Defense personnel to participate in APCO training delivery in the field as they are mandated to be certified to a national consensus standard.

So as Chair of the Correlating Committee, I would urge members present to support the motion.
Thank you.

MR. OWEN: Thank you. Microphone 6, please.

MS. McDUFFIE: Crystal McDuffie with APCO International. I would like to remind the voting body that APCO American National Standards currently exists for the positions being discussed.

MR. OWEN: I'm sorry. I should have asked you, would you state your name and whether you're for against the motion for the record.

MS. McDUFFIE: Crystal McDuffie, APCO International, and for the motion.

I just want to remind the membership that APCO currently holds American National Standards for the positions that we are discussing within NFPA 1061. APCO standards exist for the positions of training coordinator, supervisor, communications training officer, quality assurance evaluator, and manager director.

I would ask for your support in the motion to return this document to its original version, and while I understand that that will take some time to accomplish, it will allow a more quality document to be produced with collaborative efforts between APCO and NFPA.
MR. OWEN: Thank you. Is there any further discussion on Motion 1061-18 to return the entire report? Microphone 6. Please state your name and whether you are for or against the motion.

MR. VANAUKEN: Gordon Vanauken, Vice Chair of the APCO Standards Development Committee. I'm in favor of the motion.

I just want to clarify, because one of the things that was said or seem to be said was that the APCO standards are strictly training standards. That is correct for the public safety telecommunicator standard only. The remaining standards are qualifications and training standards, and that's why they conflict with the new roles that are being put out there.

MR. OWEN: Okay. Thank you. Is there any further discussion on the floor? Ms. Chair, any final brief remarks?

MS. KILBY-RICHARDS: I would just like to remind the Committee that we follow the JPR format for standards for the NFPA, and I urge you to vote against the motion.

MR. OWEN: Thank you. Before we vote, let me restate the motion. The motion on the floor is to return the entire report. Please record your vote, 1 in favor of the motion to accept or 2, oppose the motion to reject. Five seconds.

Balloting is closed. The results of the
vote are 136 to reject, 37 to accept. The motion has failed.

Is there any further discussion on NFPA 1061? Seeing none, we'll move on to the next document. Thank you, Madam Chair, for your help.

MS. KILBY-RICHARDS: Thank you.

MR. OWEN: Next report under consideration is that of the Technical Committee on Structural and Proximity Fire-Fighting Protective Clothing and Equipment. Here to present the Committee report is Correlating Committee Chair William Haskell of National Institute for Occupational Safety and Health, Andover, Massachusetts.

The Committee report can be found in the white 2012 Fall Revision Cycle ROP and ROC. The Certified Amending Motions are contained in the Motions Committee report and behind me on the screen. We'll proceed in the order of the motion number presented. Mr. Haskell?

MR. HASKELL: Thank you. Mr. Chair, ladies and gentlemen, the report of the Technical Committee on Structural and Proximity Fire-Fighting Protective Clothing and Equipment and the Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment is presented for adoption and can be found in the Report on Proposals and the Report on Comments for the 2012 Fall Meeting Revision Cycle.
TABLE A
Certified Amending Motions on Documents for the June 2013 Association Technical Meeting
(Note: The motions are presented in the order of presentation recommended by the Motions Committee)


<table>
<thead>
<tr>
<th>Motion Seq#</th>
<th>NITMAM Log #</th>
<th>Section/Para</th>
<th>Person(s) Authorized to Make the Motion</th>
<th>Certified Amending Motion**</th>
<th>Motion Committee Notes and Comments**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1061-1</td>
<td>1057</td>
<td>Title</td>
<td>Crystal McDuffie, APCO International</td>
<td>Accept Comment 1061-2</td>
<td>If successful the motion seeks to Accept Comment 1061-2 to modify the title of the Standard as follows:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NFPA 1061, <em>Standard for Professional Qualifications for Public Safety Telecommunicator Telecommunication Personnel.</em></td>
</tr>
<tr>
<td>1061-2</td>
<td>1058</td>
<td>1.1 Scope</td>
<td>Crystal McDuffie, APCO International</td>
<td>Accept Comment 1061-3</td>
<td><strong>Group Amending Motion (1061-2):</strong> Motions identified by Logs 1058 and 1059 taken together seek to modify the scope and purpose of the standard to the previous edition text as follows:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.1 This standard identifies the minimum job performance requirements for personnel working in public safety telecommunications public safety telecommunicators.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.2 The purpose of this standard is to ensure that persons meeting the requirements of this standard are qualified to serve as in public safety telecommunicators centers.</td>
</tr>
<tr>
<td></td>
<td>1059</td>
<td>1.2 Purpose</td>
<td>Crystal McDuffie, APCO International</td>
<td>Accept Comment 1061-4</td>
<td>These motions have been certified as proper. In addition, with the agreement of the authorized maker of the motions,</td>
</tr>
<tr>
<td>Motion Seq#</td>
<td>NITMAM Log #</td>
<td>Section/Para</td>
<td>Person(s) Authorized to Make the Motion</td>
<td>Certified Amending Motion**</td>
<td>Motion Committee Notes and Comments**</td>
</tr>
<tr>
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<td>----------------------------------------</td>
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</tr>
<tr>
<td>1061-18</td>
<td>1078</td>
<td>Entire Document</td>
<td>Crystal McDuffie, APCO International</td>
<td>Return Entire Report</td>
<td>these motions are being considered as dependent motions which will be debated and voted on by the assembly as a single up or down package. See NFPA Technical Meeting Convention Rules at 2.3. Accordingly, the following procedure will be in effect for these motions at the Technical Session: the two dependent motions will be grouped into a single “Group Amending Motion” identified as Motion 1061-2 which, once made by the authorized person, will effectively place the dependent motions on the floor for debate and vote as a single up or down motion.</td>
</tr>
</tbody>
</table>
July 9, 2013

Jacklyn Kilby-Richards  
Town of Groton Emergency Dispatch  
68 Groton Long Point Road  
Groton, CT 06340-4806

National Fire Protection Association  
Standards Council  
1 Batterymarch Park  
Quincy, MA 20169-7471

Members of the NFPA Standards Council:

I am responding to the letter from NFPA dated July 2, 2013, regarding the appeal from C. McDuffie of APCO requesting the overturn of the Association Action and accept Comment 1061-2, CAM 1061-1; overturn of the Association Action and accept Comment 1061-3 and 1061-4, CAM 1061-2; and overturn of the Association Action and return the entire report, CAM 1061-18.

As Chair of the Technical Committee Public Safety Telecommunications Personnel Professional Qualifications, the most powerful statement I believe I can make is that there is no conflict or duplication between NFPA 1061 and any of the related APCO documents. NFPA 1061 Standard for Professional Qualifications for Public Safety Telecommunicator is a document designed to be used to qualify individuals for levels and positions within the public safety telecommunications community. The main intent of the APCO related documents is to address the organization, resources, training and certification.

The technical committee views the NFPA and APCO documents as complimentary. Together, the series of documents provide a complete package on professional qualification, certification, resources, organization and training for the telecommunications industry.

Over the course of the past several years and with revision cycle extensions approved by the Standards Council, APCO has been provided the opportunity through the NFPA process to submit proposals and comments to the technical committee. The technical committee and correlating committee relied on consensus to revise the document. Additionally, the NFPA membership at the technical session voted overwhelmingly against the motions listed above.

I have attached the Timeline on Events and Actions for NFPA 1061. NFPA staff has also amassed associated correspondence related to the current NFPA 1061 revision cycle. I would ask that it be released to Standards Council for its review.
I will be available to speak to the Standards Council, in-person on July 30, 2013 at the time established by the Council for the appeals.

Thank you for the opportunity.

Very Respectfully,

7/9/2013

Jacklyn Kilby Richards

Signed by: Kilby-Richards, Jackie

Jacklyn Kilby-Richards

Attached: Timeline on Events and Actions for NFPA 1061
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-Oct-08</td>
<td>APCO request to replace rep on TC’s with Carol Adams</td>
</tr>
<tr>
<td>9-Jan-09</td>
<td>Call between APCO and NFPA staff and committee leadership. Discussed options for harmonization</td>
</tr>
<tr>
<td>17-Feb-09</td>
<td>In-person Staff from NFPA and APCO met to discuss collaboration and branding of document. Discussed the Occupational Analysis process and validation that was being used by APCO and the Roadmap being developed by APCO to address other roles. Discussed the use of the core competencies developed for telecommunicator and having NFPA continue with the Qualifications and APCO the training of these core competencies as in the past.</td>
</tr>
<tr>
<td>25-Jan-10</td>
<td>NFPA submits 1061 to ANSI PINS</td>
</tr>
<tr>
<td>28-May-10</td>
<td>ROP closing date, no proposals from APCO or representative</td>
</tr>
<tr>
<td>14-15 June-10</td>
<td>ROP TC meeting Dallas TX, APCO representative at meeting via conference call 2nd day</td>
</tr>
<tr>
<td>Jul/Aug-10</td>
<td>Emails highlighting independent work and use of other NFPA standards to development new chapters for NFPA 1061</td>
</tr>
<tr>
<td>3-Sep-10</td>
<td>ROP TC ballot APCO representative did not return ballot; no alternate representation</td>
</tr>
<tr>
<td>13-Sep-10</td>
<td>NFPA submits notices Fall 2011 ROP Revision for publication in Federal Register</td>
</tr>
<tr>
<td>27-Oct-10</td>
<td>ROP TCC ballot; approved</td>
</tr>
<tr>
<td>7-Nov-10</td>
<td>TCC meeting, Houston, TX</td>
</tr>
<tr>
<td>7-Dec-10</td>
<td>NFPA submits 2011 Fall Revision to ANSI</td>
</tr>
<tr>
<td>22-Dec-10</td>
<td>ROP posted and published</td>
</tr>
<tr>
<td>4-Mar-11</td>
<td>Comment closing date</td>
</tr>
<tr>
<td></td>
<td>ROC Comments; none received from APCO</td>
</tr>
<tr>
<td>11-Mar-11</td>
<td>ROC Meeting in Denver APCO representative present at meeting.</td>
</tr>
<tr>
<td>6-Apr-11</td>
<td>ROC TC ballot</td>
</tr>
<tr>
<td>27-Apr-11</td>
<td>TC submits request for scope change to SC</td>
</tr>
<tr>
<td>27-Apr-11</td>
<td>Meeting to discuss co-branding with Ken W., Ken H., and Chris Dubay</td>
</tr>
<tr>
<td>29-Apr-11</td>
<td>Telephone conversation w/ Amanda Byrd from APCO to NFPA expressing concern over duplication of scope and material from APCO into NFPA 1061</td>
</tr>
<tr>
<td>27-May-11</td>
<td>APCO sent letter to NFPA stating concerns for duplication of standards, scope and title, and development processes.</td>
</tr>
<tr>
<td>28-May-11</td>
<td>Staff reviewed findings from APCO as outlined in matrices</td>
</tr>
<tr>
<td>1-Jun-11</td>
<td>1061/APCO harmonization meeting, ANSI scope question (Amy’s office)</td>
</tr>
<tr>
<td>7-Jun-11</td>
<td>Telephone conversation with NFPA staff /program manager and APCO staff/executive director</td>
</tr>
<tr>
<td>11-Jun-11</td>
<td>ROC TCC Meeting</td>
</tr>
<tr>
<td>12-Jun-11</td>
<td>In-person meeting with NFPA staff and APCO staff at Annual Conference in Boston</td>
</tr>
<tr>
<td>12-Jun-11</td>
<td>TC Chair recommendation to TCC to ask for slip cycle to ROC; approved by TCC and forwarded to SC (F2012) (7-July-11)</td>
</tr>
<tr>
<td>7-Jul-11</td>
<td>ROC TCC Ballot</td>
</tr>
<tr>
<td>13-Jul-11</td>
<td>Staff email to NFPA Counsel</td>
</tr>
<tr>
<td>Date</td>
<td>Event Description</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8-Aug-11</td>
<td>SC approves scope change for 1061 TC and Slip cycle back to ROC and F 2012</td>
</tr>
<tr>
<td>18-Aug-11</td>
<td>NFPA submits Fall 2011 ROC to ANSI</td>
</tr>
<tr>
<td>26-Aug-11</td>
<td>F2011 ROC Posted and Published</td>
</tr>
<tr>
<td>20-Dec-11</td>
<td>F 2012 ROC reposted</td>
</tr>
<tr>
<td>2-Mar-12</td>
<td>APCO submitted comments (26) by 3/2/12 closing date on 3/1/12</td>
</tr>
<tr>
<td>23-Mar-12</td>
<td>ROC TC initial meeting set for March 15 moved to March 23, 2012 Conference call/Live Meeting; APCO representative and Program Manager (Guest) present at meeting</td>
</tr>
<tr>
<td>24-Apr-12</td>
<td>ROC TC Ballot, APCO representative voted mostly negative, some affirmative with comments</td>
</tr>
<tr>
<td>9-Jun-12</td>
<td>ROC TCC Meeting</td>
</tr>
<tr>
<td>2-Jul-12</td>
<td>ROC TCC Ballot</td>
</tr>
<tr>
<td>24-Aug-12</td>
<td>1061 TC Chair update to committee</td>
</tr>
<tr>
<td>19-Sep-12</td>
<td>Email communication with APCO program manager on next steps in SDP</td>
</tr>
<tr>
<td>5-Oct-12</td>
<td>APCO submitted NITMAMs (21)</td>
</tr>
<tr>
<td>10-15-Oct-12</td>
<td>Staff reviewed NITMAMs</td>
</tr>
<tr>
<td>25-Oct-12</td>
<td>1061 TC Nonparticipation Report</td>
</tr>
<tr>
<td>2-Nov-12</td>
<td>SC certified amending motions</td>
</tr>
<tr>
<td>12-June-13</td>
<td>Technical Session with NFPA Membership, APCO Representative present to present CAM’s, Floor votes against log #’s 1057, 1058, 1059 and 1078, no other CAM’s pursued</td>
</tr>
<tr>
<td>18-June-13</td>
<td>Email from APCO requesting names of NFPA members present at Technical Session</td>
</tr>
<tr>
<td>2-July-13</td>
<td>APCO appeals request letter for failed CAM’s</td>
</tr>
<tr>
<td>2-July-13</td>
<td>Notification email to TC and CC chairs on appeals request for hearing</td>
</tr>
<tr>
<td>9-July-13</td>
<td>TC chair response to appeals request including timeline attachment</td>
</tr>
</tbody>
</table>
Members of the NFPA Standards Council,

As Chair of the Correlating Committee, I ask the Standards Council to support the work of the NFPA 1061 Technical Committee on Public Safety Telecommunications Personnel Professional Qualifications in the development of the 2014 edition of NFPA 1061.

The Standards Council should be aware that both the NFPA 1061 Technical Committee and the NFPA Professional Qualifications Correlating Committee have spent countless hours since 2008 with this issue trying to work with APCO to develop a document that would clearly define the specific Job Performance Requirements (JPR's) for public safety telecommunications personnel. APCO's own representative on the technical committee has supported the work of the committee and voted in favor of the document at each step of the process.

NFPA 1061 is written in the same manner as other NFPA professional qualification documents, and include minimum Job Performance Requirements (JPR's) for various public safety positions. JPR's identify the minimum professional qualification standards required for specific public safety positions. JPR's in the professional qualifications documents are an assembly of three critical components:

1. The task to be performed,
2. the tools, equipment, and materials that must be provided to successfully complete the task, and
3. the evaluation parameters and/or minimum successful performance outcomes.

JPR's are used by curriculum developers to determine training course content and evaluation criteria; agencies and organizations to write job descriptions, define hiring practices, and measure successful on-the-job performance; and by certification organizations to clearly identify certification criteria. Other applications of specific criteria contained in each of the NFPA Professional Qualifications Standards are also encouraged.

Previous testimony provided by APCO indicated that NFPA 1061, as adopted by the NFPA membership in Chicago, duplicates existing APCO training "standards". A review of APCO standards against the components of the NFPA 1061 JPR's clearly refutes this assertion. While the content of APCO documents
may be consistent with identifying many of the tasks to be performed, there is no mention of the second and third critical components of a JPR which are critical to determine successful performance of the task specified.

As such, we do not believe that the work of the Technical Committee duplicates what APCO is doing. We believe it, in fact, complements the training and certification that they deliver to telecommunications personnel.

We also believe that adoption of this standard will open up an additional market for APCO by allowing Department of Defense personnel to participate in APCO training delivery in the field, as they are mandated to be certified to a national consensus standard.

As Chair of the Correlating Committee, I would urge the Standards Council to support the work of the Technical Committee and deny the request of APCO to:

- Request the document be returned to its original scope and content.
- NFPA remove positions other than Telecommunicator from NFPA 1061.
- Allow for collaboration between APCO and NFPA for revisions to 1061.

Respectfully submitted,

William Peterson, Chair

NFPA Professional Qualification Correlating Committee
Item 13-8-12
NFPA® 37-2010

Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

TIA Log No. 1101

Reference: 9.3.3

Comment Closing Date: June 14, 2013
Submitter: Clifford C. Roberts, American International Group, Inc.

1. Add a new subsection 9.3.3 to read as follows:

9.3.3 The combustion gas turbine starting sequence shall include a purge cycle that will result in a nonignitible atmosphere in the turbine and its exhaust system prior to the start of the ignition sequence and the introduction of fuel.

Submitter’s Substantiation: The purpose of this Tentative Interim Amendment (TIA) is to reinstate an important safety provision of earlier editions of NFPA 37 that was inadvertently deleted in the processing of the current 2010 edition. This requirement appears in the prior (2006) edition of NFPA 37 as Subsection 9.3.2.

Technical Validity: Proposal 37-20 (Log #CP19) in the Fall 2009 Report on Proposals (ROP) proposed a rewrite of Chapter 9 of NFPA 37. Proposal 37-20 was accepted by the Technical Committee on Internal Combustion Engines and the text being proposed for reinstatement by this TIA appears in the proposal as Subsection 9.3.2. Comment 37-7 (Log #6) proposed amendments to the rewrite of Chapter 9 in the form of a new rewrite of the text beginning with Subsection 9.2.1 and extending to the end of the chapter. This comment also was accepted.

Unfortunately, the text of Subsection 9.3.2 from the 2006 edition was not included in the text of the public comment and, therefore, does not appear in the text accepted therein. A poll of the Technical Committee members disclosed that it was never anyone's intent to delete this provision and all agreed the text needs to be reinstated.

This TIA reinstates the provision, numbered accordingly.

Emergency Nature: Failure to properly purge the exhaust system of a gas turbine can result in a significant quantity of fuel remaining in the system. History has shown that this residual fuel can ignite explosively during turbine light off, resulting in significant damage to the system, including catastrophic rupture of the exhaust system with attendant release of projectiles that can injure persons in the area and damage other equipment in the area.

Determination of emergency nature meets the conditions stated in Paragraph 5.3(a) of the Regulations Governing the Development of NFPA Standards: “The NFPA Standard contains an error or omission that was overlooked during a regular revision process.”
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 10.

\[14 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 13 \times 0.75 = 9.75\]

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

\[14 \text{ eligible} \div 2 = 7 + 1 = 8 \text{ (this is the simple majority)}\]

14 Eligible to Vote
1 Not Returned (Preston)

**Final Action: Passed**

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

**Final Action: Passed**

TC FINAL Ballot results for **Emergency Nature** are as follows:
13 Agree
0 Disagree
0 Abstentions

**Final Action: Passed**
Item 13-8-13
1. Replace the current text of subsection 6.6.3 of both the 2010 and 2014 editions of NFPA 37 with the following:

6.6.3 Piping for fuel tanks, other than engine-mounted tanks, shall be in accordance with the provisions of 6.6.3.1 through 6.6.3.3, except as provided for in 6.6.3.4 Chapter 27 of NFPA 30, Flammable and Combustible Liquids Code.

6.6.3.1 Piping for fuel tanks shall meet the applicable requirements of Chapters 21 and 27 of NFPA 30, Flammable and Combustible Liquids Code. The fill pipe shall terminate outside the building at a point at least 600 mm (24 in.) from any building opening at the same or lower level.

6.6.3.2 Tanks shall be filled by a closed piping system.

6.6.3.3 The fill pipe for each tank shall be provided on an exterior wall of the room or structure enclosing the tank at a point at least 600 mm (24 in.) from any building opening at the same or lower level.

6.6.3.4 A fill pipe terminating in accordance with 6.6.3.3 shall not be required for tanks that are filled manually at the fill connection of the tank, provided that the tank and its fill connection are located within the spill containment required by 6.3.2.4, 6.3.5.3, or 6.3.6.3 and the filling operation is constantly attended.

Submitter’s Substantiation: In sites with indoor engines, authorities having jurisdiction, citing the International Mechanical Code (IMC), have required carriers to provide exterior containment diesel fuel stations and remote fuel fill alarm panels. The problem is that on crowded communications sites, insufficient clearances are available to meet NFPA 37 as it is written. Today, installations include both remote fuel fill stations (mounted on the exterior wall of the shelters) and internal fill connections. In practice, most fuel providers are unable to meet the requirements for camlock connections (vapor-tight connections), pumps, and associated accessories necessary to fuel the tanks from the exterior connections. So, in practice, internal connections are the ones most commonly used to fill the tanks and the exterior fuel station goes unused. Class II fuels are stable, the fuel tanks at such sites are relatively small and the telephone industry has an impeccable record for fire safety and so this initiative bears more rewards than risk.

Technical Validity: Communications sites, such as cellular telephone tower sites and public safety communications systems, are arranged on small plots of land where a tower is a virtual ‘hotel’ for the antennas of numerous communications carriers. Often, the communications systems are housed in unoccupied industrial occupancies (precast shelter buildings) that have been delivered and installed on that site. Due to the small size of the shelter, it is not feasible to comply with the current provisions of Subsection 6.6.3 of NFPA 37, because there is no place to install a remote fuel fill that is far enough away from building openings at the same or lower level. See the included photos.

Left: A 2-room shelter about to be delivered. Note that there is no place to install a fuel fill that can meet the 24” clearance requirement as is covered in (current) 6.6.3.1. Right: a group of shelters placed in close proximity to each other.

Due to the limited space that multiple carriers share on a very small property, it is impractical to install the fuel fill at any distance from the shelter. Because many cell sites are on mountain tops or other off-road areas, the relatively small trucks needed to access such locations are not equipped with Camlocks, pumps, or other nozzles to achieve liquid/vapor tight connections. The shelters used for such applications already have concrete containments in the engine areas sufficient to contain spills. There is, to our knowledge,
no history of fires in cell site shelters relative to diesel fuel spills. While refueling spills do occasionally occur, the existing containment and relatively small quantities involved are easily cleaned up. The majority of existing installations utilize an internal fill connection, which has worked in practice for many years.

While no U.S. code or other regulation requires standby engine generators at cell sites, many telecommunications carriers provide them voluntarily. Such generators typically are in the 15 to 60 KW size and provide power to maintain a level of reliability necessary for public safety and competitive customer service. Although many carriers use outdoor engine modules, these assemblies are not as reliable as indoor units, because weather and rodent damage problems are inherent to such units.

Cell phones are how most people reach 911 services today and also are the secondary medium for emergency responders communicating among themselves. Additionally, the primary radio systems for first responders are dependent on repeater or ‘Trunked Radio’ systems whose antennas are collocated on towers with cellular or other systems. Emergency planners encourage citizens to prepare for evacuation emergencies with advice similar to South Carolina’s evacuation plan: “Motorists are encouraged to have a full tank of gas when they leave, bringing food items with them and cellular phones.” (emphasis added) Coping with disasters or weather severity is when the cellular and emergency responder systems are needed most and yet are times when commercial power is least reliable.

The standby diesel engines provided for communications sites employ relatively small, welded steel secondary containment-type belly tanks complying with ANSI/UL 142, Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids, for Class II fuel oil (diesel fuel). The shelters used for such purposes are unoccupied except during periodic maintenance activities and are not considered “important buildings” as defined in NFPA 30. Further, in NFPA 76, Standard for the Fire Protection of Telecommunications Facilities, these buildings are considered ‘redundant and replaceable’.

**Emergency Nature:** Given the conditions indicated herein and the contribution of standby generators to the reliability of the telecommunications system and, therefore by extension, public safety, it is vital that a standard-recognized method of fueling small diesel generators for communications equipment shelters be established.

Determination of emergency nature meets the conditions stated in Paragraph 5.3(f) of the Regulations Governing the Development of NFPA Standards: “The proposed TIA intends to correct a circumstance in which the revised NFPA Standard 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.”
TIA TC 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 10.

\[14\text{ (eligible to vote)} - 1\text{ (not returned)} - 0\text{ (abstentions)} = 13 \times 0.75 = 9.75\]

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

\[14\text{ eligible} \div 2 = 7 + 1 = 8\text{ (this is the simple majority)}\]

14 Eligible to Vote
1 Not Returned (Preston)

TC FINAL Ballot results for Technical Merit are as follows:
11 Agree
2 Disagree (Elovitz, Nieman)
0 Abstentions

FINAL ACTION: PASSED

TC FINAL Ballot results for Emergency Nature are as follows:
11 Agree
2 Disagree (Elovitz, Nieman)
0 Abstentions

FINAL ACTION: PASSED
MEMORANDUM

TO: NFPA Technical Committee on Internal Combustion Engines

FROM: R. P. Benedetti

DATE: May 29, 2013

SUBJ: NFPA 37 Proposed TIA No. 1102 FINAL TC BALLOT RESULTS

According to 5.4 in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Question 1 (Technical Merit) and Question 2 (Emergency Nature).

<table>
<thead>
<tr>
<th>Eligible to Vote</th>
<th>Not Returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>1</td>
</tr>
</tbody>
</table>

Technical Merit:

- 11 Agree (without comment)
- 0 Abstentions
- 2 Disagree (K. Elovitz and D. Nieman)

Emergency Nature:

- 11 Agree (without comment)
- 0 Abstentions
- 2 Disagree (K. Elovitz and D. Nieman)

There are two criteria necessary to pass ballot [(1) affirmative ¾ vote and (2) simple majority] with both questions needing to pass ballot in order to recommend that the Standards Council issues this TIA.

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

   \[14 \text{ eligible} ÷ 2 = 7 + 1 = 8\]

2. The number of affirmative votes needed to satisfy the ¾ requirement is 10

   (14 eligible to vote - 1 not returned - 0 abstentions = 13 × 0.75 = 9.75)

An appeal relating to a proposed Tentative Interim Amendment shall be filed no later than 5 days after the notice of the Technical Committee TIA ballot results are published in accordance with 1.6.2 (c) and 4.2.6. In the case that a Correlating Committee is also being balloted, appeals need to be filed 5 days after the notice of the Correlating Committee TIA ballot results are published.

Final ballot comments are attached for your review. Ballots received from alternate members are not included, unless the ballot from the principal member was not received.
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1102
To Replace the Current Text of Subsection 6.6.3 of both the 2010 and Proposed 2014 Editions of
NFPA 37, Standard For the Installation and Use of Stationary Combustion Engines and Gas Turbines

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to replace the current

text of subsection 6.6.3 of both the 2010 and Proposed 2014 Editions.

_________ AGREE  ________ DISAGREE*  ________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

This proposal needs more study and clarification to define the problem and identify suitable

solutions. The proposed 6.6.3.4 seems to allow hauling a fuel hose into a building and filling a tank

in a building. That does not sound like a safe arrangement. I further object to creating carve outs

in NFPA 37 to address specific users. With that approach our standard will soon have the integrity

of the Internal Revenue Code. Rather, solutions and requirements in NFPA 37 need to be
developed and stated in a way that is applicable universally.

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 submitter has not convinced me that the proposed change is appropriate, never mind
an emergency.

________________________________________________________
Signature

Kenneth M. Elowitz
Name (Please Print)

5/13/13
Date

Please return the ballot on or before Thursday, May 16, 2013

PLEASE RETURN TO:
Diane Matthews, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

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

RECEIVED 05-13-13 09:43 FROM- 5082760430 TO- F0002/0002
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1102
To Replace the Current Text of Subsection 6.6.3 of both the 2010 and Proposed 2014 Editions of NFPA 37, Standard For the Installation and Use of Stationary Combustion Engines and Gas Turbines

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to replace the current text of subsection 6.6.3 of both the 2010 and Proposed 2014 Editions.

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

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Inclusion of Ch. 27 of NFPA 30 is not necessary. More discussion and consideration of public comment(s) is needed from the Committee on this particular issue.

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 nature of the proposal does not meet the definition of emergency as defined by the "Regulations Governing the Development of NFPA Standards," in my opinion.

[Signature]

David Nieman
Name (Please Print)

5/14/13
Date

Please return the ballot on or before Thursday, May 16, 2013

PLEASE RETURN TO:
Diane Matthews, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7110
E-mail: dmatthews@nfpa.org
I oppose amendment 6.6.3.4 as written.

There is a need to specify a limitation to size of tank to be allowed manual filling. Also, there is a need for spill containment at the fill for these types of filling. Historically spills occur most often during this type of transfer operation.

Propose to add (in addition): 6.6.3.4.1 The provisions of 6.6.3.4 shall be allowed for storage containers of 1,000 gal capacity or less, that have spill protection at the fill.

Marcia Poxson  
Engineer  
Storage Tank Division  
Bureau of Fire Services  
3101 Technology Blvd  
Lansing, MI 48910  
517-373-3290  
517-332-1428  
www.michigan.gov/storagetanks
1. Revise 6.12.9 to read:

6.12.9 Where emergency shutoff valves are required to be installed in fixed piping at bulk plants and industrial plants, accordance with 6.12.2, a means shall be incorporated to actuate the emergency shutoff valves in the event of a break of the fixed piping resulting from a pull on the hose.

Submitter’s Substantiation: Since 2001 the installation of Emergency Shutoff Valves has been allowed not only to protect transfer lines at bulkheads (loading/unloading stations) but also at the liquid outlet of containers to comply with 5.7.4.2 (D)(2), (H)(2).

The action taken by the Technical Committee during the balloting process on Comment 58-58 would require all Emergency Shutoff Valves regardless of where they are installed in the fixed piping system to incorporate a means to actuate in the event of a break in the fixed piping resulting from a pull on the hose. This would include Emergency Shutoff Valves installed 100 feet or more from the transfer hose at the container opening which is used to only protect the liquid withdrawal opening at the container not the hose at the transfer station. It was the intent of the Technical Committee to require activation of only the Emergency Shutoff Valve installed within 20 feet of the nearest end of the hose or swivel-type piping connection (see 6.12.2).

Emergency Nature: The intent of the committee was to cover only those emergency shutoff valves that are installed to protect the loading and unloading stations; the proposed 6.12.9 goes far beyond the intent.

As currently written, Comment 58-58 would create a huge installation problem and in many cases could not be complied with due to the location of all the Emergency Shutoff Valves installed in the system. The difficulty in trying to connect all of the valves in the fixed piping system would far outweigh any benefit of having done so. Only the most critical valve must close and that is the one installed closest to where the hose “pull away” occurs, per the requirement in 6.12.2.

The proposed revision to 6.12.9 will clarify the limitation of this new requirement to Emergency Shutoff Valves installed within 20 ft of lineal pipe from the nearest end of the transfer hose connection to the fixed piping system (6.12.2), thereby providing the necessary protection for loading and unloading stations.
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 **17**.

\[
[29 \text{ eligible to vote} - 7 \text{ not returned} - 0 \text{ abstentions}] = 22 \times 0.75 = 16.5
\]

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

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

**29** Eligible to Vote  
**7** Not Returned (Barber, Belke, Garza-Obregon, Kastanas, Meyer, Misel, Zeman)

TC FINAL Ballot results for **Technical Merit** are as follows:  
22 Agree (Dimopoulos w/comment)  
0 Disagree  
0 Abstentions

**FINAL ACTION: PASSED**

TC FINAL Ballot results for **Emergency Nature** are as follows:  
22 Agree  
0 Disagree  
0 Abstentions

**FINAL ACTION: PASSED**
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1095

To Revise 6.12.9 of Proposed 2014 Edition of NFPA 58
Liquefied Petroleum Gas Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 6.12.9.

_____X_____ AGREE ____________ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

The current wording of 6.12.9 would require the installation of a means to actuate all emergency shutoff valves within a piping system in addition emergency shutoff valves associated with rail transfer systems noted in paragraph 6.12.12. This requirement would lead to unnecessary complexity and cost while the safety of the facility would not be measurable enhanced. Actuation of the emergency shutoff valve associated with the transfer operation adequately addresses this risk______________________________

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

Alexi Dimopoulos __________________________
Name (Please Print)

_3 / 13 / 2013 __________________________
Date

Please return the ballot no later than Wednesday, March 13, 2013.

PLEASE RETURN TO:
Kimberly Shea
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7070 E-mail: kshea@nfpa.org
Item 13-8-15
1. Revise 11.1.1 and A.11.1.1 to read:

11.1.1* This chapter applies to engine fuel systems on vehicles using LP-Gas in internal combustion engines, including containers, container appurtenances, carburetion equipment, piping, hose and fittings, and their installation.

A.11.1.1 Chapter 11 covers engine fuel systems for engines installed on vehicles for any purpose, as well as fuel systems for stationary and portable engines.

2. Relocate 11.15.2 and subsequent paragraphs to a new Section 6.26 and renumber Section 11.16 as 11.15 and Section 6.26 as 6.27 and subsequent paragraphs:

### 6.26 Containers for Stationary Engines.

#### 6.26.1 LP-Gas containers for stationary installations shall be located outside of buildings unless the buildings comply with the requirements of Chapter 10.

#### 6.26.2 Containers for stationary engines shall be installed to meet the separation requirements of Section 6.3.

#### 6.26.3 Where containers for stationary engines have a fill valve with an integral manual shutoff valve, the minimum separation distances shall be one-half of the distances specified in Section 6.3.

**Submitter’s Substantiation:** The addition of new subsection 11.15.2 placed requirements for containers providing propane engine fuel for stationary engines. This requires all ASME propane containers to have a maximum allowable working pressure (MAWP) of 312 psig, if constructed after April 1, 2001 (per 11.3.2.1). It is the intent of the LP-Gas committee to require vehicle engine fuel containers to have a MAWP of 312 psig due to the possibility of overpressure and propane release due to heat accumulated from the engine or the vehicle’s operation. This environment does not exist for ASME propane containers serving stationary engines (such as emergency generators), and the normal MAWP of 250 psig is adequate. In practice such stationary engine fuel containers exist in the same environment as propane containers providing fuel to residential heating and cooking.

The problem is ASME containers with a design pressure of 312 psig are currently produced in sizes up to 110 gallons. Larger 312 psig ASME containers will have to be custom designed and manufactured at a significantly higher cost and with a lengthy lead time. There is no technical reason to require this for stationary containers serving stationary engines.

It is noted that the ASME Boiler and Pressure Vessel Code requires a minimum wall thickness for pressure vessels, with a design pressure of 250 and 312 psig, up to about 24” diameter. This requirement results in the same design for ASME containers of about 24” diameter and smaller for pressure of 250 psig and 312 psig. Vehicle fuel containers have a diameter of about 24” or smaller. This made the requirement for engine fuel containers on vehicles essentially the same, so there was no hardship. Stationary engines normally use larger containers, for example it is not unusual for a hospital using a propane engine for standby power to use a 250 gallon or larger ASME container. By relocating the requirement to Chapter 6, the 250 psig ASME container currently used with no adverse safety implications can continue to be used.

The scope of Chapter 11 is revised to clarify that Chapter 11, in its entirety, is intended only for propane containers on vehicle, and was never intended to be applicable to containers serving stationary engines.

**Emergency Nature:** The committee erred when it added requirements for containers for stationary engines in Chapter 11, rather than Chapter 6. The NFPA regulations Governing Committee Projects provide several criteria for the emergency nature of TIA’s. Two of these are applicable to the proposed TIA:

(a) The document contains an error or an omission that was overlooked during a regular revision process.
(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 committee required the use of tanks significantly more expensive and not readily available. (312 psig containers rather than 250 psig containers in sizes larger than 110 gallons) by locating the requirements in Chapter 11, rather than Chapter 6. No technical substantiation was provided to require a change to the container design pressure; however, by inadvertently locating the requirement in Chapter 11, a higher design pressure was inadvertently mandated.
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.

\[29 \text{ (eligible to vote)} - 8 \text{ (not returned)} - 1 \text{ (abstention)} = 20 \times 0.75 = 15\]

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

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

29 Eligible to Vote
8 Not Returned (Belke, Dimopoulos, Fossa, Garza-Obregon, Kastanas, King, Meyer, Wilson)

TC FINAL Ballot results for Technical Merit are as follows:
17 Agree
3 Disagree (Gentry, McTier, Mortimer)
1 Abstention (Barber)

FINAL ACTION: PASSED

TC FINAL Ballot results for Emergency Nature are as follows:
18 Agree
2 Disagree (McTier, Mortimer)
1 Abstention (Barber)

FINAL ACTION: PASSED
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1079
To Revise Section 11.1.1 and A.11.1.1, and Relocate 11.15.2 and subsequent paragraphs to a new Section 6.26 and renumber Section 11.16 as 11.15 and Section 6.26 as 6.27 and subsequent paragraphs of the 2011 Edition and Proposed 2014 Edition of NFPA 58, Liquefied Petroleum Gas Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Section 11.1.1 and A.11.1.1 and Relocate 11.15.2 and subsequent paragraphs to a new Section 6.26 and renumber Section 11.16 as 11.15 and Section 6.26 as 6.27 and subsequent paragraphs

_____ ____ AGREE ________X____ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:
*An explanation must accompany a disagreement or abstaining position.
Just put an exception in Section 11 and I would accept the proposal.

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

_____X_____ AGREE ________X____ DISAGREE* ____________ ABSTAIN*

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

Steven T. Gentry
Signature

Steven T. Gentry
Name (Please Print)

December 27, 2012
Date

Please return the ballot on or before December 27, 2012.

PLEASE RETURN TO:
Jenny Depew, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7070 E-mail: jdepew@nfpa.org

July 22, 2013
Supplemental Agenda July 29-August 1, 2013
Page 1090 of 1861
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1079

To Revise Section 11.1.1 and A.11.1.1, and Relocate 11.15.2 and subsequent paragraphs to a new Section 6.26 and renumber Section 11.16 as 11.15 and Section 6.26 as 6.27 and subsequent paragraphs of the 2011 Edition and Proposed 2014 Edition of NFPA 58, Liquefied Petroleum Gas Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Section 11.1.1 and A.11.1.1 and Relocate 11.15.2 and subsequent paragraphs to a new Section 6.26 and renumber Section 11.16 as 11.15 and Section 6.26 as 6.27 and subsequent paragraphs

____________ AGREE _____X_______ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

An additional 11.15.2.4_statement indicating that the pressure relief valve requirements for ASME containers in stationary service for engine fuel applications that are not for LP-Gas mobile service or for use on LP-Gas fueled mobile vehicles shall not be less than a design pressure 250 psig.If the Committee agrees that the present language is not clear rather than making any other changes.

_____________________________________________________________________

_____________________________________________________________________

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._

________________________ _____________________________________________

Samuel McTier_______________________________
Signature

Samuel E. McTier________________________________
Name (Please Print)

_12/27/2012________________________________________
Date
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1079

To Revise Section 11.1.1 and A.11.1.1, and Relocate 11.15.2 and subsequent paragraphs to a new Section 6.26 and renumber Section 11.16 as 11.15 and Section 6.26 as 6.27 and subsequent paragraphs of the 2011 Edition and Proposed 2014 Edition of NFPA 58, Liquefied Petroleum Gas Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Section 11.1.1 and A.11.1.1 and Relocate 11.15.2 and subsequent paragraphs to a new Section 6.26 and renumber Section 11.16 as 11.15 and Section 6.26 as 6.27 and subsequent paragraphs

___________ AGREE ___________ DISAGREE* ___________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

__This does not look like an error, but a new requirement for stationary tanks that is not impossible to meet.__

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 requirement may cost more, but that does not make it an emergency. Tanks that meet the requirements are currently on the market and can be placed into service.

Frank J. Mortimer

12/20/2012

Date

Please return the ballot on or before December 27, 2012.

PLEASE RETURN TO:
Jenny Depew, Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
Fax: (617) 984-7070
E-mail: jdepew@nfpa.org
Dear Jenny,

I will abstain from voting on this TIA. As an overseas member it is inappropriate for me to comment or vote on a submission specifically for use in the USA.

Best regards,

Don Barber

On 14 December 2012 at 17:04 "Depew, Jenny" <JDepew@nfpa.org> wrote:
To the Technical Committee on Liquefied Petroleum Gases:

Please see the attached pdf file regarding **NFPA 58, proposed TIA No. 1079**, and the word document of the ballot form.

Please return the ballot to my attention via e-mail to: jdepew@nfpa.org, or via fax to: 617-984-7070. You may also mail your ballot to: Jenny Depew, NFPA,1 Batterymarch Park, Quincy, MA 02169 to arrive no later than **Thursday, December 27, 2012**.

This information has also been posted on the Document Information page, which you may view by going to [www.nfpa.org/58next](http://www.nfpa.org/58next). Be sure to sign in with your NFPA username/password, and scroll to the bottom to find the TIA category.

Thank you and have a nice day.

*Jenny Depew*
*Administrator, Technical Projects*
*National Fire Protection Association*
While I agree with the changes there is an error in the substantiation.

It is noted that the ASME Boiler and Pressure Vessel Code requires a minimum wall thickness for pressure vessels, with a design pressure of 250 and 312 psig, up to about 24” diameter. This requirement results in the same design for ASME containers of about 24” diameter and smaller for pressure of 250 psig and 312 psig. Vehicle fuel containers have a diameter of about 24” or smaller.

The ASME code has a minimum as per UG-16. It is not dependent on design pressure or a specific set of diameters, but rather the material, the NDE, the pressure and the diameters. Tanks for the same diameter will have different wall thickness for different pressures, as well as different materials or NDE.

J. L. Adams M. Eng., P. Eng.
EDPRO
519.690.0000 bus
519.266.3262 direct
www.edproenergy.com
Item 13-8-16
1. Remove the indication that 516.3(A)(1)(a) is to be deleted and renumber as needed. This is an error in ROC Comment 14-67 to read as follows:

“(A) Zone Classification of Locations.

(1) For the purposes of this Article, the Zone system of electrical area classification shall be applied as follows:

(a) The inside of open or closed containers or vessels shall be considered a Class I, Zone 0 location.

(b) A Class I, Division 1 location shall be permitted to be alternatively classified as a Class I, Zone 1 location.

(c) A Class I, Division 2 location shall be permitted to be alternatively classified as a Class I, Zone 2 location.

(d) A Class II, Division 1 location shall be permitted to be alternatively classified as a Zone 21 location.

(e) A Class II, Division 2 location shall be permitted to be alternatively classified as a Zone 22 location. [33: 6.2.2]”

2. Change the second to last sentence of 516.10(A) and add an informational note as shown in ROC Comment 14-67 to read as follows:

“The installation of electrostatic spraying equipment shall comply with 516.10(A)(1) through (A)(10). Spray equipment shall be listed except as otherwise permitted. All automatic electrostatic equipment systems shall comply with 516.4(A)(1) through (A)(9).

Informational Note: For more information on listing and approval of electrostatic spray equipment, see NFPA 33-2011, Standard for Spray Application Using Flammable or Combustible Materials, Section 11.5. NFPA 33 permits certain electrostatic spray equipment to be approved for use when additional mitigation equipment is employed.”

Submitter’s Substantiation: This TIA was created because the comment 14-67 as accepted by CMP-14 included wording in that did not comply with the NEC Style Manual in addition to other errors. The TCC directed that the wording be revised to comply with the style manual. In doing so, the entire rewrite of Article 516 that was accepted by CMP-14 was taken out of the 2014 Code cycle because the required revision is a technical change to the proposal. A technical change requires an affirmative ballot of CMP-14. This process is the mechanism to affect that change and simultaneously keep this significant effort in sync with the 2014 NEC.

Emergency Nature: NFPA 70:2011 contains errors that were overlooked during the 2011 revision process and contains major conflicts with other NFPA standards.

It was identified that the 2011 NEC Article 516 text stated that extracted text was taken from the 2011 editions of NFPA 33 and NFPA 34 while the actual extracted text in Article 516 is from the 2007 editions of NFPA 33 and NFPA 34. The task group formed between the Finishing Processes Committee and Code Making Panel 14 rewrote Article 516 in its entirety in order to include the correct 2011 extracted text and to reflect major revisions in both of the referenced standards.
TIA 70®-Proposed 2014
NFPA 70, National Electrical Code®
Reference: 516.3(A)(1)(a) and 516.10(A)
(TIA Log 1096)

Comment Closing: 5/24/2013
0 Public Comments Received

TIA FINAL CC 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 (Correlation Issues) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 9.
\[12 (eligible to vote) – 0 (not returned) – 1 (abstention) = 11 \times 0.75 = 8.25\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
\[12 \text{ eligible} \div 2 = 6 + 1 = 7 \text{ (this is the simple majority)}\]

12 Eligible to Vote
0 Not Returned

CC FINAL Ballot results for Correlation Issues are as follows:
10 Agree
1 Disagree (Hickman)
1 Abstention (Fiske)

FINAL ACTION: PASSED

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 9.
\[12 (eligible to vote) – 0 (not returned) – 0 (abstentions) = 12 \times 0.75 = 9\]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
\[12 \text{ eligible} \div 2 = 6 + 1 = 7 \text{ (this is the simple majority)}\]

CC FINAL Ballot results for Emergency Nature are as follows:
9 Agree
3 Disagree (Fiske, Hickman, Liggett)
0 Abstentions

FINAL ACTION: PASSED

Final NEC-P14 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 8.

\[ 14 \text{ (eligible to vote)} - 3 \text{ (not returned)} - 1 \text{ (abstention)} = 10 \times 0.75 = 7.5 \]

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

\[ 14 \text{ eligible} \div 2 = 7 + 1 = 8 \text{ (this is the simple majority)} \]

---

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

- 10 Agree
- 0 Disagree
- 1 Abstention (Wechsler)

**FINAL ACTION: PASSED**

---

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 7.

\[ 14 \text{ (eligible to vote)} - 3 \text{ (not returned)} - 2 \text{ (abstentions)} = 9 \times 0.75 = 6.75 \]

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

\[ 14 \text{ eligible} \div 2 = 7 + 1 = 8 \text{ (this is the simple majority)} \]

---

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

- 9 Agree
- 0 Disagree
- 2 Abstentions (Burns, Wechsler)

**FINAL ACTION: PASSED**
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1096
To Revise 516.3(A)(1)(a) and 516.10(A) of the Proposed 2014 edition
of NFPA 70, National Electrical Code

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.

___________ AGREE ___________ DISAGREE*  _____X_____ 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.

As written, 516.3(A)(1) conflicts with both 505.7 and 506.7. Thus, if adopted, Article 516 would permit something not permitted by Articles 505 and 506; however, the TIA contains all extracted text (taken from NFPA 33). The intent of CMP-14 was to extract NFPA 33 text, but in so doing, it created a potential conflict. To lose this text is to revert to the ROC draft version of Article 516 with all its imperfections. This is an unfortunate situation, to say the least.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

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

___________ AGREE  ____X_____ DISAGREE*  ____________ ABSTAIN*  

EXPLANATION OF VOTE - Please type or print your comments:

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

It is not obvious that the NFPA can issue a TIA to a document that has not completed the consensus process and become a published standard (as is the case with NFPA 70-2014). Changes to the ROC draft could be made via NITMAM at the 2013 Technical Session. It would seem that everyone understands that TIAs are for published codes and standards, but that is not expressly stated in the Regulations Governing Committee Projects (or in the Regulations Governing the Development of NFPA Standards). If NFPA 70-2014 had been issued as of this ballot date, we would agree that the TIA is of an emergency nature.

____________________________________________________________________
____________________________________________________________________

Signature
William T. Fiske
Name (Please Print)
Kim,

Mr. Fiske's concerns are persuasive. Accordingly, please record me as voting "Disagree" on Questions 1 and 2. I am not convinced that the Regs. allow us to vote on a TIA on a Code that is not yet final.

Kind regards,
Palmer

Kimberly Shea
Administrator, Technical Projects
NFPA
1 Batterymarch Park
Quincy, MA 02169
617-984-7953
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1096
To Revise 516.3(A)(1)(a) and 516.10(A) of the Proposed 2014 edition
of NFPA 70, National Electrical Code

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.

____XX______ 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.

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

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

_________ AGREE ______XX______ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

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

I am concerned that this has been a reaction to the CC note and not a thoroughly thought out approach. I am also concerned that the error of deleting 516.3(A)(1)(a). This portion could be considered as an true emergency but not the rest of the changes. Perhaps another TIA could be issued to correct only this oversight.

____Danny Liggett__________________________
Signature
____Danny Liggett__________________________
Name (Please Print)
____5-7-2013___________________________
Date

Ballots are due no later than Wednesday, May 8, 2013

PLEASE RETURN TO:
Kim Shea, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7070 E-mail: kshea@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1096
To Revise 516.3(A)(1)(a) and 516.10(A) of the Proposed 2014 Edition
of NFPA 70, National Electrical Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise
516.3(A)(1)(a) and 516.10(A)

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 do not see that this change constitutes an emergency response from the panel.

______________________________
Signature

______________________________
Dave Burns
Name (Please Print)

4/26/2013
Date

Please return the ballot on or before Friday, April 26, 2013.

PLEASE RETURN TO:
Kimberly Shea, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169  FAX: (617) 984-7070  E-mail: kshea@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1096
To Revise 516.3(A)(1)(a) and 516.10(A) of the Proposed 2014 Edition
of NFPA 70, National Electrical Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise
516.3(A)(1)(a) and 516.10(A)

__________ AGREE ___________ DISAGREE* _______X____ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Our ballot is to abstain on this TIA.
Our position is that there has been a great deal of coordinated efforts by members of
three different NFPA Committees to make consistent improvement to the current NEC
Article 516.
We appreciate that in performing their required work, the NEC Correlating Committee
has recommended changes. However lacking a finalized copy of Article 516 as it will
appear in the code and with our understanding that the submitter of this TIA was denied
permission to publish the complete article with the proposed TIA changes in context
which would have benefit a proper review of this TIA, limits our ability to provide a
proper evaluation.
We strongly feel that returning this Article to the 2011 NEC text is not justified nor do we
believe it is in the better interests of the NEC to publish an Article offering only some
improvements, but still needing more work possibly due to the recommendations (?) of
the Correlating Committee.

____________________________

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.

____________________________
See above comments

____________________________


David Wechsler
Signature

____________________________
David Wechsler
Name (Please Print)
Item 13-8-17
1. Revise 445.20 to read as follows:

445.20 Ground-Fault Circuit Interrupter Protection for Receptacles on 15 kW or Smaller, Portable Generators. All 125-volt, single-phase, 15- and 20 ampere receptacle outlets, that are a part of a 15 kW or smaller, portable generator, either shall have ground-fault circuit interrupter protection for personnel integral to the generator or receptacle, or shall not be available for use when the 125/250 volt locking-type receptacle is in use. If the generator does not have a 125/250 volt locking-type receptacle or was manufactured or remanufactured prior to January 1, 2015, this requirement shall not apply.

Submitter’s Substantiation: On behalf of the Portable Generator Manufacturers' Association, I am proposing a Tentative Interim Amendment (TIA) for NEC 2014.

This proposed TIA is directed towards a new section for NEC 2014, Section 445.20. This new section originated as Proposal 13-19 during the proposal phase, and was modified by Comment 13-16 during the comment phase.

The new Section 445.20 attempts to address a theoretical electrical shock hazard associated with the use of 15kW or smaller portable generators. Given the structure and application of the NEC, as Section 445.20 is written, it would apply to the use of any 15 kW or smaller portable generator -- regardless of its date of manufacture -- under circumstances covered by the NEC. This (presumably unintended) retroactive application of the NEC effectively would ban the use of millions of portable generators that have been, and continue to be, used safely. To retroactively apply the NEC in this manner is uncharacteristic, and is an unfair, not to mention unnecessary, burden on consumers, trades people and society as a whole, particularly given the complete lack of historical electrical shock incident data to support the requirement in the first instance.

The proposed TIA, if accepted, would not be the first time that a new NEC section has (a) expressly indicated that it should not be applied retroactively and (b) provided a lead time for design compliance. Rather, a precedent for the proposed TIA was set during the NEC 2011 code making cycle when Proposal 3-140 for Section 590.6 was accepted in principle by Code-Making Panel 3. Specifically, Proposal 3-140 (and what eventually became Section 590.6(A)(3)) provided an alternative means of compliance for generators manufactured prior to the effective date of the 2011 NEC.¹ It is noteworthy that Code-Making Panel 3 recognized the problem surrounding retroactive applicability and therefore modified the original proposal to add an effectivity date. The last paragraph of the Panel Statement from Code-Making Panel 3 stated:

"The revisions to the wording also clarified the requirements for GFCI protection on 15 kW or less portable generators, with information added, that will ensure that this requirement does not apply to manufactured or remanufactured generators prior to January 1, 2011."

Like Proposal 3-140, the proposed TIA makes clear that the new section should not be retroactively applied. The proposed TIA suggests a slightly longer lead time than that which Code-Making Panel 3 allowed when Proposal 3-140 was accepted in principle, but there is good reason for a longer lead time in this instance. The addition of Section 445.20 will require all generators that feature a 125/250 volt locking-type receptacle, regardless of intended use or applicability to have GFCI protection on the 125 volt 15/20 amp outlets. This will require manufacturers to redesign a wide range of existing product. This broad scale design change merits a longer lead time (of an additional year) than that provided in Proposal 3-140.

¹ Section 590.6(A)(3) states "(3) Receptacles on 15 kW or less Portable Generators. All 125-volt and 125/250-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are a part of a 15 kW or smaller portable generator shall have listed ground-fault circuit interrupter protection for personnel. Listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted for use with 15kW or less portable generators manufactured or remanufactured prior to January 1, 2011."
Emergency Nature: PGMA and its members have determined that this proposed TIA is of an emergency nature requiring prompt action in accordance with 5.3 of the NFPA Regulations Governing Committee Projects, for the following reasons:

(a) The document contains an error or an omission that was overlooked during a regular revision process; and

(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.

While your organization is reviewing the proposed TIA, we also encourage several grammatical corrections to Section 445.20, specifically that the three (3) commas identified below be removed. Not only are these commas unnecessary, they may lead to incorrect interpretations by those who rely on the code.
TIA 70®-Proposed 2014
NFPA 70, National Electrical Code®
Reference: 445.20
(TIA Log 1097)

Comment Closing: 6/14/2013
1 Public Comment Received

TIA FINAL CC 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 (Correlation Issues) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 9.

\[12 \text{ (eligible to vote)} - 0 \text{ (not returned)} - 0 \text{ (abstentions)} = 12 \times 0.75 = 9\]

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

\[12 \text{ eligible} ÷ 2 = 6 + 1 = 7 \text{ (this is the simple majority)}\]

12 Eligible to Vote
0 Not Returned

CC FINAL Ballot results for Correlation Issues are as follows:
7 Agree
5 Disagree (Brunssen, Bunker, Fiske, Hickman, LaBrake)
0 Abstentions

FINAL ACTION: FAILED

CC FINAL Ballot results for Emergency Nature are as follows:
4 Agree (Brunssen, Drake, Hittinger w/comment)
8 Disagree (Bunker, Fiske, Johnston, Kovacik, Hickman, LaBrake, Liggett, Owen)
0 Abstentions

FINAL ACTION: FAILED

Final NEC-P13 Ballots are on the next page
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 **15**.

\[
[20 \text{ (eligible to vote)} - 1 \text{ (not returned)} - 0 \text{ (abstentions)} = 19 \times 0.75 = 14.25]
\]

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

\[
[14 \text{ eligible } \div 2 = 10 + 1 = 11 \text{ (this is the simple majority)}]
\]

<table>
<thead>
<tr>
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<th>Eligible to Vote</th>
<th>Not Returned (Keenan)</th>
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<tbody>
<tr>
<td><strong>20</strong></td>
<td></td>
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<tr>
<td><strong>1</strong></td>
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**TC FINAL** Ballot results for **Technical Merit** are as follows:

- 10 Agree (Paulsen w/comment)
- 9 Disagree (Adams, Currin, Jr., Froemming, Little, Nesser, Ode, Savage, Tobias, Jr., White)
- 0 Abstentions

**FINAL ACTION: FAILED**

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

- 10 Agree (Paulsen w/comment)
- 9 Disagree (Adams, Caron, Currin, Jr., Little, Nesser, Ode, Savage, Tobias, Jr., White)
- 0 Abstentions

**FINAL ACTION: FAILED**
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 edition
of NFPA 70, National Electrical Code

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.

_______ AGREE _______ X _______ 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.

NEC Section 590.6(A)(3) requires that portable generators of 15-kW or less be equipped with listed ground-fault circuit-interrupter protection, as does proposed new Section 445.20. Section 590.6(A)(3) permits the use of listed cord sets incorporating listed ground-fault circuit-interrupter protection for personal identified for portable use as a means to avoid the retroactive application of the NEC as addressed by the TIA submitter in his substantiation. Panel 13 might have considered a similar approach to “soften” the impact of the proposed new requirement of 445.20. Acceptance of the proposed TIA will introduce a potential correlation issue concerning the date of manufacture of the generator: Section 590.6(A)(3) applies to generators manufactured prior to January 1, 2011; the proposed TIA would apply to generators manufactured prior to January 1, 2015. Additionally, the submitter is addressing an issue contained in the proposed 2014 Edition of the NEC that has not yet been officially approved by the voting assembly. Submission of a TIA at this time is inappropriate; the appropriate action was to submit a NITMAM, and if certified, address the issue on the floor of the NFPA Annual Meeting in June, 2013.

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.

Affirmative Comment: The proposed text of 445.20 would adversely impact the continued use of generators currently in use without providing relief as was done in Section 590.6(A)(3) during the 2011 Edition of the NEC. (See Regulations Governing Committee Projects, Section 5-2(f)).

James E. Brunssen

Signature
James E. Brunssen

Name (Please Print)
May 23, 2013

Date

Ballots are due no later than Wednesday, May 30, 2013
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 edition
of NFPA 70, National Electrical Code

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.

AGREE  XXXX  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.

I agree with the comments made by Ms. Little and Mr. Ode.

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

AGREE  XXXX  DISAGREE*  ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

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

I agree with the comments made by Ms. Little and Mr. Ode.

Surname

Merton Bunker, PE
Name (Please Print)

May 29, 2013
Date

Ballots are due no later than Wednesday, May 30, 2013

PLEASE RETURN TO:
Kim Shea, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7070
E-mail: kshea@nfpa.org

July 22, 2013
Supplemental Agenda July 29-August 1, 2013
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 edition
of NFPA 70, National Electrical Code

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.

_________ AGREE  _X_ 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 is nothing with which to correlate (or not). 5.1(b) of the Regulations Governing Committee Projects requires the submitter to identify the document, edition and paragraph(s) of the document to which the TIA is directed. There is no 445.20 in ANSI/NFPA 70 – 2011, and NFPA 70 – 2014 does not exist (and will not exist until after the Standards Council meeting July 30, 2013).

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

_________ AGREE  _X_ DISAGREE*  __________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

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

The proposed TIA bypasses three essential steps in the development of an NFPA standard. The first is Notice of Intent to Make a Motion, 4.5 in the Regulations Governing Committee Projects. The second is Membership Action [on a Certified Amending Motion] at Association Technical Meeting, 4.6 in the Regulations. The third is Action by the Council, 4.8 in the Regulations. Unless those steps have been taken, there does not appear to be any basis for an “emergency” Temporary Interim Amendment, which is, in any event, supposed to be used for modifying NFPA codes and standards already in effect.

[Signature]

William T. Fiske
Name (Please Print)
2013-05-24
Date

Ballots are due no later than Wednesday, May 30, 2013

PLEASE RETURN TO:
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 edition
of NFPA 70, National Electrical Code

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.

__________ 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.

Multiple members of the Technical committee have identified an obvious correlation issue between, existing 590.6 and this new section.

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

__________ AGREE   _______ DISAGREE*   _______ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

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

This is no emergency nature when the proposed revision creates a conflict within the NBC.

___________________________
Signature

Palmer Hickman
Name (Please Print)

5/29/13
Date

Ballots are due no later than Wednesday, May 30, 2013

PLEASE RETURN TO:
Kim Shea, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7070  E-mail: kshea@nfpa.org
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 edition
of NFPA 70, National Electrical Code

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.

________________________________________________________
__No apparent correlation issues.____________________________

________________________________________________________

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

________ AGREE  ______ X____ DISAGREE*  ________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

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

___The TIA does not meet the criteria for emergency nature in 5.3(a) through (f) of the Regulations Governing Committee Projects.______________________

________________________________________________________

________________________________________________________

Michael J. Johnston

Signature
_Michael J. Johnston________________________

Name (Please Print)
_05-28-2013________________________

Date

Ballots are due no later than Wednesday, May 30, 2013

PLEASE RETURN TO:
Kim Shea, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169  FAX: (617) 984-7070  E-mail: kshea@nfpa.org
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 edition
of NFPA 70, National Electrical Code

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.

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

_________ AGREE  ___X___ DISAGREE*  ___________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

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

GFIC protection would provide the appropriate protection for these circuits and extending the date out for an additional year would permit these dangerous applications to exist for an additional year. This TIA does not fit within any of the factors in 5.3(a) through (f) of the NFPA Rules and Regulations for determination of an emergency nature. The requirement for GFIC protection of these receptacles on generators manufactured after January 1, 2011 are already existing for generators used in the construction industry so an extension is unnecessary for generators used for non-construction related use.

Signature
John R. Kovacik
Name (Please Print)
May 29, 2013 Date

Ballots are due no later than Wednesday, May 30, 2013

PLEASE RETURN TO:
Kim Shea, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169  FAX: (617) 984-7070  E-mail: kshea@nfpa.org
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 edition
of NFPA 70, National Electrical Code

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.

_______ AGREE _______ X____ 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.

The Technical Committee failed to reach a 3/4ths affirmative on the technical merit of this TIA, so there is no consensus.

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

_______ AGREE _______ X____ DISAGREE* _______ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

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

The Technical Committee failed to reach a 3/4ths affirmative on the emergency nature of this TIA, so there is no consensus.

_________________________
Signature
Neil F. LaBrake, Jr. - CC Principal, EEI rep.
Name (Please Print)

29 May 2013
Date

Ballots are due no later than Wednesday, May 30, 2013

PLEASE RETURN TO:
Kim Shea, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169    FAX: (617) 984-7070   E-mail: kshea@nfpa.org
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 edition
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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.

_____ XX____ 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.


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

_______ AGREE _______ XX____ DISAGREE* _________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

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

______ I agree with the “Disagree” comments expressed in the “Explanation of Vote” ballots of the panel. Retaining the current language does not pose a hazard to the public.


Danny Liggett  __________________________
Signature

Danny Liggett  __________________________
Name (Please Print)

May 29, 2013  __________________________
Date

Ballots are due no later than Wednesday, May 30, 2013

PLEASE RETURN TO:
Kim Shea, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169  FAX: (617) 984-7070  E-mail: kshea@nfpa.org

July 22, 2013  Supplemental Agenda July 29-August 1, 2013  Page 1116 of 1861
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 edition
of NFPA 70, National Electrical Code

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.

______________________________________________________________________

______________________________________________________________________

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

AGREE  X  DISAGREE*  ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a negative/disagreement or abstaining position.
  It appears from the panel commentary that the submitter had adequate opportunity to propose this before the final draft of the 2014 NEC. I do not agree that this issue warrants a TIA.

______________________________________________________________________

Richard P. Owen
Signature

Richard P. Owen
Name (Please Print)

May 22, 2013
Date

Ballots are due no later than Wednesday, May 30, 2013

PLEASE RETURN TO:
Kim Shea, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7070
E-mail: kshea@nfpa.org

July 22, 2013
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 edition
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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.

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.

_____ I agree that it is of an emergency nature in that the time needed to change all the effected products was omitted during the deliberation of the changes to the Code.

____________________
Signature

____________________
Name (Please Print)

5.24.13
Date

Ballots are due no later than Wednesday, May 30, 2013.

PLEASE RETURN TO:
Kim Shea, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7070    E-mail: kshea@nfpa.org
CORRELATING COMMITTEE
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To: Revise 445.20 of the Proposed 2014 edition
of NFPA 70, National Electrical Code

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.

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.

Affirmative Comment: We have reviewed section 5.3 of the Regulations Governing the Development of the NFPA Standards. It is our opinion that 5.3(4) applies and that failure to revise certain text in 445.20 would create an adverse impact on portable generators. While some may argue that this issue should have been submitted as a NTMAM, the situation must be resolved.

David Hittinger
Signature

Name (Please Print)

Date

Ballots are due no later than Wednesday, May 30, 2013.

PLEASE RETURN TO:
Kim Shea, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02179

FAX: (617) 984-7070
E-mail: kshea@nfpa.org
Kim,

Please revise my CMP-13 ballot on TIA 1097 as follows:

Please change my vote on the correlation issues to **Negative** for the following reason:
I believe the writer of the TIA misrepresented what CMP-3 did in 590.6(A)(3) in the 2011 NEC cycle.

Please change my vote on emergency nature to **Negative** for the following reason:
I feel there is no emergency, because this TIA is incorrect. We have the ability to put forth another TIA to reflect what CMP-3 did in 590.6(A)(3) in the 2011 NEC cycle.

Martin D Adams
President
Adams Electric Inc
320 S Santa Fe Ave
Pueblo, Co 81003
719-542-2333 - Office
719-240-2950 - Cell
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 Edition of NFPA 70, National Electrical Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 445.20.

XXX AGREE  XXXX DISAGREE*  XXXX 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.

XXX AGREE  XXXX DISAGREE*  XXXX ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I disagree that the subject is of an emergency nature. As stated in the TIA “To retroactively apply the NEC in this manner is uncharacteristic, and is an unfair, not to mention unnecessary, burden on consumers, trades people and society as a whole…..”. As written, the current iteration of 445.20 does not impart an unsafe situation, where consumers, trades people and society are placed in danger.

Signature

Daniel L. Caton
Name (Please Print)

April 29, 2013
Date

Ballots are due no later than May 13, 2013.

PLEASE RETURN TO:
Kim Shea
email: kshea@nfpa.org
fax: (617) 984-7070
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 Edition of NFPA 70, National Electrical Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 445.20.

_________ AGREE   __X__ DISAGREE*   ________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

The intent of Article 445.20 was to provide safety for persons exposed to portable generators connected to premise wiring. This is a real hazard due to the fact the neutral may be no longer isolated when connected in this manner.

______________________________

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.

______________________________

Article 445.20 does not pose a threat to the safety of the public nor does the proposed TIA mitigate any such danger.

______________________________

Richard D. Currin Jr.
Name (Please Print)

5/21/2013
Date

Ballots are due no later than May 13, 2013.

PLEASE RETURN TO:
Kim Shea
e-mail: kshea@nfpa.org
fax: (617) 984-7070
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 Edition of NFPA 70, National Electrical Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 445.20.

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

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

[ ] The language should also allow the use of cord sets or listed devices in line with
590.6

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
Steven F. Froemming

Name (Please Print)

5/21/13
Date

Ballots are due no later than May 13, 2013.

PLEASE RETURN TO:
Kim Shea
e-mail: kshea@nfpa.org
fax: (617) 984-7070
Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 445.20.

- AGREE  √ DISAGREE*  ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

The new requirement accepted by CMP-13 in the 2014 NEC cycle will address shock hazards created where floating neutral type portable generators are connected to premises wiring through a manual transfer switch. The shock hazard is not "theoretical" as implied in the TIA. The language CMP-3 used in 590.6(A)(3) of the 2011NEC did not provide an exception for GFCI protection of 15- and 20-ampere receptacles on generators manufactured or re-manufactured before January 1, 2011. The language simply permits such generators to be used with listed cord sets or listed devices incorporating the GFCI protection for personnel. No such requirement exists for homeowners.

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 TIA was submitted while the window to submit a NITMAM was open. Where an issue arises after the comment stage, application of the rules governing commit projects requires a NITMAM to make such a change. A TIA is only applicable after the Standards Council has issued the next edition of the NEC.

Linda J. Little
May 13, 2013

Ballots are due no later than May 13, 2013.

PLEASE RETURN TO:
Kim Shea
e-mail: kshea@nfpa.org
fax: (617) 984-7070
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 Edition of NFPA 70, National Electrical Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 445.20.

____________ AGREE  ________X_______ DISAGREE*  __________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

________________________________________

This proposed change to the effectivity date would delay an important safety enhancement.

________________________________________

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 the CMP-3 action in 590.6 for the 2011 NEC that had no effective date just permission to use portable GFCIs.

________________________________________

Q[signature]  
Name (Please Print)

5/13/13
Date

Ballots are due no later than May 13, 2013.

PLEASE RETURN TO:
Kim Shea
email: kshea@nfpa.org
fax: (617) 984-7070
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 Edition of NFPA 70, National Electrical Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 445.20.

_________ AGREE  _______X____ DISAGREE*  _______ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I agree with Ms. Little in her explanation of negative vote that the text in 590.6(A)(3) of the 2011 NEC does not provide an exception for GFCI protection of 15 and 20 ampere receptacles on generators manufactured or re-manufactured before January 1, 2011. The text accepted by Panel 3 for generators permits these generators to be used with listed cord sets and listed devices incorporating GFCI protection for personnel at the point where the circuit receives its supply (at the generator). Three and four wire generators installed as floating neutral generators are a hazard since grounding of one of the hot legs on a three wire floating neutral generator would result in a 240 volt to ground installation.

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.

GFCI protection would provide the appropriate protection for these circuits and extending the date out for an additional year would permit these dangerous applications to exist for an additional year. This TIA does not fit within any of the factors in 5.3(a) through (f) of the NFPA Rules and Regulations for determination of an emergency nature. The requirement for GFCI protection of these receptacles on generators manufactured after January 1, 2011 are already existing for generators used in the construction industry so an extension is unnecessary for generators used for non-construction related use.

________________________________________

Signature  A.Cole/68

5/24/13
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 Edition of NFPA 70, National Electrical Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 445.20.

_______ AGREE _______X____ DISAGREE* _________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I am changing my vote based on I believe the writer of the TIA possibly misunderstood what CMP-3 actually did under 590.6(A)(3). They stated that one can use the older generators provided portable GFCI protection is provided. I do not believe this is a burden it simply lets users know that GFCI protection is required without requiring discontinued use of an older GENSET.

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 believe CMP-3 adequately covered the writers concerns, with the flexibility of a portable device.

_Michael L. Savage, Sr._
Signature

_Michael L. Savage, Sr._
Name (Please Print)

_______May 16, 2013__________
Date

Ballots are due no later than May 13, 2013.

PLEASE RETURN TO:
Kim Shea
cmail: kshea@nfpa.org
fax: (617) 984-7070
This is to confirm the change in vote to Disagree on both questions based on agreement with voting comments submitted by Linda Little.

David Tobias, Jr.
Assistant Chief Engineer, Electrical & Sanitation
Direct: 330-405-3552, x321
Intertek
2307 East Aurora Rd., Unit B7
 Twinsburg, OH 44087
Phone: 330-405-3552
Mobile: 330 255 4742
Fax: 330-405-3554
E-mail: david.tobias@intertek.com

www.intertek.com

CONFIDENTIALITY NOTICE
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From: Shea, Kimberly [mailto:kshea@NFPA.org]
Sent: Tuesday, May 21, 2013 3:38 PM
To: David Tobias Intertek
Subject: RE: TIA 1097

Please confirm that you would like to change your vote to DISAGREE on both Questions with your explanation being; I agree with the voting comments submitted by Linda Little (contained in the attached pdf).

Kim

From: David Tobias Intertek [mailto:david.tobias@intertek.com]
Sent: Tuesday, May 21, 2013 3:19 PM
To: Shea, Kimberly
Subject: FW: TIA 1097

Hello Kim,

Based on the additional information provided, I support the proposed text below.

Will this email serve as my change in vote?

Kindest Regards,

David

David Tobias, Jr.
Assistant Chief Engineer, Electrical & Sanitation
TECHNICAL COMMITTEE LETTER BALLOT  
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097  
To Revise 445.20 of the Proposed 2014 Edition of NFPA 70, National Electrical Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 445.20.

_________ AGREE  __________ XXX __________ DISAGREE*  __________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.
I agree with the comments made by Linda Little concerning the technical merits of the TIA.

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

_________ AGREE  __________ XXX __________ DISAGREE*  __________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.
I do not believe this rises to the level of an emergency. I do not believe it would impose a severe burden on manufacturers.

__________________________________________
Signature:

James R. White
Name (Please Print)

3/11/2013
Date

Ballots are due no later than May 13, 2013.

PLEASE RETURN TO:
Kim Shea
c/o: kshea@nfpa.org
fax: (617) 984-7070

July 22, 2013  Supplemental Agenda July 29-August 1, 2013  Page 1129 of 1861
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1097
To Revise 445.20 of the Proposed 2014 Edition of NFPA 70, National Electrical Code

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise 445.20.

________ AGREE        ________ DISAGREE*        ________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Generally I am not in favor of placing effective dates in the body of the NEC. The AHJ will determine these dates when they determine adoption dates. I am also of the opinion that the NEC should not be used retroactively unless determined so by the AHJ.

That being said, it appears that a precedent has already been set in the 2011 NEC, Section 590.6 so I will vote in Agreement.

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 Subject does appear to comply with Clause 5.3 (f) of the NFPA Regulations Governing Committee Projects.

__________________________
Signature

__________________________
Shawn Paulsen
Name (Please Print)

May 7th, 2013
Date

Ballots are due no later than May 13, 2013.

PLEASE RETURN TO:
Kim Shea
e-mail: kshea@nfpa.org
Briggs & Stratton is in full support of PGMA’s TIA 1097 which would allow manufacturers the required time to develop product to meet the intent of the new 445.20 section. We are also in support of allowing generators manufactured prior to January 1, 2015 not to require GFCI’s as requested in the proposed 445.20, this would allow millions of existing portable generators to remain in service.

Thank you,
Greg Marchand
Product Safety & Compliance Manager
Briggs & Stratton
June 6, 2013

Ms. Linda Fuller  
Manager, Codes and Standards Administration  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169

Via Email:  ifuller@nfpa.org

SUBJECT:  Proposed Tentative Interim Amendment (Log #1097) on NFPA 70, National Electrical Code®, 2014 edition

Dear Ms. Fuller,

In response to your attached letter dated May 22, 2013, the Portable Generator Manufacturers’ Association wishes to file an appeal with the Standards Council regarding the subject proposed Tentative Interim Amendment. In addition, we would like to request a hearing with the Standards Council at its July 29 – August 1, 2013 meeting.

Sincerely,

JOSEPH HARDING  
Technical Director

JH/jlb  
pgma  
Attachment
May 22, 2013

Mr. Joseph Harding
Technical Director
Portable Generator Manufacturers Association
1300 Sumner Avenue
Cleveland, OH 44115-2851

Dear Mr. Harding:

This letter is to notify you that the proposed Tentative Interim Amendment (Log #1097) on NFPA 70, *National Electrical Code®, 2012 edition*, did not pass ballot of the Technical Committee on both Technical Merit and the Emergency Nature. As you know, this is deemed to be a recommendation of the Committee to the Standards Council that this TIA not be issued. A recommendation for approval of the TIA by the Committee requires a three-fourths affirmative vote.

In accordance with section 1.6.2 (c) of the Regulations Governing Committee Projects (enclosed), parties wishing to appear in person before the Council shall notify the Council Secretary. Although not required, parties wishing to advocate a position are encouraged, to the extent practicable, to file written submissions in general conformance with 1.6.3 and 1.6.4 in advance of the meeting at which action will be considered.

The Standards Council will consider the issuance of this TIA at its July 29 – August 1, 2013 meeting. If you wish to file an appeal with the Standards Council, please let us know what your intentions are by June 7, 2013. In addition, please let us know if you also wish to be in attendance to address the Standards Council on this issue.

Very truly yours,

Linda Fuller
Manager, Codes and Standards Administration

LF/nmw

cc: M. Earley, Staff Liaison
    (TIA #1097)
Appeal Documentation for NFPA 70
Tentative Interim Amendment
(TIA) Log No. 1097
Appellant Information

Joseph Harding
Technical Director
Portable Generator Manufacturers’ Association (PGMA)
1300 Sumner Avenue
Cleveland, OH 44115
Particular Action To Which The Appeal Relates

PGMA requests that the Standards Council issue the proposed TIA Log No. 1097, as amended in this document, in accordance with the NFPA Regulations Governing Committee Projects section 5.6 b)
Grounds For The Appeal

- The new section 445.20 for NEC 2014 will require the redesign of a majority of all 15 KW or smaller portable generators sold in the United States.

- PGMA believes that NEC Code-Making Panel 13 simply overlooked establishing an effectivity date for this new requirement, similar to the effectivity date given for section 590.6 (A) (3) in NEC 2011 for portable generators used in temporary wiring installations.
Grounds For The Appeal

- Adding an effectivity date to new Section 445.20 solves two major issues:
  - Allows manufacturers sufficient time to redesign their products in order to comply with NEC 2014
  - Avoids retroactive applicability of this new requirement for integral GFCI on older portable generators and allows a corded (external) GFCI option
Grounds For The Appeal

- As currently written, new Section 445.20 would make the vast majority of 15 kW or smaller portable generators that use a 125/250V locking receptacle obsolete.
- There are currently millions of units safely in use.
- No incident data supports making these units obsolete.
Grounds For The Appeal

- Making these units obsolete would force portable generator users to purchase new units that comply with 445.20 as written.
- This would be an unnecessary burden on consumers, trades people and society as a whole, especially given the lack of incident data.
Grounds For The Appeal

- PGMA submitted proposed TIA Log No. 1097 in order to establish an effectivity date as follows:

445.20 Ground-Fault Circuit Interrupter Protection for Receptacles on 15 kW or Smaller, Portable Generators. All 125-volt, single-phase, 15-and 20 ampere receptacle outlets, that are a part of a 15 kW or smaller, portable generator, either shall have ground fault circuit interrupter protection for personnel integral to the generator or receptacle, or shall not be available for use when the 125/250 volt locking-type receptacle is in use. If the generator does not have a 125/250 volt locking-type receptacle or was manufactured or remanufactured prior to January 1, 2015, this requirement shall not apply.
Grounds For The Appeal

- The proposed TIA failed ballot at the CMP-13 level (11 agree, 9 disagree) on both correlation issues and emergency nature.
- The nine members who disagreed on correlation issues did so for the same reason. All of them felt that for existing portable generators without integral GFCI, the use of listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use should be required.
- No members felt that existing portable generators without integral GFCI should be made obsolete.
Grounds For The Appeal

- The reasons for disagreeing with the emergency nature of the TIA were more diverse:
  - Three felt there was no emergency since the TIA was incorrect.
  - Two felt there was no emergency since there was no hazard to society.
  - Two felt the TIA should have been a NITMAM
  - One stated the situation does not fit the emergency nature outlined in NFPA Regulations 5.3 a) through f)
  - One stated that the new section 445.20 does not impose a severe burden on manufacturers
Grounds For The Appeal

- PGMA believes that the proposed TIA clearly meets the emergency nature criteria outlined in 5.3 a) and 5.3 f):
  - 5.3 a) The document contains an error or an omission that was overlooked during a regular revision process.
  - 5.3 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.
Precise Relief Requested

- PGMA accepts the view of the CMP-13 members who disagreed with the TIA on correlation issues. We propose to correct this with the following revised text for 445.20:

  - **445.20 Ground-Fault Circuit Interrupter Protection for Receptacles on 15 kW or Smaller, Portable Generators.** All 125-volt, single-phase, 15- and 20 ampere receptacle outlets that are a part of a 15 kW or smaller portable generator either shall have ground-fault circuit interrupter protection for personnel integral to the generator or receptacle, or shall not be available for use when the 125/250 volt locking-type receptacle is in use. If the generator was manufactured or remanufactured prior to January 1, 2015, listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted. If the generator does not have a 125/250 volt locking-type receptacle, this requirement shall not apply.
Item 13-8-18
1. Delete entire subsection 10.2.3.6(5) as follows:

(5) *Means are employed to ensure that additional devices or nonmedical equipment cannot be connected to the multiple outlet extension cord after leakage currents have been verified as safe.

2. Delete corresponding Annex A material A.10.2.3.6(5) as follows:

A.10.2.3.6(5) Power taps used in conjunction with an isolated power system are not subject to this requirement.

Submitter’s Substantiation: The Technical Committee accepted a public comment (NFPA 99 HEA-MED A11 ROC; 99-307 Log #272 HEA-MED) which would have deleted 10.2.3.6 (5), but another public comment 99-308 Log #64 HEA-MED on that section was Accepted in Principal and resulted in adding annex material A.10.2.3.6 (5) to that section. (Both items reported in the NFPA 99 Report on Comments A2011.) NFPA, when compiling the revised version of the document, did not incorporate the first committee action and implemented the second action, without determining the position of the committee on this issue.

Technical background: Both of the ROC proposals were based on the recognition that it is impractical to completely eliminate the use in hospitals of multiple outlet extension cords that allow clinicians and staff to plug and unplug devices as needed. The situation in the OR was adeptly explained in ROC 99-308 Log #64, “It is near impossible to plug all electrical devices used in an operating room to a wall receptacle. The cord length on equipment are not long enough to reach the wall and even if it did it would restrict safe movement around the OR table.” The problem, however, exists not just in the OR. For example, it is often necessary to use three or more infusion pumps, in addition to other devices, on one patient in a patient room. There may not be an adequate number of outlets nearby and running multiple cords, perhaps with extension cords, can hamper access to the patient and present a trip hazard. Instead, having an appropriate quality and properly maintained multiple outlet extension cord mounted on an IV pole, allows a safe method of powering whatever number of IV pumps is needed for a patient.

The Committee action to accept proposal 99-307 Log #272 would have allowed this type of use of multiple outlet extension cords and eliminated any need for further exceptions or annex material. Furthermore, the use of isolated power, currently mentioned in the annex material, does not address concerns related to touch (leakage) current values that are addressed in the main text to which the annex comment is attached. Isolated power does not limit equipment touch currents to values required within the main document.

Emergency Nature: Uncorrected, the present requirements pose an unreasonable burden on hospitals and clinicians and restricts safe access to patients not only in the operating room, but also in other patient care areas. Furthermore, as accrediting bodies, such as The Joint Commission (TJC) and the U.S. Centers for Medicare & Medicaid Services (CMMS) incorporate these requirements into their assessments and survey processes, it becomes increasingly difficult to reverse these decisions and facilities are forced to implement alternative practices that may be either unnecessarily expensive (e.g., renovations to increase outlet numbers and accessibility throughout the hospital) or less safe (e.g., use of more single outlet extension cords running greater distances to access multiple wall outlets). Hospitals have already approached ECRI Institute regarding this problem, and it is therefore not just a theoretical concern, but one which facilities are being forced to address now.

This TIA would address at least three of the factors to be considered when assessing the emergency nature of a TIA proposal (REGULATIONS GOVERNING COMMITTEE PROJECTS, http://www.nfpa.org/assets/files/PDF/CodesStandards/Directory/RegsGovCommProjects_2012.pdf)

(b) The document contains a conflict within the document or with another NFPA document. This factor applies, because, as discussed in the technical background above, the Annex reference to isolated power is not related to the associated main document text.
(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. Adherence to the requirements may hinder access to the patient and pose a trip hazard.

(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. As discussed above, the current situation is the result of NFPA procedures in place at the time (and since corrected) that allowed for decisions to be made based on a procedural mishap without addressing technical considerations.
According to 5.4 in the NFPA (RGCP), the final results show this TIA HAS achieved the necessary votes on both Question 1 (Correlation Issues) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 12.

\[ 19 \text{ (eligible to vote)} - 3 \text{ (not returned)} - 0 \text{ (abstentions)} = 16 \times 0.75 = 12 \]

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

\[ 19 \text{ eligible} ÷ 2 = 9.5 = 10 \text{ (this is the simple majority)} \]

19 Eligible to Vote
3 Not Returned (Brannan, Gagnon, Jensen)

CC FINAL Ballot results for Correlation Issues are as follows:
16 Agree
0 Disagree
0 Abstentions

FINAL ACTION: PASSED

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

FINAL ACTION: PASSED

Final HEA-MED 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.

\[14 \text{ (eligible to vote)} - 3 \text{ (not returned)} - 0 \text{ (abstention)} = 11 \times 0.75 = 8.25\]

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

\[14 \text{ eligible} ÷ 2 = 7 + 1 = 8 \text{ (this is the simple majority)}\]

---

14 Eligible to Vote  
3 Not Returned (Brousseau, King, Silver)

TC FINAL Ballot results for Technical Merit are as follows:

- 11 Agree
- 0 Disagree
- 0 Abstention

**FINAL ACTION: PASSED**

TC FINAL Ballot results for Emergency Nature are as follows:

- 11 Agree
- 0 Disagree
- 0 Abstention

**FINAL ACTION: PASSED**
I am in agreement with ECRis proposal that there is a need to allow users to be able to plug and unplug equipment in multiple outlet extension cords in various areas of the hospital.

Jim Marsala  
Director of Clinical Engineering  
JeffTECH @ Holy Redeemer Health System  
215-938-3903  
jmarsala@holyredeemer.com

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Thank you for your cooperation.
Walker, Nancy

From: JAMES McGOWAN [JMCGOWAN@umm.edu]  
Sent: Monday, May 13, 2013 10:26 AM  
To: TIAs  
Subject: Comment on Proposed TIA 1104

To Whom It May Concern:
I would like to express my concerns regarding the following proposed rule change by the NPFA;

Section 10.2.3.6(5) of NFPA 99 specifies the following: "Means are employed to ensure that additional devices or nonmedical equipment cannot be connected to the multiple outlet extension cord after leakage currents have been verified as safe."

As a Surgical Services Administrator, I feel that such a requirement will place considerable burden upon hospitals to either retrofit electrical systems to be compliant. As an alternative I envision that many will use single electrical extension cords which will then pose a serious risk to patients and staff in all surgical suites. Steps have been taken over the years to construct operating rooms with alternatives to cords having to be strung across floors and this proposed change will in fact bring them back again creating an unsafe environment as that will be the only short term solution.

I encourage you to re-evaluate this approach and work with the surgical community to arrive at a better solution or at least one that addresses this need with future construction versus existing suites.

Thank you for the opportunity of input.

James E. McGowan, DHA  
Vice President  
Procedural Care Services  
University of Maryland Medical Center  
22 S. Greene St.  
Baltimore MD. 21201  
Pagan - Best Contact Method  
[Internal] 82337 Pgr #9190  
[External] 410.480.0385  
jmcgowan@umm.edu

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From: Marquis, Roger [RMarquis@CMC-NH.ORG]  
Sent: Friday, May 10, 2013 6:07 PM  
To: TIAs  
Subject: Comment on Proposed TIA 1104

This is in reference to TIA 1104-

We are in full support of the ECRI Institute proposed revision of the NFPA Mandate regarding restricted use of multiple outlet extension cords.

Thank You,

Roger

Roger A. Marquis  
Director, Clinical Engineering  
Catholic Medical Center  
100 McGregor St.  
Manchester, NH 03102

p 603-663-6152  
f 603-663-6827
NFPA,
I agree with ECRI Institute’s proposal:

Our facilities have mounted multiple outlet extension cords on medical devices and IV poles in order to accommodate a proliferation of low energy use devices that require power near our patients. This has been done on dialysis, anesthesia, and respiratory equipment in order to aggregate equipment used with that particular device. It has also been done on IV poles for general use in OR’s. We simply do not have enough electrical outlets and/or power cords that are long enough to individually power each of these devices. In every case, the added electrical outlets are inventoried and routinely inspected for safe operation.

Please implement the emergency revision to Section 10.2.3.6(5) of NFPA 99 as recommended by ECRI. Failure to do so will result in undue hardship for our facilities.

Larry Feenstra - Director, Clinical Engineering Dept., Loma Linda University Medical Center
PO Box 2000, 11290 Campus St., Loma Linda, California 92354 | phone (909) 558-4503 | fax (909) 558-0403 | email lfeenstra@llu.edu
Please consider allowing users to be able to plug and unplug equipment in multiple outlet extension cords in various areas of the hospital. Without this provision there will be more risk of injury with multiple power cords everywhere. A removal of this provision is in my opinion warranted at this time, not waiting until the next revision in 2015.

Thank You for your consideration

Bob Siefers - CBET
Promedica Flower Hospital
Clinical Engineering/Biomed
(419)824-1496
bob.siefers@promedica.org

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Item 13-8-19
March 28, 2013

Harold Levitt
Port Authority of New York and New Jersey
PATH Department
One PATH Plaza-8th Floor
Jersey City, NJ 07306

William Connell
PB Americas, Inc.
75 Arlington Street
Boston, MA 02116

Messrs. Levitt and Connell:

I am transmitting to you herewith the following action of the Standards Council (March 6-7, 2013):

The Council voted to defer action on issuing proposed Tentative Interim Amendments (TIAs) to Sections 5.4.10, 6.3.3.2.10, 7.7.10, A.5.4.10.3, A.6.3.3.2.10.2 and A.7.7.10.2 of the 2010 and proposed 2014 editions of NFPA 130, Standard for Fixed Guideway Transit and Passenger Rail Systems, (TIA No.1080) and to Sections 12.1.2 and A.12.1.2 of the 2011 and proposed 2014 editions of NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways, (TIA No. 1083). The Council has directed that the Technical Committee on Road Tunnel and Highway Fire Protection and the Technical Committee on Fixed Guideway Transit and Passenger Rail Systems seek further input from the National Electrical Code (NEC) Correlating Committee and NEC Code Making Panel 13 on whether these TIAs, if issued, would cause any correlation issues with documents that report through the National Electrical Code Project. The Council requests that the NEC Correlating Committee and NEC Code Making Panel 13 responses be submitted to the Secretary of the Standards Council for dissemination to the technical committees responsible for NFPA 130 and NFPA 502 for their consideration. Once the Committees have reviewed the responses from the NEC and develop a course of action, they should report back to the Standards Council at their August, 2013 meeting. Standards Council Member Kerry Bell recused himself during the deliberations and vote on the issue.

Very truly yours,

Linda Fuller, Manager
Codes and Standards Administration

   TC Fixed Guideway Transit and Passenger Rail Systems
   TC Road Tunnel and Highway Fire Protection
   NEC Correlating Committee
   Interested Parties

13-3-11
13-3-12
Proposed language to the 2010 edition.

1. Revise 5.4.10 and add a new 5.4.10.1, 5.4.10.2, and 5.4.10.3 to read as follows:

   **5.4.10 Fire-Resistive Cables.** Fire-resistive cables shall be listed and have a minimum 1-hour fire-resistive rating in accordance with ANSI/UL 2196 and shall be installed per the listing requirements.

   **5.4.10.1** Fire-resistive cables shall be tested by an approved testing laboratory in a totally enclosed furnace using the ASTM E 119 time-temperature curve.

   **5.4.10.2** The cables shall demonstrate functionality for no less than 1 hour, as described in the ANSI/UL 2196 test standard.

   **5.4.10.3** The cables and systems shall comply with the following:
   
   (a) Fire-resistive cables intended for installation in a raceway, be tested in the type of raceway in which they are intended to be installed.
   
   (b) Installation instructions that describe the tested assembly and only the components included in the tested assembly are acceptable for installation.

2. Revise 6.3.3.2.10 and add a new 6.3.3.2.10.1 and 6.3.3.2.10.2 to read as follows:

   **6.3.3.2.10 Fire-Resistive Cables used for emergency lighting and communication shall be listed and have a minimum 1-hour fire-resistive rating in accordance with ANSI/UL 2196 and shall be installed per the listing requirements.**

   **6.3.3.2.10.1** The cables shall demonstrate functionality for no less than 1 hour, as described in the ANSI/UL 2196 test standard.

   **6.3.3.2.10.2** The cables and systems shall comply with the following:
   
   (a) Fire-resistive cables intended for installation in a raceway, be tested in the type of raceway in which they are intended to be installed.
   
   (b) Installation instructions that describe the tested assembly and only the components included in the tested assembly are acceptable for installation.

3. Revise 7.7.10 and add a new 7.7.10.1 and 7.7.10.2 to read as follows:

   **7.7.10 Fire-Resistive Cables shall be listed and have a minimum 1-hour fire-resistive rating in accordance with ANSI/UL 2196 and shall be installed per the listing requirements.** Fire-resistive cables shall be tested by an approved testing laboratory in a totally enclosed furnace using the ASTM E 119 time-temperature curve.

   **7.7.10.1** The cables shall demonstrate functionality for no less than 1 hour, as described in the ANSI/UL 2196 test standard.

   **7.7.10.2** The cables and systems shall comply with the following:
   
   (a) Fire-resistive cables intended for installation in a raceway, be tested in the type of raceway in which they are intended to be installed.
   
   (b) Installation instructions that describe the tested assembly and only the components included in the tested assembly are acceptable for installation.

4. Add a new A.5.4.10.3, A.6.3.3.2.10.2, and A.7.7.10.2 to read as follows:

   **A.5.4.10.3** When selecting a fire-resistive cable, it is important to understand how it will be installed and if it was tested as a complete system, including splices. Cables that are exposed (not embedded in concrete) should be protected using either a raceway or an armor/sheath (see 5.4.2). There are two basic configurations of fire-resistive cables:
Cables enclosed by a metallic sheath or armor, such as Type MI or Type MC, are installed without raceways. Cables that are installed in a raceway, such as Type RHW-2, Type TC, or Type CM, are tested as a complete system. Regardless of the fire test standard used to evaluate fire-resistive cables that will be installed in a raceway, it is important to consider that the cables are only one part of the system. Other components of the system include but are not limited to the type of raceway, the size of raceway, raceway support, raceway couplings, boxes, conduit bodies, splices where used, vertical supports, grounds, and pulling lubricants. Each cable type should be tested to demonstrate compatibility. Only the specific types of raceways tested should be acceptable for installation. Each cable type that is intended to be installed in raceway should be tested in both a horizontal configuration and a vertical configuration to demonstrate circuit integrity.

A.6.3.3.10.2 When selecting a fire-resistive cable, it is important to understand how it will be installed and if it was tested as a complete system, including splices. Cables that are exposed (not embedded in concrete) should be protected using either a raceway or an armor/sheath (see 5.4.2). There are two basic configurations of fire-resistive cables:
(1) Cables enclosed by a metallic sheath or armor, such as Type MI or Type MC, are installed without raceways.
(2) Cables that are installed in a raceway, such as Type RHW-2, Type TC, or Type CM, are tested as a complete system.

Regardless of the fire test standard used to evaluate fire-resistive cables that will be installed in a raceway, it is important to consider that the cables are only one part of the system. Other components of the system include but are not limited to the type of raceway, the size of raceway, raceway support, raceway couplings, boxes, conduit bodies, splices where used, vertical supports, grounds, and pulling lubricants. Each cable type should be tested to demonstrate compatibility. Only the specific types of raceways tested should be acceptable for installation. Each cable type that is intended to be installed in raceway should be tested in both a horizontal configuration and a vertical configuration to demonstrate circuit integrity.

A.7.7.10.2 When selecting a fire-resistive cable, it is important to understand how it will be installed and if it was tested as a complete system, including splices. Cables that are exposed (not embedded in concrete) should be protected using either a metallic raceway or an armor/sheath (see 12.4.1). There are two basic configurations of fire-resistive cables:
(1) Cables enclosed by a metallic sheath or armor, such as Type MI or Type MC, are installed without raceways.
(2) Cables that are installed in a raceway, such as Type RHW-2, Type TC, or Type CM, are tested as a complete system.

Regardless of the fire test standard used to evaluate fire-resistive cables that will be installed in a raceway, it is important to consider that the cables are only one part of the system. Other components of the system include but are not limited to the type of raceway, the size of raceway, raceway support, raceway couplings, boxes, conduit bodies, splices where used, vertical supports, grounds, and pulling lubricants. Each cable type should be tested to demonstrate compatibility. Only the specific types of raceways tested should be acceptable for installation. Each cable type that is intended to be installed in raceway should be tested in both a horizontal configuration and a vertical configuration to demonstrate circuit integrity.

Proposed language to the proposed 2014 edition.

1. Revise Section 12.5 (added via 130-165 Log #CC15 in the Second Draft) to read as follows:

12.5 Fire-Resistive Cables.

12.5.1 Fire-resistive cables shall be listed and have a minimum 1-hour fire resistance rating tested by an approved testing laboratory in a totally enclosed furnace using the ASTM E 119 time-temperature curve.

12.5.2 The cables shall demonstrate functionality for no less than 1 hour, as described in the ANSI/UL 2196 test standard.

12.5.3 The cables and systems shall comply with the following:

(1)* Fire-resistive cables intended for installation in a raceway shall be tested in the type of raceway in which they are intended to be installed.
(2) Each fire-resistive cable system have installation instructions that outline the test procedure and only the components stated in the test report are acceptable for actual installations.

A.12.5.3(1) When selecting a fire-resistive cable, it is important to understand how it will be installed and if it was tested as a complete system, including splices. Cables that are exposed (not embedded in concrete) should be protected using either a metallic raceway or an armor/sheath (see 12.4.1). There are two basic configurations of fire-resistive cables:
(1) Cables enclosed by a metallic sheath or armor, such as Type MI or Type MC, are installed without raceways.
(2) Cables that are installed in a raceway, such as Type RHW-2, Type TC, or Type CM, are tested as a complete system.

Regardless of the fire test standard used to evaluate fire-resistive cables that will be installed in a raceway, it is important to consider that the cables are only one part of the system. Other components of the system include but are not limited to the type of raceway, the size of raceway, raceway support, raceway couplings, boxes, conduit bodies, splices where used, vertical supports, grounds, and pulling lubricants. Each cable type should be tested to demonstrate compatibility. Only the specific types of raceways tested should be acceptable for installation. Each cable type that is intended to be installed in raceway should be tested in both a horizontal configuration and a vertical configuration to demonstrate circuit integrity.

Submitter’s Substantiation: This correction addresses the recent action of UL pertaining to their UL 2196, Standard for Safety for Test for Fire Resistive Cables, 2012. Specifically, as of September 12, 2012, UL has withdrawn all cable certifications (listings) to this test standard. Recent fire testing has demonstrated that hot-dipped galvanized coatings on the interior surface of raceways can cause premature failure of copper fire-resistive cable systems.

NFPA 130, 2010 edition currently allows the use of fire-resistive cable listed in accordance with UL 2196, Standard for Safety for Test for Fire Resistive Cables, 2012. Because NFPA 130 had relied upon the UL listing for compliance, this UL action has changed the standard.

Emergency Nature: The 2010 edition of the document contains listing requirements that are no longer available for fire-resistive cables. The proposed revision provides prescriptive requirements for obtaining the equivalent fire resistance without obtaining UL certification (listing). Several projects currently in the design and construction phase are being burdened by this UL action and are seeking the direction of this Technical Committee.
TIA TC PRELIMINARY BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the preliminary results show this TIA is achieving 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.

\[
\text{[32 (eligible to vote) – 9 (not returned) – 0 (abstentions) = 23 \times 0.75 = 17.25]}
\]

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

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

32 Eligible to Vote
9 Not Returned (Grizard, Harrison, Hunt, Mao, Markos, Middlebrook, Peacock, Thomas, & Weng)

TC PRELIMINARY Ballot results for Technical Merit are as follows:

- 21 Agree
- 2 Disagree (Devlin, Koffel)
- 0 Abstentions

PRELIMINARY ACTION: PASSING

TC FINAL Ballot results for Emergency Nature are as follows:

- 20 Agree
- 3 Disagree (Devlin, Koffel, Nelsen)
- 0 Abstentions

PRELIMINARY ACTION: PASSING
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1080
To revise and add language in Section 5.4.10, 6.3.2.10, 7.7.10, A.5.4.10.3, A.6.3.3.2.10.2 and
A.7.7.10.2 in the 2010 Edition and Proposed 2014 Edition of NFPA 130
Standard for Fixed Guideway Transit and Passenger Rail Systems

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA 1080

AGREE     X DISAGREE*     ABSTAIN*

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

The proposed text changes are essentially more words to describe what already exists in the 2010 &
2014 editions. The installation parameters defining the "system" tested are best defined in the fire test
standard / product listing. Since the committee still agrees that test standard is ANSI/UL 2190 then the
additional language is unnecessary. The annex language reads as prescriptive means and methods of
installing the cable systems; I do not agree with prescriptive language.

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.

UL task groups are developing corrective actions to the test standards and product listing which when
released will resolve this matter.

Signature

John F. Devlin
Name (Please Print)

16 Jan 2013
Date

Please return the ballot on or before Monday, January 14, 2013

PLEASE RETURN TO:
Stacey Van Zandt, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7056
E-mail: svanzandt@nfpa.org
Question 1: I agree with the **TECHNICAL MERITS** of the Proposed TIA 1080

<table>
<thead>
<tr>
<th>AGREE</th>
<th>DISAGREE*</th>
<th>ABSTAIN*</th>
</tr>
</thead>
</table>

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

*An explanation must accompany a disagreement or abstaining position.

Discussions are still ongoing at UL in task groups and the final decision has not yet received STP approval.

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

<table>
<thead>
<tr>
<th>AGREE</th>
<th>DISAGREE*</th>
<th>ABSTAIN*</th>
</tr>
</thead>
</table>

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

*An explanation must accompany a disagreement or abstaining position.

Discussions are still ongoing at UL in task groups and the final decision has not yet received STP approval.

William E. Koffel

Name (Please Print)

January 10, 2013

Date

Please return the ballot on or before **Monday, January 14, 2013**

**PLEASE RETURN TO:**
Stacey Van Zandt, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169

**FAX:** (617) 984-7056

**E-mail:** svanzandt@nfpa.org
Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA 1080

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.

I am not sure that I appreciate the emergency nature of this TIA based on the following update from UL:

As of December 21, 2012, UL and ULC have re-established certification of Fire Resisting Cables for use in Electrical Circuit Integrity Systems. Please click on the following links and then click on “view listings” to see the specific manufacturers and systems covered by UL and ULC:

For installation in accordance with the National Electrical Code
- Electrical Circuit Integrity Systems (FHIT)
- Fire-resistant Cable (FHJR)

For installation in accordance with the Canadian Electrical Code
- Electrical Circuit Integrity Systems (FHITC)
- Fire-resistant Cable (FHJRC)

Signature

John Nelsen
Name (Please Print)

January 14, 2013
Date

Please return the ballot on or before Monday, January 14, 2013
Subject: FW: TIA Log No. 1080

From: "Ramirez, Alfredo M."<alfredo.m.ramirez@ul.com>
Date: January 15, 2013 7:33:10 PM EST
To: TIA<tias.errata@nfpa.org>
Cc: "Cronin, Amy"<acronin@nfpa.org>
Subject: TIA Log No. 1080

To whom it may concern:

We submit the following comment in opposition to TIA Log No. 1080 issued for NFPA® 130-2010 and Proposed 2014 Edition Standard for Fixed Guideway Transit and Passenger Rail System:

The proposed changes to NFPA 130 are not necessary and will create confusion and/or misapplication of code requirements.

NFPA 130 currently allows the AHJ to accept new technology or non-listed products/assemblies if there is a hardship or the designer/owner does not want to use/purchase prescribed products. NFPA 130 already contain equivalency requirements which allow users to propose equivalent products for enforcers to accept using alternate test methods, material, or devices which demonstrate equivalency or greater protection to current requirements. See Section 1.4 of NFPA 130.

Besides inaccuracies in the substantiation presented, it is UL's opinion the direction of the proposed revisions will likely decrease the integrity of the referenced critical safety circuits. Specifically:

1. The phrase 'tested by an approved testing laboratory' is not defined by the code and may be misunderstood or cause confusion in the application of the impacted code sections. This revision may require enforcers of this code (AHJs) to validate test results themselves or interpret test results submitted directly to them. AHJs do not have access to testing equipment and experienced engineers to make their product acceptance decisions.

2. The use of the NFPA Official Term 'listed' should remain as it appears in the current version of NFPA 130. The use of the term 'listed' is appropriate for the nature of the critical life safety cable in question. The term 'listed' requires products to be validated by certification organizations, acceptable to an AHJ, capable to make compliance decisions and subject a 'listed' product/systems to factory surveillance.

3. Removing the reference to a recognized safety standard, UL 2196, removes critical guidance needed for users and enforcers of NFPA 130 and may result in the misuse of inappropriate test
standards. Users and enforcers may not have the necessary background to determine the appropriateness of a standard(s) or test method(s) to accurately test fire resistive cables or cable systems.

The Emergency nature of the TIA implies UL is the only capable Certification Organization and that Certified products complying with UL 2196 requirements do not exist. There are multiple certification organizations that certify fire resistive cable assemblies and UL does have listed fire resistive cable assemblies. UL certifications can be viewed at ul.com/database under UL Product Categories FHJR(Fire Resistive Cables) and FHIT (Electrical Circuit Integrity Systems). For these reasons we request that this TIA not be accepted.

Regards,

Al Ramirez
Regulatory Services Regional Manager

UL LLC
333 Pfingsten Road
Northbrook, IL 60062-2096 USA
T: 847.664.2905
F: 847.313.2905
W: ul.com

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To the Secretary, Standards Council, NFPA:

This comment is made to address some potential confusion related to the underlying cause of the TIA to NFPA 130.

Below is a UL announcement that was also distributed by the Staff Liaison to the NFPA 130 Technical Committee. This announcement would appear to have resolved the issues related to UL’s previous action to delist cables fire rated under ANSI/UL-2196.

On deeper examination of the links provided, the UL subject line may be a source of some confusion. What has happened is that UL has listed the Mineral Insulated (MI) (Pyrotenax) product under their interim listing program.

This re-listing of the MI product was already known to the Technical Committee before generation of the TIA content. As such, nothing has materially changed from what is in the current TIA document.

Regards, DMP

David M. Plotkin, PE
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From: UL Regulatory Services [mailto:ULregulatoryservices@us.ul.com]
Sent: Wednesday, January 02, 2013 10:31 AM
Subject: UL and ULC have re-established certification of Fire Resistive Cables for use in Electrical Circuit Integrity Systems

As of December 20, 2012, UL and ULC have re-established certification of the Fire Resistive Cables for use in Electrical Circuit Integrity Systems. Please click on the following link and then click on View Application for the specific product you are interested in:

For installations in accordance with either the National Electrical Code Electrical Circuit Integrity Systems (NFPA 70:NEC) or the Canadian Electrical Code Electrical Circuit Integrity Systems (CH2C)

July 22, 2013  Supplemental Agenda July 29-August 1, 2013  Page 1167 of 1861
Walker, Nancy

From: Shugarman, Blake M. [Blake.M.Shugarman@ul.com]
Sent: Wednesday, February 13, 2013 4:26 PM
To: TIAs
Cc: Cronin, Amy
Subject: Comment on Proposed TIA 1080 - NFPA 130

Formerly SC Item 13-3-11-c

As UL’s primary technical expert for ANSI/UL 2196, I appreciate the opportunity to comment on proposed TIA 1080 to NFPA 130. I am writing in opposition to the TIA since I believe the TIA is technically flawed. The TIA suggests that the cable need only comply with the fire endurance test, and does not reference the need for additional testing as described in ANSI/UL 2196 including the hose stream and electrical conductor tensile strength test. The hose stream as referenced in ANSI/UL 2196 is intended to subject the system to the impact and cooling effects of the water hose stream. By omission of this test, as well as, omission of the electrical conductor tensile strength test, which evaluates the maximum unsupported vertical length of cable in a raceway; I believe the TIA fails to address these important performance issues.

With respect to the substantiation provided for this TIA, UL has conducted research on a wide array of products and systems originally certified to ANSI/UL 2196 and obtained inconsistent performance when subjected to the standard Fire Endurance Test of ANSI/UL 2196. As a result, manufacturers were no longer authorized to place the UL mark on fire-resistant cable. UL’s decision was not based solely on the fire endurance test results of copper fire-resistant cable systems with hot-dipped galvanized coatings on the interior surface of raceways. UL’s action to discontinue the previous certification program was a direct result of the inconsistent performance of fire-resistant cables and systems.

With respect to the emergency nature of this TIA, it is true that all UL listings were withdrawn on September 12, 2012. However, as of September 17, 2012, UL’s modified certification program for fire-resistant cables and their associated systems was announced, which has provided the opportunity for manufacturers to resubmit products for UL certification. As of December 21, 2012, UL issued the first certification to this modified program, which takes into consideration variables of the installed product, increases the number of samples to demonstrate consistency, and includes reference to the manufacturer’s installation instructions. An additional manufacturer has since successfully passed the ANSI/UL 2196 testing under the current program and several more certification projects are being established. Consequently, I strongly believe the substantiation for the emergency nature of this TIA does not have merit, as there is an active certification program with current and anticipated listings.

The TIA appears to suggest that the construction of the cable system used for testing should be the same as installed. If this is the case, UL’s modified certification program provides the opportunity for a manufacturer to obtain a listing for a specific cable construction with installation limitations and has so since September 17, 2012. While this TIA promotes requirements for obtaining fire resistance without obtaining listing, it also creates an additional burden on the Authority Having Jurisdiction to gain additional expertise with respect to identifying appropriate testing and test arrangements.

Lastly, the TIA removes the requirement for listing, including the requirement for auditing of the manufacturing facility by the listing organization to determine that the cable produced is representative of the samples used for qualification testing. Without a robust follow-up surveillance program in place, the on-going performance and compliance of fire-resistant cables would be uncertain.

Again, I appreciate the opportunity to provide input on the TIA.

Should you have any questions or comments, please contact me.

Blake M. Shugarman
Principal Engineer - Special Hazard Fire Protection
Product Safety

July 22, 2013  Supplemental Agenda July 29-August 1, 2013  Page 1168 of 1861
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To: Standards Council, in care of Mary Maynard

CC: NFPA 130 Committee

From Stephanie Markos, NFPA 130 Committee Principal Member

Re: TIA Log No. 1080

I regret that I was unable to previously submit a vote for the TIA, since I was out of office most of January. After my return to office in early February, I developed a very bad cold and was out of the office for several more days, missing the mid-February deadline to change my vote.

However, in reviewing the Committee votes and the UL substantiation in the public comment, I have the following comments:

I disagree with the technical nature and emergency nature of the TIA for both the 2010 and 2014 editions of NFPA 130.

Technical Nature:

1. I do not understand why the TIA proposer or Committee members apparently did not consult with UL as to what alternative approaches would be appropriate/acceptable before submitting a TIA.

2. Since the inclusion of UL 2186 was included only in the 2010 edition, how is it that “several projects currently in the design and construction phase are being burdened by this UL action and are seeking the direction of this Technical Committee?”

3. If a TIA is necessary, why was the alternative of reverting back to the 2007 edition of NFPA 130 which includes citation of UL 1685 and UL 1666, not considered by the Committee as a TIA?

4. Although, the word “should” is used in the proposed annex text, the text that is included does contain what “should” be prescriptive requirements.

5. I believe that the reasons for the Committee negative votes and the public comments provide more than adequate reasoning for rejecting the TIA.

6. The wire and cable requirements were substantially revised in 2003 and 2010 (with some added annex text in 2007). While it is a good idea to put all the wire and cable requirements (except for the vehicle) into one chapter to reduce repetition, careful consideration of the actual requirements by persons technically familiar with the actual meaning of the requirements is essential to avoid yet additional revisions that the majority of Committee members may not be really technically knowledgeable about.

6. The proposed TIA is confusing since it retains “listed” and “listing” and thus, if accepted, the TIA introduces several inconsistencies in the use of “listed” and “listing” by its deletion in the specified sections in both 2010 (see bold italics) and the 2014 edition since several sections still retain “listed,” including, for example, reference in 5.4.8 to 5.4.10, although the revised TIA 5.4.10 text deletes “listed.” Same issue in Chapters 6 and 7, as noted below see next page.

Emergency Nature: As stated in the public comment, since UL has indicated technical reservations with the UL certification process for UL 2186 alone, that does not necessarily preclude the idea of other organization listings using other UL or other standards for wire and cable, or, in fact, the “listing” of the wire and cable, as permitted according to one of the options contained in the 2007 NFPA 130 requirements (including UL 1685 UL and UL 1666).
5.4.4.1 All insulated conductors and cables shall be listed for wet locations.

5.4.5 All wires and cables used shall be listed as being resistant to the spread of fire and shall have reduced smoke emissions, by complying with 5.4.5.1 or 5.4.5.2.

5.4.8 The emergency lighting and communications circuits shall be protected from physical damage by system vehicles or other normal system operations and from fires in the system for a period of not less than 1 hour. The circuits shall be a listed fire-resistant cable system with a minimum 1-hour rating, in accordance with 5.4.10.

6.3.3.2.6.1* Conductors in conduits or raceways shall be permitted to be embedded in concrete or run in concrete electrical duct banks, but shall not be installed, exposed, or surface-mounted in air plenums unless cables are listed fire-resistant cables in accordance with 5.4.10. (is this correct or should it refer to 6.3.3.2.10?.

6.3.3.2.8 (4) Use of a listed fire-resistant cable system with a minimum 1-hour rating in accordance with 6.3.3.2.10.

6.3.3.9 Power Supply for Emergency Ventilation. See Chapter 7.

6.3.3.2.10 Fire-resistant cables used for emergency lighting and communication shall be listed and have a minimum 1-hour fire-resistant rating in accordance with ANSI/UL 2196 and shall be installed per the listing requirements.

7.7.5 All insulations shall conform to NFPA 70 and shall be moisture- and heat-resistant types carrying temperature ratings corresponding to either of the following conditions:

- 75°C (167°F) for listed fire-resistant cables
- 90°C (194°F) for all other applications

7.7.5.1 All insulated conductors and cables shall be listed for wet locations.

7.7.6 All wires and cables used in emergency ventilation circuits shall be listed as being resistant to the spread of fire and shall have reduced smoke emissions, by complying with 7.7.6.1 or 7.7.6.2.

7.7.6.1 All wires and cables shall comply with the FT4/IEEE 1202 exposure requirements for cable char height, total smoke released, and peak smoke release rate of ANSI/UL 1685.

7.7.6.2 Wires and cables listed as having adequate fire-resistant and low-smoke-producing characteristics, by having a flame travel distance that does not exceed 1.5 m (5 ft) and generating a maximum peak optical density of smoke of 0.50 and a maximum average optical density of smoke of 0.15 when tested in accordance with NFPA 262, shall be permitted for use instead of the wires and cables specified in 7.7.6.1.

7.7.10 Fire-resistant cables shall be listed and have a minimum 1-hour fire-resistant rating in accordance with ANSI/UL 2196 and shall be installed per the listing requirements.

IN SUMMARY, all of the wire and cable requirements should be VERY carefully reviewed by the Committee, with assistance by UL and knowledgeable persons on the NEC and other standard organizations. I believe that is NO technical nature or emergency nature requiring acceptance of the TIA.

VERY Brief History of Wire and Cable Requirements in NFPA 130 for Stations and Trainways.

2000 and Prior: 2-4 (2.4.2 & 2-4.5), 3.2.3 (3-2.3.2 & 3-2.3.50) & 4-7 (4-7.3 & 4.7.6) NEC. 500° for 1 hour and shall not support combustion. Wire and cable for vital train circuits shall pass flame propagating criteria of IEEE 383. NEC type listed cables suitable for plenums permitted for train signal circuits. Etc.

2003 and 2007. 5.4.2 (6.3.3.2.2), 5.4.5.1 and 6.3.3 (6.3.3.2.5.1) & 7.7 (7.7.3 & 7.7.6.1) 500° for 1 hour and shall not support combustion ADDED: Listed by several methods: UL 1581/ASTM 662; CSAC22.2 and ASTM 662; listed as low smoke UL 1685; UL 1666 and ASTM 662 travel distance less than 4.9 ft and NFPA 262. (2007 a few annex notes)

2010 5.4 (5.4.5, 5.4.8 & 5.4.10) and Deleted the 500° and added fire resistive rating: 1 hour rating UL 2196
February 28, 2013

NFPA Standards Council
1 Battery Park
Quincy, MA 02169 - 7471

Subject: TIA Log 1080 (NFPA 130) and TIA Log 1083 (NFPA 502)

Dear Sirs,

We at Underwriters Laboratories (UL) are deeply committed to advancing the safety and technology in electrical installations – the core of UL’s Public Safety Mission.

UL supports third party code promulgators like the National Fire Protection Association and the open consensus process used. However, we believe if the code development process for NFPA 130 and 502 is allowed to function without intercession of NFPA’s Standards Council, the minimum level of electrical safety established NFPA 130 (Standard for Fixed Guideway Transit and Passenger Rail System) and NFPA 502 (Standard for Road Tunnels, Bridges and Other Limited Access Highways) will be compromised and become inconsistent with other NFPA codes that include critical safety circuit installation requirements (i.e. critical identified power services, fire pump power, fire incident communications, etc.). Specifically, those codes would be NFPA 70, NFPA 72, NFPA 262, NFPA 2010 and NFPA 5000.

The development of the 2014 edition of National Electric Code (NEC) was recently completed and the critical electrical installation requirements were left intact including references to UL 2196. The NEC is recognized throughout the US and internationally as the preeminent electrical installation Code. The scope of the NEC does not exclude tunnels and rail stations, thus the NEC’s critical safety circuit installation requirements should align and support the critical safety circuit requirements established in NFPA 130 and 502.

In addition to the above and paraphrasing our previously submitted comments, UL feels the consequence of the TIAs may decrease the integrity of the critical safety circuits in question. Specifically:
1. The phrase 'tested by an approved testing laboratory' is not defined by the code and may be misunderstood or cause confusion in the application of the impacted code sections. This revision may require enforcers of this code (AHJs) to validate test results themselves or interpret test results submitted directly to them. AHJs do not have access to testing equipment and experienced engineers to make their product acceptance decisions.

2. The use of the NFPA Official Term 'listed' should remain as it appears in the current version of NFPA 130 and NFPA 502. The use of the term "listed" is appropriate for the nature of the critical life safety cable in question. The term 'listed' requires products to be validated by a certification organization, that is acceptable to an AHJ, and capable of making compliance decisions and subjecting a 'listed' product/systems to factory surveillance. Products/systems that are simply tested as opposed to certified are not subject to routine factory surveillance and follow-up testing, which creates a scenario where future changes are not assessed for compliance to the requirements. We believe this can lead to a reduction of the safety and performance of these life safety products/systems.

3. Removing the reference to a recognized safety standard, ANSI/UL 2196, removes critical guidance needed for users and enforcers of NFPA 130 and NFPA 502 and may result in the misuse of inappropriate test standards. Users and enforcers may not have the necessary background to determine the appropriateness of a standard(s) or test method(s) to accurately test fire resistive cables or cable systems.

4. The TIA suggests that the cable need only comply with the fire endurance test, and does not reference the need for additional testing as described in ANSI/UL 2196 including the hose stream and electrical conductor tensile strength test. The hose stream as referenced in ANSI/UL 2196 is intended to subject the system to the impact and cooling effects of the water hose stream. Omitting of this test, as well as omitting the electrical conductor tensile strength test, that evaluates the maximum unsupported vertical length of cable in a raceway can result in systems where the performance of such is compromised.

5. As of December 21, 2012, UL issued the first certification to this modified program, which takes into consideration variables of the installed product, increases the number of samples to demonstrate consistency, and includes reference to the manufacturer's installation instructions. An additional manufacturer has since successfully passed the ANSI/UL 2196 testing under the current program and several more certification projects are being established for other wireways and cable types. UL does have an active certification program with current and anticipated listings. UL certifications
can be viewed at ul.com/database under UL Product Categories FHJR (Fire Resistant Cables) and FHIT (Electrical Circuit Integrity Systems).

In conclusion, we request the Standards Council to reverse the decisions of NFPA 130 and 502 Technical Committees and require them to refrain from editing existing critical safety circuit requirements appearing in NFPA 130 and 502.

Sincerely,

August Schaefer
Sr. Vice President & Public Safety Officer
Underwriters Laboratories
333 Pfingsten Road
Northbrook, IL. 60062
From: Connell, William [mailto:ConnellW@pbworld.com]
Sent: Tuesday, March 05, 2013 4:47 PM
To: Stanek, Sandra
Cc: 'Levitt, Harold'; Conrad, James; David Plotkin; 'English, Gary'; 'Locke, Harold A.'; Alexandre Debs
Subject: UL Appeal of NFPA 130 and NFPA Proposed TIA's

Sandra –

The attached has been jointly prepared by the Chairs and certain Technical Committee Members of both the NFPA 130 and NFPA 502 Technical Committees specifically to address the appeal letter submitted by UL taking exception to jointly proposed TIA’s #1080 and #1083 which amend fire rated cable testing equipments in both NFPA 130 and NFPA 502, respectively.

This reply is offered to the Standards Council, in addition to the substantiation already provided in the body of the TIA, for their consideration when acting in regard to the noted appeal.

Regards – Bill and Harold

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(t) 201-216-6206 / (f) 201-216-6493 / (c) 201-320-6390
Chairperson-NFPA 130-Standard for Fixed Guideway Transit & Passenger Rail Systems
March 5, 2013

NFPA Standards Council  
1 Batterymarch Park  
Quincy, MA  02169-7471

Subject: TIA Log 1080 (NFPA 130) and TIA Log 1083 (NFPA 502)  
Underwriters Laboratories Appeal Letter dated February 28, 2013

The Technical Committees for NFPA 502 and NFPA 130 provide the following responses to the points raised in the subject UL appeal of the proposed TIA to each Standard for the consideration of the Standards Council. The portions of the UL appeal are reproduced below in italics and responded to in a point by point format.

UL supports third party code promulgators like the National Fire Protection Association and the open consensus process used. However, we believe if the code development process for NFPA 130 and 502 is allowed to function without intercession of NFPA's Standards Council, the minimum level of electrical safety established NFPA 130 (Standard for Fixed Guideway Transit and Passenger Rail System) and NFPA 502 (Standard for Road Tunnels, Bridges and Other Limited Access Highways) will be compromised and become inconsistent with other NFPA codes that include critical safety circuit installation requirements (i.e. critical identified power services, fire pump power, fire incident communications, etc.). Specifically, those codes would be NFPA 70, NFPA 72, NFPA 262, NFPA 2010 and NFPA 5000.

The technical committees (TC) for both NFPA 130 and 502 both recognize the validity of and specifically embrace the work of other NFPA Standards. NFPA 130 and 502 both reference several other NFPA standards. NFPA 70 National Electrical Code (NEC) does not specifically address the environments covered by NFPA130 for “Fixed Guideway Transit and Passenger Rail System” or NFPA 502 for “Road Tunnels, Bridges and Other Limited Access Highways”. However, the electrical functionality of wire and cables are required within NFPA 130 and 502 to be listed and to comply with the NFPA 70 National Electrical Code (NEC) except as modified within the individual Standard. Tunnels represent a unique environment that is unlike that of a typical building. The operational nature and varying fire loads inherent with these types of tunnels require these two Standards place more stringent requirements for wire and cable than those found in the NEC.

The NFPA 130 and 502 TC’s have in no way suggested any language that has or will compromise critical circuit safety requirements found in other NFPA Codes or Standard as suggested by UL. The other Codes and Standards mentioned above call for the critical circuits to be protected by either a Circuit Integrity (CI) Cable or an Electrical Circuit Protective System. NFPA 130 and 502 do not use the terms CI...
cable or an Electrical Circuit Protective System for protection of critical circuits, therefore we are not in conflict with other NFPA Codes or Standards.

The development of the 2014 edition of National Electric Code (NEC) was recently completed and the critical electrical installation requirements were left intact including references to UL 2196. The NEC is recognized throughout the US and internationally as the preeminent electrical installation Code. The scope of the NEC does not exclude tunnels and rail stations, thus the NEC's critical safety circuit installation requirements should align and support the critical safety circuit requirements established in NFPA 130 and 502.

The NEC requires 2 hour protection for fire pumps and emergency circuits per Article 700 and 708. One method of providing this protection is called an Electrical Circuit Protective System. There are two types of Electrical Circuit Protective System: one of the systems consists of a fire resistive cables per UL 2196 like the cables we call for in NFPA 130 and 502; and the other systems consist of a fire protective wrap that envelope the conduit or cable trays and tested to UL 1724.

The wrap type systems are typically used in conditioned spaces and are not conducive for use in tunnels areas or similar unconditioned and challenging environments. Since the wrap systems were and still are available, there was no reason for the NEC to take any action in CMP 13. On September 12, 2012 UL only suspended their certifications for systems using the fire resistive cables. NFPA 130 and 502 do not recognize an Electrical Circuit Protective System for a method of protecting critical circuits in tunnel environments.

As mentioned above, NFPA 130 and 502 both follow and insist on the general requirements of the NEC, and due to the severe conditions found in a tunnel environment include additional requirements. For example: The NEC only requires feeders to be protected from fire, but NFPA 130 and 502 require the entire circuit to survive a fire. This means the entire circuit must be protected from a fire all the way to the end device and could include feeders as well as branch circuits.

In addition to the above and paraphrasing our previously submitted comments, UL feels the consequence of the TIAs may decrease the integrity of the critical safety circuits in question. Specifically:

1. The phrase ‘tested by an approved testing laboratory’ is not defined by the code and may be misunderstood or cause confusion in the application of the impacted code sections. This revision may require enforcers of this code (AHJs) to validate test results themselves or interpret test results submitted directly to them. AHJs do not have access to testing equipment and experienced engineers to make their product acceptance decisions.

The phrase “approved testing laboratory” does not need to be defined. NFPA 130 and 502 use the term “approved” in several places, which is defined as “approved by
the AHJ”. Tunnel projects require the AHJ to be involved at all levels and work jointly with the owners, designers and engineers from design to completion, and beyond.

It must also be kept in mind that both NFPA-502 and NFPA-130 are used not only in the US but are also used extensively around the world. AS such, using wording that is captive to US practices only affects the wide application of these Standards.

Our tunnel standards are very specific to the road or rail environment, and a considerable effort has been expended in both Standards to shift from a prescriptive approach to an integrated performance approach.

UL’s argument appears to be that AHJ’s are not competent to understand or apply these Standards. We note that AHJ’s are typically empowered to retain whatever outside expertise they may require for when they believe additional support is called for.

We have plenty of other examples (the table that was used as a black box, the passive protection, the escape routes, etc.). There’s no one recipe that can fit all tunnels, and I believe that each tunnel is a specific case that should be considered as a specific case with a guidance document that give latitude for engineers to find alternative sound protection measures.

2. The use of the NFPA Official Term 'listed' should remain as it appears in the current version of NFPA 130 and NFPA 502. The use of the term "listed" is appropriate for the nature of the critical life safety cable in question. The term 'listed' requires products to be validated by a certification organization, that is acceptable to an AHJ, and capable of making compliance decisions and subjecting 'listed' product/systems to factory surveillance. Products/systems that are simply tested as opposed to certified are not subject to routine factory surveillance and follow-up testing, which creates a scenario where future changes are not assessed for compliance to the requirements. We believe this can lead to a reduction of the safety and performance of these life safety products/systems.

The term “listed” was removed for two reasons:

1. UL suspended all Fire Resistive Cable System tests and rescinded all certifications in accordance with UL 2196, for both raceway and non-raceway systems. This action was taken for several reasons but the underlying reason was the discovery that pervious qualified systems that passed the UL 2196 test in EMT failed when tested in galvanized rigid steel conduit. To date there are no fire resistive cable systems listed by UL or any other NRTL that can be installed in a raceway.

2. The TC reviewed the testing requirements in UL 2196 and noticed that the current
standard does not adequately address testing systems when installed in a raceway. Since UL 2196 test standard has not been changed or withdrawn, it could be possible for a manufacturer to test a cable in EMT and at an NTRL and ask for a “listing”. With the new wording in the TIA all systems must be tested as a complete system and in the type of raceway that will be used for that project. The testing must be done by a NRTL approved by the AHJ. In addition to testing as a complete system, a complete test report must be submitted to the AHJ describing the how the system was tested and all components.

The TIA language is required to address the shortfalls of the UL 2196 Standard as it presently stands, and does so by adding more stringent requirements to increase assurance that the required life safety goals are achieved for the tunnel environments.

3. Removing the reference to a recognized safety standard, ANSI/UL 2196, removes critical guidance needed for users and enforcers of NFPA 130 and NFPA 502 and may result in the misuse of inappropriate test standards. Users and enforcers may not have the necessary background to determine the appropriateness of a standard(s) or test method(s) to accurately test fire resistive cables or cable systems.

This statement by UL is definitely and demonstrably incorrect. Both NFPA 130 and 502 require the cables to demonstrate functionality for defined minimum time periods as described in the ANSI/UL 2196 test standard. There is no removal of reference to the recognized standard, which remains in both NFPA 130 and NFPA 502. The respective TC’s didn’t use the previous wording “in accordance with” because the TC’s determined based on UL’s own actions that the current standard does not adequately address testing cables in raceways.

4. The TIA suggests that the cable need only comply with the fire endurance test, and does not reference the need for additional testing as described in ANSI/UL 2196 including the hose stream and electrical conductor tensile strength test. The hose stream as referenced in ANSI/UL 2196 is intended to subject the system to the impact and cooling effects of the water hose stream. Omitting of this test, as well as omitting the electrical conductor tensile strength test that evaluates the maximum unsupported vertical length of cable in a raceway can result in systems where the performance of such is compromised.

This statement by UL is definitely and demonstrably incorrect. Neither NFPA 130 nor NFPA 502 give exception to any part of UL 2196, therefore all cables must pass the entire test including the hose stream and tensile tests.

5. As of December 21, 2012, UL issued the first certification to this modified program, which takes into consideration variables of the installed product, increases the number of samples to demonstrate consistency, and includes reference to the manufacturer's installation instructions. An additional manufacturer has since successfully passed the ANSI/UL 2196 testing under the current program and several more certification projects are being established for other
wireways and cable types. UL does have an active certification program with current and anticipated listings. UL certifications can be viewed at ul.com/database under UL Product Categories FHJR (Fire Resistive Cables) and FHIT (Electrical Circuit Integrity Systems).

UL’s position appears to be confusing at best. The ANSI/UL-2196 Standard has not been changed. UL took the action September 12, 2012 to end their own certification to the Standard based on discovered shortfalls, which does not bind any other NRTL’s or listing agencies, but has had impact on AHJ’s and end users.

We note that UL actually presented to the TC’s at the ROC meetings that use of the previously listed cable manufactured before that action date was still “OKAY” to use per UL listing, a position that may result in legal actions involving UL given the shortfalls discovered, however, these legal actions are not within the scope of 502 or 130 to address.

The fact that UL has taken a certain business approach (the de-certification, the “interim” listing program) to addressing shortfalls discovered in the UL 2196 Standard should not limit NFPA from adding appropriate requirements within their own Standards that reflect on the use of that UL Standard to compensate for that shortfall.

In conclusion, we request the Standards Council to reverse the decisions of NFPA 130 and 502 Technical Committees and require them to refrain from editing existing critical safety circuit requirements appearing in NFPA 130 and 502.

Action to follow the UL recommendation to invalidate the TIA’s will place the various User agencies, AHJ’s, and multiple tunnel projects that depend on the NFPA 502 and NFPA 130 Standards in an untenable position. The UL interim testing protocols are very difficult and expensive to meet, and impose added time constraints.

The TIA’s as written will provide the necessary flexibility to users to select an approved testing lab while maintaining the same testing regimen as required by t UL 2196. Approval of these TIA’s will also allow the international community, which is highly dependent upon these Standards to utilize their own national and/or regional testing laboratories.

The technical basis for the TIA’s is valid and is necessary to address the shortfalls Standard created by the actions of UL and that specifically affect application for the tunnel environments covered by these two NFPA Standards. The TC’s urge the Standards Council to accept the proposed TIA’s.
Date: April 24, 2013

Task Group

Larry Ayer, Biz Com Electric, Chairman
Mark Ode, UL
James Conrad, RSCC Wire & Cable
Steve Pasternac, Intertek

RE: TIA-1080 NFPA 130

Report:

A Task Group was formed to review correlation issues between NFPA 130 and NFPA 70 (NEC) as a result of a proposed TIA-1080 submitted by the NFPA 130 committee. The Task Group reviewed this TIA during a conference call on April 12, 2013.

TIA-1080 was submitted to revise certain text in NFPA 130 that specifically dealt with listed Fire-Resistive Cable Systems. This TIA was submitted in response to UL’s action in September 2012 to discontinue certification (listing) of Fire-Resistive Cable Systems to UL 2196, Standard for Tests of Fire Resistive Cables. These systems are a large part of wiring methods used in train stations, trainways, and emergency ventilation systems for passenger rail type systems. The TIA was submitted to provide prescriptive requirements for obtaining equivalent fire resistance of Cable Systems without obtaining UL listing.

The Task Group has reviewed the TIA and notes a couple of items.

1. First, while UL Certification was initially discontinued in September 2012, an interim program was developed in late September 2012 and re-established certification in December, 2012. To date, manufacturers have provided two systems which have achieved certification under this new program: a MI Cable certified for 2 hours and a MC Cable system certified for 1 hour. Additional Fire-Resistive Cable manufacturers have shown interest in submitting their products. The interim program, in the tasks groups’ opinion, eliminates any need to remove the listing requirements in NFPA 130 or NFPA 70 for that matter.

2. Fire-Resistive Cable Systems as they relate to the NEC are considered a subset of a larger group of protective systems which also includes Protective Wraps. This larger group is called “Electrical Circuit Protective Systems”. While the UL certification was originally discontinued for the Fire-Resistive Cable Systems the certification of Protective Wraps remained. These systems are used throughout the code but specifically in Articles 695 and 700. During the recently completed 2014 NEC Revision Cycle, several comments were submitted to Code Panel 13 that acknowledged that certain certifications were discontinued, however Panel 13 maintained the current code text since Protective Wraps had maintained their certification.

3. During the same NFPA 70 (NEC) revision cycle, Code Panel 3 accepted a new Article 728 which deals specifically with Fire-Resistive Cable Systems. This new article maintains the listing requirements for these type systems and clarifies to the user of the NEC that each Fire-Resistive Cable System has certain specific listing requirements that must be met in order for the system to function consistently for a certain period of time during a fire. The listing requirements
consider system components, such as the type of wiring method or conduit, conduit supports, type of couplings, vertical supports, boxes and splices that are to be used with each system. Code Panel 3 maintained that the certification process for Fire-Resistive provided in new Article 728 was important and that any issues regarding re-certification of these type systems would likely be resolved in the very near future.

As a result of the NEC reaffirming the listing and certification for Fire Resistive Cables in Code Panels 3, and reaffirming the listing and certification of Electrical Circuit Protective Systems in Code Panel 13 the changes proposed by TIA-1080 would create correlation issues with the NFPA 70 (NEC) document.
TO: Technical Committee on Fixed Guideway Transit and Passenger Rail Systems (FKT-AAA)

FROM: Sandra Stanek, Staff Liaison

DATE: May 1, 2013

SUBJECT: Informational Ballot Results on Proposed TIA 1080

The NFPA 130 Informational ballot results are as follows:

32 Members Eligible to Vote
2 Members Voted in support of proceeding (S. Gilardi, Jr., N. Nott)
21 Members Voted NOT in support of proceeding

Votes from Alternate Members were not included in the results unless their Principal did not vote.
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1080

With respect to Proposed TIA Log 1080 to revise and add language to Sections 5.4.10, 6.3.3.2.10, 7.7.10, A.5.4.10.3, A.6.3.3.2.10.2 and A.7.7.10.2 to the 2010 Edition and the Proposed 2014 Edition of NFPA 130, Standard for Fixed Guideways Transit and Passenger Rail Systems, please record me as voting:

☐ In support of proceeding with the proposed TIA

☐ NOT in support of proceeding with the proposed TIA.

Name: ________________________________

Please return ballots via email to kshea@nfpa.org no later than Friday, April 19, 2013.
Item 13-8-20
March 28, 2013

Harold Levitt
Port Authority of New York and New Jersey
PATH Department
One PATH Plaza-8th Floor
Jersey City, NJ 07306

William Connell
PB Americas, Inc.
75 Arlington Street
Boston, MA 02116

Messrs. Levitt and Connell:

I am transmitting to you herewith the following action of the Standards Council (March 6-7, 2013):

The Council voted to defer action on issuing proposed Tentative Interim Amendments (TIAs) to Sections 5.4.10, 6.3.3.2.10, 7.7.10, A.5.4.10.3, A.6.3.3.2.10.2 and A.7.7.10.2 of the 2010 and proposed 2014 editions of NFPA 130, Standard for Fixed Guideway Transit and Passenger Rail Systems, (TIA No.1080) and to Sections 12.1.2 and A.12.1.2 of the 2011 and proposed 2014 editions of NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways, (TIA No. 1083). The Council has directed that the Technical Committee on Road Tunnel and Highway Fire Protection and the Technical Committee on Fixed Guideway Transit and Passenger Rail Systems seek further input from the National Electrical Code (NEC) Correlating Committee and NEC Code Making Panel 13 on whether these TIAs, if issued, would cause any correlation issues with documents that report through the National Electrical Code Project. The Council requests that the NEC Correlating Committee and NEC Code Making Panel 13 responses be submitted to the Secretary of the Standards Council for dissemination to the technical committees responsible for NFPA 130 and NFPA 502 for their consideration. Once the Committees have reviewed the responses from the NEC and develop a course of action, they should report back to the Standards Council at their August, 2013 meeting. Standards Council Member Kerry Bell recused himself during the deliberations and vote on the issue.

Very truly yours,

Linda Fuller, Manager
Codes and Standards Administration

TC Fixed Guideway Transit and Passenger Rail Systems
TC Road Tunnel and Highway Fire Protection
NEC Correlating Committee
Interested Parties

13-3-11
13-3-12
Proposed language to the 2011 edition.

1. Revise 12.1.2 and 12.1.2*(1) to read as follows:

12.1.2 (1)* Fire-resistant cables shall be listed for 2 hours in accordance with ANSI/UL/2196 or other equivalent internationally recognized standards to 950°C (1742°F) when approved by the AHJ, tested by an approved testing laboratory in a totally enclosed furnace using the ASTM E 119 time-temperature curve.

   (a) The cables shall demonstrate functionality for no less than 2 hours as described in the ANSI/UL 2196 test standard
   (b) Testing shall be performed in the type and configuration of raceway in which they are intended to be installed
   (c) Provide documentation to include a full description of the actual test procedure conducted and a list of acceptable components to be used for installation certifying compliance with the test procedure

12.1.2(2) text remains unchanged.

Proposed language to the proposed 2014 edition.

1. Revise 12.1.2 and 12.1.2(1) – (4) to read as follows:

12.1.2 (1)* Fire-resistant cables shall be listed for 2 hours in accordance with ANSI/UL/2196 or other equivalent internationally recognized standards to 950°C (1742°F) when approved by the AHJ, tested by an approved testing laboratory in a totally enclosed furnace using the ASTM E 119 time-temperature curve.

   (a) The cables shall demonstrate functionality for no less than 2 hours as described in the ANSI/UL 2196 test standard
   (b) Testing shall be performed in the type and configuration of raceway in which they are intended to be installed
   (c) Provide documentation to include a full description of the actual test procedure conducted and a list of acceptable components to be used for installation certifying compliance with the test procedure

   (2) Circuits embedded in concrete or protected by a 2-hour fire barrier system in accordance with UL 1724. The insulation for cables or conductors shall be thermoset and shall be suitable to maintain functionality at the temperature within the embedded conduit or fire barrier system.

   (3) Routing external to the roadway

   (4) Diversity in system routing as approved (such as separate redundant or multiple circuits separated by a 1-hour fire barrier) so that a single fire or emergency event will not lead to a failure of the system.

2. Revise A.12.1.2 and A.12.1.2(1) for both the 2011 and proposed 2014 editions to read as follows:

A.12.1.2 The actual duration required for the circuits to be operative will depend upon the duration required for the circuits to be operative for the emergency evacuation and rescue phase — and, in some circumstances, incident management and structural protection. Factors such as the length of the tunnel, evacuation pathways, the use of fixed water-based fire suppression systems, and the proximity of emergency services may influence this period of time.
When selecting a fire-resistive cable, it is important to know how it will be installed and if it was tested as a complete system, including splices. Cables that are exposed (not embedded in concrete) should be protected using either a metallic raceway or an armor/sheath (see 12.3.1). There are two basic configurations of fire-resistive cables:

1. Armored cables, such as Type MI or Type MC, are installed without raceways.
2. Cables installed in a raceway, such as Type RHW-2, Type TC, or Type CM, are tested as a complete system.

Regardless of the fire test standard used to evaluate fire-resistive cables installed in a raceway, it is important to consider that the cables are only one part of the system. Other components of the system include but are not limited to the type of raceway, the size of raceway, raceway supports, raceway couplings, boxes, conduit bodies, splices where used, vertical supports, grounds, and pulling lubricants. Each cable type should be tested to demonstrate compatibility. Recent fire testing has demonstrated that hot-dipped galvanized coatings on the interior surface of raceways can cause premature failure of copper fire-resistive cable systems. Only the specific types of raceways tested should be acceptable for installation. Each cable type intended to be installed in a raceway should be tested in both a horizontal and a vertical configuration to demonstrate circuit integrity.

Submitter’s Substantiation: This correction addresses the recent action of UL pertaining to their UL 2196, Standard for Safety for Test for Fire Resistive Cables, 2012. Specifically, as of September 12, 2012, UL has withdrawn all cable certifications (listings) to this test standard. NFPA 502 currently allows the use of 2-hour fire-resistive cable listed in accordance with UL 2196, Standard for Safety for Test for Fire Resistive Cables, 2012. Because NFPA 502 had relied upon the UL listing for compliance, this UL action has changed the standard.

Emergency Nature: The 2011 edition of the document contains listing requirements that are no longer available for 2-hour fire-resistive cables for emergency circuits. The proposed revision provides prescriptive requirements for obtaining the equivalent fire resistance without obtaining UL certification (listing). Several tunnel projects currently in the design and construction phase are being burdened by this UL action and are seeking the direction of this Technical Committee.
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.

\[
[26 \text{ (eligible to vote)} - 2 \text{ (not returned)} - 0 \text{ (abstentions)} = 24 \times 0.75 = 18]
\]

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

\[
[26 \text{ eligible} \div 2 = 13 + 1 = 14 \text{ (this is the simple majority)}]
\]

TC FINAL Ballot results for Technical Merit are as follows:
23 Agree (Conrad, Sturm w/comment)
1 Disagree (Pillette)
0 Abstentions

FINAL ACTION: PASSED

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

\[
[26 \text{ (eligible to vote)} - 2 \text{ (not returned)} - 1 \text{ (abstention)} = 23 \times 0.75 = 17.25]
\]

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

\[
[26 \text{ eligible} \div 2 = 13 + 1 = 14 \text{ (this is the simple majority)}]
\]

TC FINAL Ballot results for Emergency Nature are as follows:
20 Agree (Conrad, Sturm w/comment)
3 Disagree (Debs, Nelsen, Pilette)
1 Abstention (Kashef)

FINAL ACTION: PASSED
Van Zandt, Stacey

From: Firecode13@aol.com
Sent: Friday, February 15, 2013 2:31 PM
To: Van Zandt, Stacey
Cc: Stanek, Sandra; Foley, Patrick; Walker, Nancy; ConnellW@pbworld.com
Subject: Re: NFPA 502 TIA COMMENT CIRCULATION

Stacey

I wish to change my vote to Negative (technical merit) and (emergency nature).

I'm no longer in favor of the proposed TIA. UL has resolved the issue. See re-circulation comments C # 001, C # 002 and C # 003 (via your email dated 2-15-2013)

There is no longer a need for 502 to reinvent the wheel and cause confusion.

Maurice
502 Committee Member

Maurice M. Pilette, PE, CFPS, CET-IV
Fire Protection Consulting Engineers
Regulatory Reviews & Inspections
Mechanical Designs Ltd.
POB 2188
19 Erie Drive
Natick, MA 01760

Phone: 508-653-5452
Fax: 508-655-1318

In a message dated 2/15/2013 9:27:50 A.M. Eastern Standard Time, svanzandt@NFPA.org writes:

To Technical Committee on Road Tunnel and Highway Fire Protection:

Attached is the NFPA 502 TIA Comment Circulation. If you wish to change your TIA vote, please do so by Wednesday, February 20, 2013. If you are not changing your vote, no action is required.

This information can also be found by clicking on www.nfpa.org/502next.

Thank you.

Stacey Van Zandt
TIA TC PRELIMINARY BALLOT RESULTS

According to 5.4 in the NFPA (RGCP), the preliminary results show this TIA is achieving 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 17.

\[ 26 \text{ (eligible to vote)} - 4 \text{ (not returned)} - 0 \text{ (abstentions)} = 22 \times 0.75 = 16.5 \]

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

\[ 26 \text{ eligible} \div 2 = 13 + 1 = 14 \text{ (this is the simple majority)} \]

TC PRELIMINARY Ballot results for Technical Merit are as follows:

22 Agree (Conrad, Sturm w/comment)
0 Disagree
0 Abstentions

PRELIMINARY ACTION: PASSING

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

\[ 26 \text{ (eligible to vote)} - 4 \text{ (not returned)} - 1 \text{ (abstention)} = 21 \times 0.75 = 15.75 \]

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

\[ 26 \text{ eligible} \div 2 = 13 + 1 = 14 \text{ (this is the simple majority)} \]

TC PRELIMINARY Ballot results for Emergency Nature are as follows:

19 Agree (Conrad, Sturm w/comment)
2 Disagree (Debs, Nelsen)
1 Abstention (Kashef)

PRELIMINARY ACTION: PASSING
Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA 1083

\[ \checkmark \text{ AGREE } \quad \square \text{ DISAGREE* } \quad \square \text{ ABSTAIN* } \]

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.

\[ \square \text{ AGREE } \quad \checkmark \text{ DISAGREE* } \quad \square \text{ ABSTAIN* } \]

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

With announcement of UL that it has re-established certification of fire resistant cable the urgency of this proposal has changed as of today.

Signature

Alexandre Debs

Name (Please Print)

2013/01/15

Date

Please return the ballot on or before Monday, January 14, 2013

PLEASE RETURN TO:
Stacey Van Zandt, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7056
E-mail: svanzandt@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1083
To revise Section 12.1.2 and A.12.1.2 in the 2011 Edition and Proposed 2014 Edition of NFPA 502
Standard for Road Tunnels, Bridges and Other Limited Access Highways

Formerly SC Item 13-3-12-b

July 22, 2013

Supplemental Agenda July 29-August 1, 2013

Page 1193 of 1861

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA 1083

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.

I am not sure that I appreciate the emergency nature of this TIA based on the following update from UL:

As of December 21, 2012, UL and ULC have re-established certification of Fire Resistant Cables for use in Electrical Circuit Integrity Systems. Please click on the following links and then click on "view listings" to see the specific manufacturers and systems covered by UL and ULC:

For installation in accordance with the National Electrical Code
- Electrical Circuit Integrity Systems (FHit)
- Fire-resistant Cable (FHR)

For installation in accordance with the Canadian Electrical Code
- Electrical Circuit Integrity Systems (FHitC)
- Fire-resistant Cable (FHRc)

Signature

John Nelsen
Name (Please Print)

January 14, 2013
Date

Please return the ballot on or before Monday, January 14, 2013
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1083
To revise Section 12.1.2 and A.12.1.2 in the 2011 Edition and Proposed 2014 Edition of NFPA 502
Standard for Road Tunnels, Bridges and Other Limited Access Highways

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA 1083

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.

With announcement of UL that it has re-established its certification of Fire Resistant cables for use in Electrical Circuit Integrity Systems as of December 21, 2012, the urgency of this proposal might not be apparent.

Signature

Ahmed Kashef
Name (Please Print)

January 03, 2013
Date

Please return the ballot on or before Monday, January 14, 2013

PLEASE RETURN TO:
Stacey Van Zandt, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7056
E-mail: svanzandt@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1083
To revise Section 12.1.2 and A.12.1.2 in the 2011 Edition and Proposed 2014 Edition of NFPA 502
Standard for Road Tunnels, Bridges and Other Limited Access Highways

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA 1083

JSC  AGREE  DISAGREE*  ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Please see attachment for my comment on a wording change to (b)

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

JSC  AGREE  DISAGREE*  ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Please see attachment for my comment on a wording change to (b)

[Signature]
James Conrad
Name (Please Print)
1-14-13
Date

Please return the ballot on or before Monday, January 14, 2013

PLEASE RETURN TO:
Stacey Van Zandt, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7056
E-mail: svanzandt@nfpa.org
Suggested wording change for TIA Log No 1083

On December 13, 2012 there was a conference call to discuss revising the wording. During this call it was agreed that we need to maintain wording to clarify the fire resistive system must be tested as a complete system. It is very important to maintain the system wording because the current UL 2196 does not provide enough details on testing as a complete system. I confirmed with Bill Connell and David Plotkin and they agree that wording was changed slightly after our Dec. 13, 2012 call.

The wording of (a) was reworded as follows: (a) Tested as a complete system of conductors, cable and raceways as applicable. I would suggest we add the complete system wording to (b) as follows: Testing shall be performed as a complete system of conductors, cables and raceways, in the type and configuration of raceway in which they are intended to be installed.

James Conrad
1-14-2013
TECHNICAL COMMITTEE LETTER BALLOT  
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1083 
To revise Section 12.1.2 and A.12.1.2 in the 2011 Edition and Proposed 2014 Edition of NFPA 502 
Standard for Road Tunnels, Bridges and Other Limited Access Highways 

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA 1083 

X AGREE  ___________ DISAGREE*  ___________ ABSTAIN* 

EXPLANATION OF VOTE - Please type or print your comments: 

*An explanation must accompany a disagreement or abstaining position.  

[Signature]  
Peter STURM  
Name (Please Print)  
2013-08-09  
Date  

Please return the ballot on or before Monday, January 14, 2013   

PLEASE RETURN TO:  
Stacey Van Zandt, Project Administrator  
NFPA  
1 Batterymarch Park  
Quincy, MA 02169  
FAX: (617) 984-7056  
E-mail: svanzandt@nfpa.org
Dear Colleagues,

please find attached my ballot form. In general I agree with the proposed changes. However, I have a small problem in fully understanding the full text of 12.1.2*. The text says that cables have to remain functional ...by one of the following methods:........

(1)* The methods however are more or less descriptions of a test and its documentation! (a) - (c) more requirements (2) - (4). A cable will not remain functional by a test description. The term 'meeting' which is now going to be eliminated was for me much clearer, or maybe a text like 'fulfilling the requirements according to (1) to (4)' would fit better.

But maybe this is only a misinterpretation of the proposed text due to my limited language knowledge.

Best regards

Peter Sturm
A Univ.-Prof. Dr. Dr.-techn.
Graz University of Technology
Institute for Internal Combustion Engines and Thermodynamics
Innfeldgasse 21a, A-8010 Graz, Austria
Tel.: +43 316 873 30200
Tel.2: +43 316 873 30201
Fax.: +43 316 873 30202
Mobile: +43 664 433 25 01

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From: Van Zandt, Stacey [svanzandt@NFPA.org]
Sent: Montag, 07. Jänner 2013 17:17
An: Van Zandt, Stacey
Cc: Stanek, Sandra
Betreff: Reminder - NFPA 502 TIA Log 1083 Ballot due 1/14/2013

To TC on Road Tunnel and Highway Fire Protection:

This is a reminder that this ballot is due Monday, January 14, 2013 and according to my records you still have not returned your ballot. Please return your ballot before the due date.

Thank you.

---

From: Van Zandt, Stacey
Sent: Wednesday, January 02, 2013 2:01 PM
To: Van Zandt, Stacey
Cc: Stanek, Sandra; Foley, Patrick; Walker, Nancy
Subject: NFPA 502 TIA Log 1083 Ballot

To TC on Road Tunnel and Highway Fire Protection:

Attached is a ballot package and ballot form on NFPA 502 TIA log 1083. Please review and return the ballot by Monday, January 14, 2013. This information can also be found on the document information page by clicking on www.nfpa.org/502next.
Subject: FW: TIA Log No. 1083

From: "Ramirez, Alfredo M." <Alfredo.M.Ramirez@ul.com>
Date: January 15, 2013 7:44:26 PM EST
To: TIAS <TIAs_Errata_Files@nfpa.org>
Cc: "Cronin, Amy" <acronin@nfpa.org>
Subject: TIA Log No. 1083

To whom it may concern:

We submit the following comment in opposition to TIA Log No. 1083 issued for NFPA 502-2011 and Proposed 2014 Edition Standard for Road Tunnels, Bridges and Other Limited Access Highways:

The proposed changes to NFPA 502 are not necessary and will create confusion and/or misapplication of code requirements.

NFPA 502 currently allows the AHJ to accept new technology or non-listed products/assemblies if there is a hardship or the designer/owner does not want to use/purchase prescribed products. NFPA 502 already contain equivalency requirements which allow users to propose equivalent products for enforcers to accept using alternate test methods, material, or devices which demonstrate equivalency or greater protection to current requirements. See Section 1.5 of NFPA 502.

Besides inaccuracies in the substantiation presented, it is UL's opinion the direction of the proposed revisions will likely decrease the integrity of the referenced critical safety circuits. Specifically:

1. The phrase 'tested by an approved testing laboratory' is not defined by the code and may be misunderstood or cause confusion in the application of the impacted code sections. This revision may require enforcers of this code (AHJs) to validate test results themselves or interpret test results submitted directly to them. AHJs do not have access to testing equipment and experienced engineers to make their product acceptance decisions.

2. The use of the NFPA Official Term 'listed' should remain as it appears in the current version of NFPA 502. The use of the term "listed" is appropriate for the nature of the critical life safety cable in question. The term 'listed' requires products to be validated by certification organizations, acceptable to an AHJ, capable to make compliance decisions and subject a 'listed' product/systems to factory surveillance.

3. Removing the reference to a recognized safety standard, UL 2196, removes critical guidance needed for users and enforcers of
NFPA 502 and may result in the misuse of inappropriate test standards. Users and enforcers may not have the necessary background to determine the appropriateness of a standard(s) or test method(s) to accurately test fire resistive cables or cable systems.

The Emergency nature of the TIA implies UL is the only capable Certification Organization and that Certified products complying with UL 2196 requirements do not exist. There are multiple certification organizations that certify fire resistive cable assemblies and UL does have listed fire resistive cable assemblies. UL certifications can be viewed at ul.com/database under UL Product Categories FHJR(Fire Resistive Cables) and FHIR (Electrical Circuit Integrity Systems). For these reasons we request that this TIA not be accepted.

Regards,

Al Ramirez
Regulatory Services Regional Manager
UL LLC
333 Pfingsten Road
Northbrook, IL 60062-2096 USA
T: 847.664.2905
F: 847.313.2905
W: ul.com

This e-mail may contain privileged or confidential information. If you are not the intended recipient: (1) you may not disclose, use, distribute, copy or rely upon this message or attachment(s); and (2) please notify the sender by reply e-mail, and then delete this message and its attachment(s). Underwriters Laboratories Inc. and its affiliates disclaim all liability for any errors, omissions, corruption or virus in this message or any attachments.
To the Secretary, Standards Council, NFPA:

This comment is made to address some potential confusion related to the underlying cause of the TIA to NFPA 502.

Below is a UL announcement that was also distributed by the Staff Liaison to the NFPA 502 Technical Committee. This announcement would appear to have resolved the issues related to UL’s previous action to de-list cables fire rated under ANSI/UL-2196.

On deeper examination of the links provided, the UL subject line may be a source of some confusion. What has happened is that UL has listed the Mineral Insulated (MI) (Pyrotex) product under their interim listing program.

This re-listing of the MI product was already known to the Technical Committee before generation of the TIA content. As such, nothing has materially changed from what is in the current TIA document.

Regards, DMP

David M. Plotkin, PE
Associate Vice President
Tunnel Ventilation Services
D 212.701.2880
david.plotkin@aecom.com

AECOM
20 Exchange Place, New York, NY 10005
T 212.510.2100 F 212.510.2599
www.aecom.com

From: UL Regulatory Services [mailto:ULregulatoryservices@usai1.com]
Sent: Wednesday, January 02, 2013 10:31 AM
Subject: UL and ULC have re-established certification of Fire Resistant Cables for use in Electrical Circuit Integrity Systems

As of December 12, 2012, UL and ULC have re-established certification of Fire Resistant Cable for use in Electrical Circuit Integrity Systems. Please refer to the following links for the updated certification, UL and ULC.

For Installation in accordance with the National Electrical Code
Electrical Circuit Integrity System (ECIS)

For Installation in accordance with the Canadian Electrical Code
As UL’s primary technical expert for ANSI/UL 2196, I appreciate the opportunity to comment on proposed TIA 1083 to NFPA 502. I am writing in opposition to the TIA since I believe the TIA is technically flawed. The TIA suggests that the cable need only comply with the fire endurance test, and does not reference the need for additional testing as described in ANSI/UL 2196 including the hose stream and electrical conductor tensile strength test. The hose stream as referenced in ANSI/UL 2196 is intended to subject the system to the impact and cooling effects of the water hose stream. By omission of this test, as well as, omission of the electrical conductor tensile strength test, which evaluates the maximum unsupported vertical length of cable in a raceway; I believe the TIA fails to address these important performance issues.

With respect to the substantiation provided for this TIA, UL has conducted research on a wide array of products and systems originally certified to ANSI/UL 2196 and obtained inconsistent performance when subjected to the standard Fire Endurance Test of ANSI/UL 2196. As a result, manufacturers were no longer authorized to place the UL mark on fire-resistant cable. UL’s decision was not based solely on the fire endurance test results of copper fire-resistant cable systems with hot-dipped galvanized coatings on the interior surface of raceways. UL’s action to discontinue the previous certification program was a direct result of the inconsistent performance of fire-resistant cables and systems.

With respect to the emergency nature of this TIA, it is true that all UL listings were withdrawn on September 12, 2012. However, as of September 17, 2012, UL’s modified certification program for fire-resistant cables and their associated systems was announced, which has provided the opportunity for manufacturers to resubmit products for UL certification. As of December 21, 2012, UL issued the first certification to this modified program, which takes into consideration variables of the installed product, increases the number of samples to demonstrate consistency, and includes reference to the manufacturer’s installation instructions. An additional manufacturer has since successfully passed the ANSI/UL 2196 testing under the current program and several more certification projects are being established. Consequently, I strongly believe the substantiation for the emergency nature of this TIA does not have merit, as there is an active certification program with current and anticipated listings.

The TIA appears to suggest that the construction of the cable system used for testing should be the same as installed. If this is the case, UL’s modified certification program provides the opportunity for a manufacturer to obtain a listing for a specific cable construction with installation limitations and has so since September 17, 2012. While this TIA promotes requirements for obtaining fire resistance without obtaining listing, it also creates an additional burden on the Authority Having Jurisdiction to gain additional expertise with respect to identifying appropriate testing and test arrangements.

Lastly, the TIA removes the requirement for listing, including the requirement for auditing of the manufacturing facility by the listing organization to determine that the cable produced is representative of the samples used for qualification testing. Without a robust follow-up surveillance program in place, the on-going performance and compliance of fire-resistant cables would be uncertain.

Again, I appreciate the opportunity to provide input on the TIA.

Should you have any questions or comments, please contact me.

Blake M. Shugarman
Principal Engineer - Special Hazard Fire Protection
Product Safety
February 28, 2013

NFPA Standards Council
1 Battery Park
Quincy, MA 02169 - 7471

Subject: TIA Log 1080 (NFPA 130) and TIA Log 1083 (NFPA 502)

Dear Sirs,

We at Underwriters Laboratories (UL) are deeply committed to advancing the safety and technology in electrical installations – the core of UL’s Public Safety Mission.

UL supports third party code promulgators like the National Fire Protection Association and the open consensus process used. However, we believe if the code development process for NFPA 130 and 502 is allowed to function without intercession of NFPA’s Standards Council, the minimum level of electrical safety established NFPA 130 (Standard for Fixed Guideway Transit and Passenger Rail System) and NFPA 502 (Standard for Road Tunnels, Bridges and Other Limited Access Highways) will be compromised and become inconsistent with other NFPA codes that include critical safety circuit installation requirements (i.e. critical identified power services, fire pump power, fire incident communications, etc.). Specifically, those codes would be NFPA 70, NFPA 72, NFPA 262, NFPA 2010 and NFPA 5000

The development of the 2014 edition of National Electric Code (NEC) was recently completed and the critical electrical installation requirements were left intact including references to UL 2196. The NEC is recognized throughout the US and internationally as the preeminent electrical installation Code. The scope of the NEC does not exclude tunnels and rail stations, thus the NEC’s critical safety circuit installation requirements should align and support the critical safety circuit requirements established in NFPA 130 and 502.

In addition to the above and paraphrasing our previously submitted comments, UL feels the consequence of the TIAs may decrease the integrity of the critical safety circuits in question. Specifically:
1. The phrase 'tested by an approved testing laboratory' is not defined by the code and may be misunderstood or cause confusion in the application of the impacted code sections. This revision may require enforcers of this code (AHJs) to validate test results themselves or interpret test results submitted directly to them. AHJs do not have access to testing equipment and experienced engineers to make their product acceptance decisions.

2. The use of the NFPA Official Term 'listed' should remain as it appears in the current version of NFPA 130 and NFPA 502. The use of the term "listed" is appropriate for the nature of the critical life safety cable in question. The term 'listed' requires products to be validated by a certification organization, that is acceptable to an AHJ, and capable of making compliance decisions and subjecting a 'listed' product/systems to factory surveillance. Products/systems that are simply tested as opposed to certified are not subject to routine factory surveillance and follow-up testing, which creates a scenario where future changes are not assessed for compliance to the requirements. We believe this can lead to a reduction of the safety and performance of these life safety products/systems.

3. Removing the reference to a recognized safety standard, ANSI/UL 2196, removes critical guidance needed for users and enforcers of NFPA 130 and NFPA 502 and may result in the misuse of inappropriate test standards. Users and enforcers may not have the necessary background to determine the appropriateness of a standard(s) or test method(s) to accurately test fire resistive cables or cable systems.

4. The TIA suggests that the cable need only comply with the fire endurance test, and does not reference the need for additional testing as described in ANSI/UL 2196 including the hose stream and electrical conductor tensile strength test. The hose stream as referenced in ANSI/UL 2196 is intended to subject the system to the impact and cooling effects of the water hose stream. Omitting of this test, as well as omitting the electrical conductor tensile strength test that evaluates the maximum unsupported vertical length of cable in a raceway can result in systems where the performance of such is compromised.

5. As of December 21, 2012, UL issued the first certification to this modified program, which takes into consideration variables of the installed product, increases the number of samples to demonstrate consistency, and includes reference to the manufacturer's installation instructions. An additional manufacturer has since successfully passed the ANSI/UL 2196 testing under the current program and several more certification projects are being established for other wireways and cable types. UL does have an active certification program with current and anticipated listings. UL certifications
can be viewed at ul.com/database under UL Product Categories FHJR (Fire Resistant Cables) and FHIT (Electrical Circuit Integrity Systems).

In conclusion, we request the Standards Council to reverse the decisions of NFPA 130 and 502 Technical Committees and require them to refrain from editing existing critical safety circuit requirements appearing in NFPA 130 and 502.

Sincerely,

August Schaefer  
Sr. Vice President & Public Safety Officer  
Underwriters Laboratories  
333 Pfingsten Road  
Northbrook, IL  60062
From: Connell, William [mailto:ConnellW@pbworld.com]
Sent: Tuesday, March 05, 2013 4:47 PM
To: Stanek, Sandra
Cc: 'Levitt, Harold'; Conrad, James; David Plotkin; 'English, Gary'; 'Locke, Harold A.'; Alexandre Debs
Subject: UL Appeal of NFPA 130 and NFPA Proposed TIA's

Sandra –

The attached has been jointly prepared by the Chairs and certain Technical Committee Members of both the NFPA 130 and NFPA 502 Technical Committees specifically to address the appeal letter submitted by UL taking exception to jointly proposed TIA's #1080 and #1083 which amend fire rated cable testing equipments in both NFPA 130 and NFPA 502, respectively.

This reply is offered to the Standards Council, in addition to the substantiation already provided in the body of the TIA, for their consideration when acting in regard to the noted appeal.

Regards – Bill and Harold

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Chairperson-NFPA 130-Standard for Fixed Guideway Transit & Passenger Rail Systems
March 5, 2013

NFPA Standards Council
1 Batterymarch Park
Quincy, MA  02169-7471

Subject: TIA Log 1080 (NFPA 130) and TIA Log 1083 (NFPA 502)
Underwriters Laboratories Appeal Letter dated February 28, 2013

The Technical Committees for NFPA 502 and NFPA 130 provide the following responses to the points raised in the subject UL appeal of the proposed TIA to each Standard for the consideration of the Standards Council. The portions of the UL appeal are reproduced below in italics and responded to in a point by point format.

UL supports third party code promulgators like the National Fire Protection Association and the open consensus process used. However, we believe if the code development process for NFPA 130 and 502 is allowed to function without intercession of NFPA's Standards Council, the minimum level of electrical safety established NFPA 130 (Standard for Fixed Guideway Transit and Passenger Rail System) and NFPA 502 (Standard for Road Tunnels, Bridges and Other Limited Access Highways) will be compromised and become inconsistent with other NFPA codes that include critical safety circuit installation requirements (i.e. critical identified power services, fire pump power, fire incident communications, etc.). Specifically, those codes would be NFPA 70, NFPA 72, NFPA 262, NFPA 2010 and NFPA 5000.

The technical committees (TC) for both NFPA 130 and 502 both recognize the validity of and specifically embrace the work of other NFPA Standards. NFPA 130 and 502 both reference several other NFPA standards. NFPA 70 National Electrical Code (NEC) does not specifically address the environments covered by NFPA130 for “Fixed Guideway Transit and Passenger Rail System” or NFPA 502 for “Road Tunnels, Bridges and Other Limited Access Highways”. However, the electrical functionality of wire and cables are required within NFPA 130 and 502 to be listed and to comply with the NFPA 70 National Electrical Code (NEC) except as modified within the individual Standard. Tunnels represent a unique environment that is unlike that of a typical building. The operational nature and varying fire loads inherent with these types of tunnels require these two Standards place more stringent requirements for wire and cable than those found in the NEC.

The NFPA 130 and 502 TC’s have in no way suggested any language that has or will compromise critical circuit safety requirements found in other NFPA Codes or Standard as suggested by UL. The other Codes and Standards mentioned above call for the critical circuits to be protected by either a Circuit Integrity (CI) Cable or an Electrical Circuit Protective System. NFPA 130 and 502 do not use the terms CI.
cable or an Electrical Circuit Protective System for protection of critical circuits, therefore we are not in conflict with other NFPA Codes or Standards.

The development of the 2014 edition of National Electric Code (NEC) was recently completed and the critical electrical installation requirements were left intact including references to UL 2196. The NEC is recognized throughout the US and internationally as the preeminent electrical installation Code. The scope of the NEC does not exclude tunnels and rail stations, thus the NEC’s critical safety circuit installation requirements should align and support the critical safety circuit requirements established in NFPA 130 and 502.

The NEC requires 2 hour protection for fire pumps and emergency circuits per Article 700 and 708. One method of providing this protection is called an Electrical Circuit Protective System. There are two types of Electrical Circuit Protective System: one of the systems consists of a fire resistive cables per UL 2196 like the cables we call for in NFPA 130 and 502; and the other systems consist of a fire protective wrap that envelope the conduit or cable trays and tested to UL 1724.

The wrap type systems are typically used in conditioned spaces and are not conducive for use in tunnels areas or similar unconditioned and challenging environments. Since the wrap systems were and still are available, there was no reason for the NEC to take any action in CMP 13. On September 12, 2012 UL only suspended their certifications for systems using the fire resistive cables. NFPA 130 and 502 do not recognize an Electrical Circuit Protective System for a method of protecting critical circuits in tunnel environments.

As mentioned above, NFPA 130 and 502 both follow and insist on the general requirements of the NEC, and due to the severe conditions found in a tunnel environment include additional requirements. For example: The NEC only requires feeders to be protected from fire, but NFPA 130 and 502 require the entire circuit to survive a fire. This means the entire circuit must be protected from a fire all the way to the end device and could include feeders as well as branch circuits.

In addition to the above and paraphrasing our previously submitted comments, UL feels the consequence of the TIAs may decrease the integrity of the critical safety circuits in question. Specifically:

1. The phrase ‘tested by an approved testing laboratory’ is not defined by the code and may be misunderstood or cause confusion in the application of the impacted code sections. This revision may require enforcers of this code (AHJs) to validate test results themselves or interpret test results submitted directly to them. AHJs do not have access to testing equipment and experienced engineers to make their product acceptance decisions.

The phrase “approved testing laboratory” does not need to be defined. NFPA 130 and 502 use the term “approved” in several places, which is defined as “approved by
the AHJ”. Tunnel projects require the AHJ to be involved at all levels and work jointly with the owners, designers and engineers from design to completion, and beyond.

It must also be kept in mind that both NFPA-502 and NFPA-130 are used not only in the US but are also used extensively around the world. AS such, using wording that is captive to US practices only affects the wide application of these Standards.

Our tunnel standards are very specific to the road or rail environment, and a considerable effort has been expended in both Standards to shift from a prescriptive approach to an integrated performance approach.

UL’s argument appears to be that AHJ’s are not competent to understand or apply these Standards. We note that AHJ’s are typically empowered to retain whatever outside expertise they may require for when they believe additional support is called for.

We have plenty of other examples (the table that was used as a black box, the passive protection, the escape routes, etc.). There’s no one recipe that can fit all tunnels, and I believe that each tunnel is a specific case that should be considered as a specific case with a guidance document that give latitude for engineers to find alternative sound protection measures.

2. The use of the NFPA Official Term 'listed' should remain as it appears in the current version of NFPA 130 and NFPA 502. The use of the term "listed" is appropriate for the nature of the critical life safety cable in question. The term 'listed' requires products to be validated by a certification organization, that is acceptable to an AHJ, and capable of making compliance decisions and subjecting 'listed' product/systems to factory surveillance. Products/systems that are simply tested as opposed to certified are not subject to routine factory surveillance and follow-up testing, which creates a scenario where future changes are not assessed for compliance to the requirements. We believe this can lead to a reduction of the safety and performance of these life safety products/systems.

The term “listed” was removed for two reasons:

1. UL suspended all Fire Resistive Cable System tests and rescinded all certifications in accordance with UL 2196, for both raceway and non-raceway systems. This action was taken for several reasons but the underlying reason was the discovery that previous qualified systems that passed the UL 2196 test in EMT failed when tested in galvanized rigid steel conduit. To date there are no fire resistive cable systems listed by UL or any other NRTL that can be installed in a raceway.

2. The TC reviewed the testing requirements in UL 2196 and noticed that the current
standard does not adequately address testing systems when installed in a raceway. Since UL 2196 test standard has not been changed or withdrawn, it could be possible for a manufacturer to test a cable in EMT and at an NTRL and ask for a “listing”. With the new wording in the TIA all systems must be tested as a complete system and in the type of raceway that will be used for that project. The testing must be done by a NRTL approved by the AHJ. In addition to testing as a complete system, a complete test report must be submitted to the AHJ describing how the system was tested and all components.

The TIA language is required to address the shortfalls of the UL 2196 Standard as it presently stands, and does so by adding more stringent requirements to increase assurance that the required life safety goals are achieved for the tunnel environments.

3. Removing the reference to a recognized safety standard, ANSI/UL 2196, removes critical guidance needed for users and enforcers of NFPA 130 and NFPA 502 and may result in the misuse of inappropriate test standards. Users and enforcers may not have the necessary background to determine the appropriateness of a standard(s) or test method(s) to accurately test fire resistant cables or cable systems.

This statement by UL is definitely and demonstrably incorrect. Both NFPA 130 and 502 require the cables to demonstrate functionality for defined minimum time periods as described in the ANSI/UL 2196 test standard. There is no removal of reference to the recognized standard, which remains in both NFPA 130 and NFPA 502. The respective TC’s didn’t use the previous wording “in accordance with” because the TC’s determined based on UL’s own actions that the current standard does not adequately address testing cables in raceways.

4. The TIA suggests that the cable need only comply with the fire endurance test, and does not reference the need for additional testing as described in ANSI/UL 2196 including the hose stream and electrical conductor tensile strength test. The hose stream as referenced in ANSI/UL 2196 is intended to subject the system to the impact and cooling effects of the water hose stream. Omitting of this test, as well as omitting the electrical conductor tensile strength test that evaluates the maximum unsupported vertical length of cable in a raceway can result in systems where the performance of such is compromised.

This statement by UL is definitely and demonstrably incorrect. Neither NFPA 130 nor NFPA 502 give exception to any part of UL 2196, therefore all cables must pass the entire test including the hose stream and tensile tests.

5. As of December 21, 2012, UL issued the first certification to this modified program, which takes into consideration variables of the installed product, increases the number of samples to demonstrate consistency, and includes reference to the manufacturer’s installation instructions. An additional manufacturer has successfully passed the ANSI/UL 2196 testing under the current program and several more certification projects are being established for other
wireways and cable types. UL does have an active certification program with current and anticipated listings. UL certifications can be viewed at ul.com/database under UL Product Categories FHJR (Fire Resistant Cables) and FHIT (Electrical Circuit Integrity Systems).

UL’s position appears to be confusing at best. The ANSI/UL-2196 Standard has not been changed. UL took the action September 12, 2012 to end their own certification to the Standard based on discovered shortfalls, which does not bind any other NRTL’s or listing agencies, but has had impact on AHJ’s and end users.

We note that UL actually presented to the TC’s at the ROC meetings that use of the previously listed cable manufactured before that action date was still “OKAY” to use per UL listing, a position that may result in legal actions involving UL given the shortfalls discovered, however, these legal actions are not within the scope of 502 or 130 to address.

The fact that UL has taken a certain business approach (the de-certification, the “interim” listing program) to addressing shortfalls discovered in the UL 2196 Standard should not limit NFPA from adding appropriate requirements within their own Standards that reflect on the use of that UL Standard to compensate for that shortfall.

In conclusion, we request the Standards Council to reverse the decisions of NFPA 130 and 502 Technical Committees and require them to refrain from editing existing critical safety circuit requirements appearing in NFPA 130 and 502.

Action to follow the UL recommendation to invalidate the TIA’s will place the various User agencies, AHJ’s, and multiple tunnel projects that depend on the NFPA 502 and NFPA 130 Standards in an untenable position. The UL interim testing protocols are very difficult and expensive to meet, and impose added time constraints.

The TIA’s as written will provide the necessary flexibility to users to select an approved testing lab while maintaining the same testing regimen as required by t UL 2196. Approval of these TIA’s will also allow the international community, which is highly dependent upon these Standards to utilize their own national and/or regional testing laboratories.

The technical basis for the TIA’s is valid and is necessary to address the shortfalls Standard created by the actions of UL and that specifically affect application for the tunnel environments covered by these two NFPA Standards. The TC’s urge the Standards Council to accept the proposed TIA’s.
Date: April 24, 2013

Task Group

Larry Ayer, Biz Com Electric, Chairman
Mark Ode, UL
James Conrad, RSCC Wire & Cable
Steve Pasternac, Intertek

RE: TIA-1083 NFPA 502

Report:

A Task Group was formed to review correlation issues between NFPA 502 and NFPA 70 (NEC) as a result of the proposed TIA-1083 submitted by the NFPA 502 committee. The Task Group reviewed this TIA during a conference call on April 12, 2013.

TIA-1083 was submitted to revise certain text in NFPA 502 that specifically dealt with listed Fire-Resistive Cable Systems. This TIA was submitted in response to UL’s action in September 2012 to discontinue certification (listing) of Fire-Resistive Cable Systems to UL 2196, Standard for Tests of Fire Resistive Cables. These systems are a large part of wiring methods used in Road Tunnels, Bridges and other areas covered under NFPA 502. The TIA was submitted to provide prescriptive requirements for obtaining equivalent fire resistance of Cable Systems without obtaining UL listing.

The Task Group has reviewed the TIA and notes a couple of items.

1. First, while UL Certification was initially discontinued in September 2012, an interim program was developed in late September 2012 and re-established certification in December, 2012. To date, manufacturers have provided two systems which have achieved certification under this new program: a MI Cable certified for 2 hours and a MC Cable system certified for 1 hour. Additional Fire-Resistive Cable manufacturers have shown interest in submitting their products. The interim program, in the tasks groups’ opinion, eliminates any need to remove or replace the listing requirements in NFPA 502 or NFPA 70 for that matter.

2. Fire-Resistive Cable Systems as they relate to the NEC are considered a subset of a larger group of protective systems which also includes Protective Wraps. This larger group is called “Electrical Circuit Protective Systems”. While the UL certification was originally discontinued for the Fire-Resistive Cable Systems the certification of Protective Wraps remained. These systems are used throughout the code but specifically in Articles 695 and 700. During the recently completed 2014 NEC Revision Cycle, several comments were submitted to Code Panel 13 that acknowledged that certain certifications were discontinued, however Panel 13 maintained the current code text since Protective Wraps had maintained their certification.

3. During the same NFPA 70 (NEC) revision cycle, Code Panel 3 accepted a new Article 728 which deals specifically with Fire-Resistive Cable Systems. This new article maintains the listing requirements for these type systems and clarifies to the user of the NEC that each Fire-Resistive Cable System has certain specific listing requirements that must be met in order for the system to function consistently for a certain period of time during a fire. The listing requirements
consider system components, such as the type of wiring method or conduit, conduit supports, type of couplings, vertical supports, boxes and splices that are to be used with each system. Code Panel 3 maintained that the certification process for Fire-Resistive provided in new Article 728 was important and that any issues regarding re-certification of these type systems would likely be resolved in the very near future.

4. The review of the TIA and has also brought concerns regarding the proposed wording in 12.1.2(1)(b). The present wording infers that both Fire-Resistant MC Cable and MI Cable must be tested in a raceway in order to use these wiring methods. However, these systems have not been tested for this specific application nor do they require a raceway. The Task Group prefers the wording for the same section that was proposed and accepted during the ROC stage.

As a result of the NEC reaffirming the listing and certification for Fire Resistive Cables in Code Panels 3, and reaffirming the listing and certification of Electrical Circuit Protective Systems in Code Panel 13 the changes proposed by TIA-1083 would create correlation issues with the NFPA 70 (NEC) document.
MEMORANDUM

To: NFPA Technical Committee on Road Tunnel and Highway Fire Protection
From: Kelly Carey, Administrator, Technical Projects
Date: July 22, 2013
Subject: NFPA 502 Informational Poll Ballots – Final Results

The Final Results of the NFPA 502 Informational Poll Ballots are as follows:

**Part 1 – 2014 Edition**

- **Members Eligible to Vote**: 26
- **Recommend the text of TIA No. 1083 be incorporated into the 2014 edition of NFPA 502.**: 4
- **Recommend the text of Comment 502-27 as Accepted by the Technical Committee be incorporated into the 2014 edition of NFPA 502. (2 with comments, C. Both, A. Brinson)**: 13
- **Abstain**: 0

**Part 2 – 2011 Edition**

- **Members Eligible to Vote**: 26
- **Recommend that TIA No. 1083 be Issued on the 2011 edition of NFPA 502.**: 17
- **Recommend that TIA No. 1083 Not be Issued on the 2011 edition of NFPA 502.**: 0
- **Abstain**: 0

According to the final ballot results, both ballot items passed with simply majority.
TECHNICAL COMMITTEE ROAD TUNNEL AND HIGHWAY FIRE PROTECTION (ROA-AAA)

INFORMATIONAL POLL (Part 1)

NFPA 502, 2014 edition

The Standards Council is requesting clarification on the position of the Road Tunnel and Highway Fire Protection Technical Committee in relation to Comment 502-27 and TIA No. 1083 on the 2014 edition of NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways (check one):

☐ I recommend the text of TIA No. 1083 be incorporated into the 2014 edition of NFPA 502.
    See attached TIA No. 1083.

Or

☒ I recommend the text of Comment 502-27 as Accepted by the Technical Committee be incorporated into the 2014 edition of NFPA 502
    See attached Comment 502-27.

☐ Abstain*

*Reasons must accompany these votes.
When possible, reasons are requested via e-mail in a Word Document.

_____ The Comment 502-27 uses language in 12.1.2 (1) “certified or listed”, rather than the language in the TIA, stating that the cables are to be tested (only). Certification and listing has added value, and although perhaps not consistently adopted as a part of a quality approach to materials, products and systems in tunnels, I feel it is a step backwards if we would not include it in the language. If an entire certification system or listing scheme of a product group is withdrawn, like we have experienced, then normally there is good reason and substantiation for it, but even if not, or poorly communicated, this will be an incidental, rather than structural issue.
Signature

Dr. Kees Both

Name (Please Print)

June 18th 2013

Date

Please return this Poll on or before **12:00 PM EST, Monday, July 22, 2013**.

**PLEASE RETURN TO:**

Kelly Carey

Project Administrator

NFPA

One Batterymarch Park

Quincy, MA 02169

E-Mail: kcarey@nfpa.org  Fax: 617-984-7110
TECHNICAL COMMITTEE ROAD TUNNEL AND HIGHWAY FIRE PROTECTION (ROA-AAA)
INFORMATIONAL POLL (Part 1)
NFPA 502, 2014 edition

The Standards Council is requesting clarification on the position of the Road Tunnel and Highway Fire Protection Technical Committee in relation to Comment 502-27 and TIA No. 1083 on the 2014 edition of NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways (check one):

☐ I recommend the text of TIA No. 1083 be incorporated into the 2014 edition of NFPA 502.
See attached TIA No. 1083.

Or

☒ I recommend the text of Comment 502-27 as Accepted by the Technical Committee be incorporated into the 2014 edition of NFPA 502.
See attached Comment 502-27.

☐ Abstain*

*Reasons must accompany these votes.
When possible, reasons are requested via e-mail in a Word Document.

We were asked to choose whether to support TIA 1083 or ROC 502-27/Log#CC11. I have chosen to support ROC 502-27/Log#CC11 because, as I understand it, this language allows cables to be used that are not UL listed but have equivalent performance. This is important if the standard is to be applicable outside the US, where the available cables may not have a UL listing. We should also refrain where possible from imposing a monopolistic position in a standard.

Signature

ALAN BRINSON

Name (Please Print)

7/7/2013

Date
Supplemental Attachment 13-8-20-f
Page 5 of 8 ADDITION

Report on Comments – June 2013

502-27 Log #CC11
(12.1.2, A.12.1.2 (1))

Final Action: Accept

Submitter: Technical Committee on Road Tunnel and Highway Fire Protection,
Comment on Proposal No: 502-109
Recommendation: Revise the existing text as follows:
12.1.2* Emergency circuits installed in a road tunnel and ancillary areas shall remain functional for a period of not less than 1 hour, for the anticipated fire condition, by meeting one of the following methods:
(1)* Fire-resistive cables shall be certified or listed as having been listed for 2 hours in accordance with ANSI/UL 2196 or other equivalent internationally recognized standards to 950°C (1742°F) when approved by the AHJ, tested in a totally enclosed furnace using the ASTM E-119 temperature time curve and which demonstrate functionality for no less than 2 hours as described in the ANSI/UL 2196 test standard and as follows:
   a) Tested as a complete system of conductors, cables and raceways as applicable, using a sample no shorter than 3.0 m (9.84 ft).
   b) Fire-resistive cables intended for installation in a raceway are tested in the type of raceway in which they are intended to be installed.
   c) Each fire-resistive cable system have installation instructions that outline the test procedure and only the components stated in the test report are acceptable for actual installations.
(2) Circuits embedded in concrete are protected by a 2-hour fire barrier system in accordance with UL 1724. The insulation for cables or conductors shall be thermost and shall be suitable to maintain functionality at the temperature within the embedded conduit or fire barrier system.
(3) Routing external to the roadway
(4) Diversity in system routing as approved (such as separate redundant or multiple circuits separated by a 1-hour fire barrier) so that a single fire or emergency event will not lead to a failure of the system.
Add the following annex text as follows:
A.12.1.2
The actual duration required for the circuits to be operative will depend upon the duration required for the circuits to be operative for the emergency evacuation and rescue phase — and, in some circumstances, incident management and structural protection: Factors such as the length of the tunnel, evacuation pathways, the use of fixed water-based fire suppression systems, and the proximity of emergency services may influence this period of time. See also A.12.1.2(1)(b).
(1) When selecting a fire-resistive cable, it is important to understand how it will be installed and if it was tested as a complete system, including splices. Cables that are exposed (not embedded in concrete) should be protected using either a metallic raceway or an armor/sheath (see 12.3.1). There are two basic configurations of fire-resistive cables. Cables enclosed by a metallic sheath or armor, such as Type MI or Type MC, are installed without raceways. Cables that are installed in a raceway, such as Type RHW-2, Type TC or Type CM are tested as a complete system. Regardless of the fire test standard used to evaluate fire-resistive cables that will be installed in a raceway, it is important to consider that the cables are only one part of the system. Other components of the system include but are not limited to the type of raceway, the size of raceway, raceway support, raceway couplings, boxes, conduit bodies, splices where used, vertical supports, grounds, and pulling lubricants. Each cable type should be tested to demonstrate compatibility.
Only those specific types of raceways tested should be acceptable for installation. Each cable type that is intended to be installed in raceway should be tested in both a horizontal and vertical configuration while demonstrating circuit integrity.
Substantiation: The Technical Committee has taken this action to revise Sec. 12.1.2* in order to address the recent modification of UL pertaining to their standard UL2196. The UL action has invalidated standard requirements in Chapter 12 by making the listing requirements unattainable as written. Specifically, as of Sept 12, 2012, UL has withdrawn all cable certifications (listings) to this test standard. Recent fire testing has demonstrated failure modes such as hot-dipped galvanized coatings on the interior surface of the raceways potentially causing premature failure of copper fire-resistive cable systems. NFPA 502 currently allows the use of fire resistive cable listed in accordance with UL2196 Standard for Safety for Test for Fire Resistive Cables 2012.
Committee Meeting Action: Accept
Number Eligible to Vote: 26
Ballot Results: Affirmative: 24
Ballot Not Returned: 2 LeBlanc, D., Sturm, P.
Comment on Affirmative:
CONNELL, W.: Editorial: Proposed text in 12.1.2* (1)* is not literate as used in context of overall paragraph. Please revise as follows:
Revise 12.1.2* (1)* a) to read: Fire-resistive cables used for emergency circuits shall be tested as part of a complete system including the conductors, cables, and raceway (if utilized) using a sample no shorter than 3.0 m (9.84 ft).
Revise 12.1.2* (1)* b) to read: Fire-resistive cables intended for installation in a raceway, shall be tested in the type of raceway in which they are to be installed.
Revise 12.1.2* (1)* c) to read: Documentation certifying that the fire-resistive cable system testing required herein shall be made available to the AHJ.

DIX, A.: I am very concerned that there is a disconnection between the testing regime which is suggested and the need for circuit performance in a fire emergency. I do not want to support this change in the absence of important information about the link between the test method and the required performance. I also note that such information probably does not exist and that there is an urgent need for certainty. I am NOT negative to the need for the amendment, just hesitant about the substance of its effect.

PLOTKIN, D.: Editing issues in substantiation text. Believe should read as:
The Technical Committee has taken this action to revise Sec. 12.1.2* in order to address the recent modification of UL pertaining to their standard UL2196. The UL action has invalidated standard requirements in Chapter 12 by making the listing requirements unattainable as written. Specifically, as of September 12, 2012, UL has withdrawn all cable certifications (listings) to this test standard. Recent fire testing has demonstrated failure modes such as hot-dipped galvanized coatings on the interior surface of the raceways potentially causing premature failure of copper fire-resistive cable systems. NFPA 502 currently allows the use of fire resistive cable listed in accordance with UL2196 Standard for Safety for Test for Fire Resistant Cables 2012.
Standard for Road Tunnels, Bridges and Other Limited Access Highways
TIA Log No. 1083
Reference: 12.1.2 and A.12.1.2
Comment Closing Date: February 13, 2013
Submitter: William Connell, PB Americas, Inc.

Proposed language to the 2011 edition.

1. Revise 12.1.2 and 12.1.2(1) to read as follows:

12.1.2* Emergency circuits installed in a road tunnel and ancillary areas shall remain functional for a period of not less than 1 hour, for the anticipated fire condition, by meeting one of the following methods:

(1)* -A fire-resistive cables shall be listed for 2 hours in accordance with ANSI/UL 2196 or other equivalent internationally recognized standards to 950°C (1742°F) when approved by the AHJ, tested by an approved testing laboratory in a totally enclosed furnace using the ASTM E 119 time-temperature curve.
   (a) The cables shall demonstrate functionality for no less than 2 hours as described in the ANSI/UL 2196 test standard
   (b) Testing shall be performed in the type and configuration of raceway in which they are intended to be installed
   (c) Provide documentation to include a full description of the actual test procedure conducted and a list of acceptable components to be used for installation certifying compliance with the test procedure

12.1.2(2) text remains unchanged.

Proposed language to the proposed 2014 edition.

1. Revise 12.1.2 and 12.1.2(1) – (4) to read as follows:

12.1.2* Emergency circuits installed in a road tunnel and ancillary areas shall remain functional for a period of not less than 1 hour, for the anticipated fire condition, by meeting one of the following methods:

(1)* -A fire-resistive cables listed for 2 hours in accordance with ANSI/UL 2196 or other equivalent internationally recognized standards to 950°C (1742°F) when approved by the AHJ, tested by an approved testing laboratory in a totally enclosed furnace using the ASTM E 119 time-temperature curve.
   (a) The cables shall demonstrate functionality for no less than 2 hours as described in the ANSI/UL 2196 test standard
   (b) Testing shall be performed in the type and configuration of raceway in which they are intended to be installed
   (c) Provide documentation to include a full description of the actual test procedure conducted and a list of acceptable components to be used for installation certifying compliance with the test procedure

(2) Circuits embedded in concrete or protected by a 2-hour fire barrier system in accordance with UL 1724. The insulation for cables or conductors shall be thermoset and shall be suitable to maintain functionality at the temperature within the embedded conduit or fire barrier system.
(3) Routing external to the roadway
(4) Diversity in system routing as approved (such as separate redundant or multiple circuits separated by a 1-hour fire barrier) so that a single fire or emergency event will not lead to a failure of the system.

2. Revise A.12.1.2 and A.12.1.2(1) for both the 2011 and proposed 2014 editions to read as follows:

A.12.1.2 The actual duration required for the circuits to be operative will depend upon the duration required for the circuits to be operative for the emergency evacuation and rescue phase — and, in some circumstances, incident management and structural protection. Factors such as the length of the tunnel, evacuation pathways, the use of fixed water-based fire suppression systems, and the proximity of emergency services may influence this period of time.
A.12.1.2 (1) When selecting a fire-resistive cable, it is important to know how it will be installed and if it was tested as a complete system, including splices. Cables that are exposed (not embedded in concrete) should be protected using either a metallic raceway or an armor/sheath (see 12.3.1). There are two basic configurations of fire-resistive cables:
(1) Armored cables, such as Type MI or Type MC, are installed without raceways.
(2) Cables installed in a raceway, such as Type RHW-2, Type TC, or Type CM, are tested as a complete system.

Regardless of the fire test standard used to evaluate fire-resistive cables installed in a raceway, it is important to consider that the cables are only one part of the system. Other components of the system include but are not limited to the type of raceway, the size of raceway, raceway support, raceway couplings, boxes, conduit bodies, splices where used, vertical supports, grounds, and pulling lubricants. Each cable type should be tested to demonstrate compatibility. Recent fire testing has demonstrated that hot-dipped galvanized coatings on the interior surface of raceways can cause premature failure of copper fire-resistive cable systems. Only the specific types of raceways tested should be acceptable for installation. Each cable type intended to be installed in a raceway should be tested in both a horizontal and a vertical configuration to demonstrate circuit integrity.

**Submitter’s Substantiation:** This correction addresses the recent action of UL pertaining to their UL 2196, *Standard for Safety for Test for Fire Resistive Cables*, 2012. Specifically, as of September 12, 2012, UL has withdrawn all cable certifications (listings) to this test standard. NFPA 502 currently allows the use of 2-hour fire-resistive cable listed in accordance with UL 2196, *Standard for Safety for Test for Fire Resistive Cables*, 2012. Because NFPA 502 had relied upon the UL listing for compliance, this UL action has changed the standard.

**Emergency Nature:** The 2011 edition of the document contains listing requirements that are no longer available for 2-hour fire-resistive cables for emergency circuits. The proposed revision provides prescriptive requirements for obtaining the equivalent fire resistance without obtaining UL certification (listing). Several tunnel projects currently in the design and construction phase are being burdened by this UL action and are seeking the direction of this Technical Committee.
Item 13-8-21
1. Revise 2.3.3 to read as follows:


2. Add the two new paragraphs below to follow 6.1.3.3.3. Renumber existing paragraphs 6.1.3.3.4 and 6.1.3.3.5 as 6.1.3.3.6 and 6.1.3.3.7 respectively. Change Annex item A.6.1.3.3.5 to A.6.1.3.3.7. Change Table 6.1.3.3.5 to Table 6.1.3.3.7.

6.1.3.3.4 The location of the wrist crease shall be determined by first placing the glove on a measurement board palm down and securing (locking) the fingertips down onto the board.

6.1.3.3.5 A 1 lb weight shall be attached to the end of the glove body or gauntlet glove interface component. The weight shall not be attached to a knitted wristlet glove interface component. The weight shall be applied evenly across the glove.

3. Add the two new paragraphs below to follow 6.2.3.3.3. Renumber existing paragraphs 6.2.3.3.4, 6.2.3.3.5, 6.2.3.3.6, 6.2.3.3.7 and 6.2.3.3.8 as 6.2.3.3.6, 6.2.3.3.7, 6.2.3.3.8, 6.2.3.3.9 and 6.2.3.3.10 respectively. Change Annex item A.6.2.3.3.5 to A.6.2.3.3.7.

6.2.3.3.4 The location of the wrist crease shall be determined by first placing the glove on a measurement board palm down and securing (locking) the fingertips down onto the board.

6.2.3.3.5 A 1 lb weight shall be attached to the end of the glove body or gauntlet glove interface component. The weight shall not be attached to a knitted wristlet glove interface component. The weight shall be applied evenly across the glove.

4. Revise 7.1.3.5 to read as follows:

7.1.3.5 Gloves shall be tested for grip as specified in Section 8.29, Grip Test, and shall not have a drop of force of more than 30 percent from the peak pull force value in any 0.2 second interval.

5. Revise 7.1.4.5 to read as follows:

7.1.4.5 Footwear soles and heels shall be tested for abrasion resistance as specified in Section 8.34, Abrasion Resistance Test 3, and the relative volume loss shall not be greater than 200 250 mm$^3$ (0.01 0.02 in.$^3$).

6. Revise 7.2.3.5 to read as follows:

7.2.3.5 Gloves shall be tested for grip as specified in Section 8.29, Grip Test, and shall not have a drop of force of more than 30 percent from the peak pull force value in any 0.2 second interval.

7. Revise 7.2.4.5 to read as follows:

7.2.4.5 Footwear soles and heels shall be tested for abrasion resistance as specified in Section 8.34, Abrasion Resistance Test 3, and the relative volume loss shall not be greater than 200 250 mm$^3$ (0.01 0.02 in.$^3$).

8. Revise 7.3.4.5 to read as follows:

7.3.4.5 Gloves shall be tested for grip as specified in Section 8.29, Grip Test, and shall not have a drop of force of more than 30 percent from the peak pull force value in any 0.2 second interval.

9. Revise 7.3.5.5 to read as follows:

7.3.5.5 Footwear soles and heels shall be tested for abrasion resistance as specified in Section 8.34, Abrasion Resistance Test 3, and the relative volume loss shall not be greater than 200 250 mm$^3$ (0.01 0.02 in.$^3$).
10. Revise 7.3.5.10 to read as follows:

7.3.5.10 Footwear shall be individually tested for flame resistance as specified in Section 8.32, Flame Resistance Test 4, and shall not have an afterflame of more than \(25\) seconds, shall not melt or drip, and shall not exhibit any burn-through.

11. Revise 8.1.9.5 to read as follows:

8.1.9.5 The wash cycle procedure in Table 8.1.9.5 (a) through Table 8.1.9.5 (c) shall be followed.

Add two tables 8.1.9.5 (b) and 8.1.9.5 (c) to follow existing Table 8.1.9.5. Renumber Table 8.1.9.5 as Table 8.1.9.5 (a).

### Table 8.1.9.5 (b)

<table>
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<tr>
<th>Number of Garments</th>
<th>Low Water Level ±1 cm (3/8 in.)</th>
<th>High Water Level ±1 cm (3/8 in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 3</td>
<td>15 cm 5.9 in.</td>
<td>25.5 cm 10 in.</td>
</tr>
<tr>
<td>4 to 6</td>
<td>17.5 cm 6.9 in.</td>
<td>28 cm 11 in.</td>
</tr>
<tr>
<td>7 or more</td>
<td>20 cm 7.9 in.</td>
<td>30.5 cm 12 in.</td>
</tr>
</tbody>
</table>

### Table 8.1.9.5 (c)

<table>
<thead>
<tr>
<th>Low Water Level +1 cm (3/8 in.)</th>
<th>High Water Level +1 cm (3/8 in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloves</td>
<td>20 cm 7.9 in.</td>
</tr>
<tr>
<td>Glove Pouches</td>
<td>20 cm 7.9 in.</td>
</tr>
</tbody>
</table>

12. Revise 8.1.9.14 to read as follows:

8.1.9.14 Gloves and glove pouches shall be tumbled for 60 minutes and shall be removed immediately at the end of the drying cycle. At the conclusion of the final drying cycle, the gloves or glove pouches shall be permitted to be dried on a forced air nontumble drying mechanism operated at \(10^\circ\text{C} ± 2^\circ\text{C} (50^\circ\text{F} ± 3^\circ\text{F})\) above current room temperature until completely dry.

13. Revise 8.2.2.2 to read as follows:

8.2.2.2 Samples shall be conditioned as specified in 8.2.8, 8.2.9, or 8.2.10, except CBRN garment and material samples shall be conditioned as specified in 8.2.8, 8.2.9, or 8.2.10 followed by 8.1.2.
14. Revise 8.2.9.1 to read as follows:

8.2.9.1 Samples for conditioning shall be in the form of a pouch as described in 8.2.9.4 and 8.1.14.

15. Revise 8.4.2.2 to read as follows:

8.4.2.2 Samples shall be conditioned as specified in 8.1.2. Other samples shall be conditioned as specified in 8.1.3 followed by conditioning as specified in 8.1.2, except CBRN garment and material samples shall be conditioned as specified in 8.1.9 followed by 8.1.2.

16. Revise 8.5.11.4 to read as follows:

8.5.11.4 Sample helmets shall be positioned according to the HPI as described in 8.1.13 on the thermal headform conforming to the dimensions in Figure 8.5.11.4.

17. Revise 8.5.2.2 to read as follows:

8.5.2.2 Samples shall be conditioned as specified in 8.1.3 followed by conditioning as specified in 8.1.2, except CBRN garment and material samples and glove samples shall be conditioned as specified in 8.1.9 followed by conditioning as specified in 8.1.2.

18. Revise the following subsections to read as follows:

8.7.2.2 Samples shall be conditioned as specified in 8.1.3 followed by conditioning as specified in 8.1.2, except CBRN garment and material samples shall be conditioned as specified in 8.1.9 followed by conditioning as specified in 8.1.2.

8.8.2.2 Samples shall be conditioned as specified in 8.1.3 followed by conditioning as specified in 8.1.2, except CBRN garment and material samples shall be conditioned as specified in 8.1.9 followed by conditioning as specified in 8.1.2.

8.9.2.2 Samples shall be conditioned as specified in 8.1.3 followed by conditioning as specified in 8.1.2, except CBRN garment and material samples shall be conditioned as specified in 8.1.9 followed by conditioning as specified in 8.1.2.

19. Revise 8.11.7.1 to read as follows:

8.11.7.1 Specimens shall be representative of the glove body composite construction at the glove areas A-P, B-P, D-P, E-P, F-P, G-P, H-P, I-P, A-B, B-B, D-B, E-B, F-B, G-B, H-B, I-B as described in 8.1.14 and shall not include seams. Samples and specimens shall be permitted to be materials representative of those used in the construction of the glove.

20. Revise 8.13.2.2 and 8.16.2.2 to read as follows:

8.13.2.2 Samples shall be conditioned as specified in 8.1.3 followed by conditioning as specified in 8.1.2, except CBRN garment and material samples shall be conditioned as specified in 8.1.9 followed by conditioning as specified in 8.1.2.

8.16.2.2 Garment materials samples shall be conditioned as specified in 8.1.3 followed by conditioning as specified in 8.1.2, except CBRN garment and material samples shall be conditioned as specified in 8.1.9 followed by conditioning as specified in 8.1.2.

21. Revise 8.16.8.1 to read as follows:

8.16.8.1 Samples for conditioning shall be in the form of a pouch as described in 8.1.14 and 8.1.15.

22. Revise 8.17.2.2 to read as follows:

8.17.2.2 Garment materials samples shall be conditioned as specified in 8.1.3 followed by conditioning as specified in 8.1.2, except CBRN garment and material samples shall be conditioned as specified in 8.1.9 followed by conditioning as specified in 8.1.2.

23. Revise 8.17.8.1 to read as follows:

8.17.8.1 Samples for conditioning shall be in the form of a pouch as described in 8.1.14 and 8.1.15.

24. Revise 8.19.5.1 to read as follows:
8.19.5.1 Specimen helmets shall be positioned on the headform according to the HPI as described in 8.1.12. Where the crown clearance of the helmet is adjustable, the helmet shall be mounted with the least amount of clearance. Where an internal faceshield is an integral part of the structural integrity of the helmet, it shall be deployed as far as possible without interfering with the test equipment. Helmets shall be subjected to the environmental conditions specified in 8.1.2, 8.1.4, 8.1.5, and 8.1.6 prior to each impact and within the specified time after being removed from conditioning.

25. Revise 8.20.5.1 to read as follows:

8.20.5.1 The environmentally conditioned helmet shall be positioned according to the HPI as described in 8.1.132 on the test headform and secured by the helmet retention system or by other means that will not interfere with the test. Where the crown clearance of the helmet is adjustable, the helmet shall be mounted with the least amount of clearance. The helmet shall be positioned so that the penetration striker shall impact perpendicular to the helmet. The helmet shall be adjusted to a size sufficient to properly fit on the headform with the horizontal center plane parallel and within 5 degrees of the reference plane. The front-to-back centerline of the shell shall be within 13 mm (0.5 in.) of the midsagittal plane of the headform. Where an internal faceshield is an integral part of the structural integrity of the helmet, it shall be deployed as far as possible without interfering with the test equipment.

26. Revise 8.21.5.1.1 to read as follows:

8.21.5.1.1 The helmet shall be positioned according to the HPI as described in 8.1.132 on the ISO size J headform specified in Figure 8.23.4.1. Where the crown clearance of the helmet is adjustable, the helmet shall be mounted with the most amount of clearance.

27. Revise 8.25.7.2 to read as follows:

8.25.7.2 Specimens shall be representative of glove body composite construction at glove areas A-P, B-P, D-P, E-P, F-P, G-P, H-P, I-P as described in 8.1.143.

28. Revise 8.26.7.2 to read as follows:


29. Revise 8.27.7.2 to read as follows:

8.27.7.2 Specimens shall be representative of glove body composite construction at glove areas A-P, B-P, D-P, E-P, F-P, G-P, H-P, I-P as described in 8.1.143. All variations in composite construction and the order of layering of composite materials shall constitute a new composite and shall be tested separately.

30. Revise 8.29.3.5, 8.29.4, and 8.29.5.5 to read as follows:

8.29.3.5 Specimen glove pairs shall be tested after being wet conditioned for wet conditions as specified in 8.1.7.

8.29.4 Apparatus. The apparatus shall consist of a pulling device that is a 31.7 mm (1¼ in.) diameter fiberglass pole attached to an overhead calibrated force measuring device in such a fashion that pulls on the pole will be perpendicular to the ground and downward in direction. This pole shall be used until surface degradation occurs. The force measuring system shall provide a graphical plot of force-vs-time.

8.29.5.4 The test subject and the test subject’s hand shall be positioned as shown in Figure 8.29.5.4(a) then make three pulls on the pulling device with gloves, with peak and Figure 8.29.5.4(b), and as described below minimum pull force values measured.

8.29.5.4.1 The test subject shall stand facing the pole with feet shoulder width apart.

8.29.5.4.2 While wearing specimen gloves, the test subject shall grasp the pole with the bottom of the bottom hand at a height equal to the height of the subject.

8.29.5.4.3 The hands shall be stacked on each other and the thumbs shall not overlap the fingers.

8.29.5.4.4 The body shall be distanced from the pole so that the forearms are approaching vertical and in plane with the pole.

8.29.5.4.5 The elbows shall be shoulder width apart, rotated neither fully in (arms parallel to the pole) nor fully out (arms perpendicular to the pole).
8.29.5.5 The test subject shall pull the pole with as much pulling force as possible in a smooth, steady, swift, and non-jerking action for 5 +1/-0 seconds. The test subject shall minimize forward or backward movement during the pull as much as possible. The test subject shall not bend the knees or pull down with body weight during the pull. The test subject shall continue to pull until the test facilitator instructs the test subject to end the pull at 5 +1/-0 seconds. Pulls shall be performed as described in 8.29.5.5.1 through 8.29.5.5.6.

31. Delete existing subsections 8.29.5.5.1 through 8.29.5.5.6 and add a new subsection 8.29.5.6 to read as follows:

8.29.5.6 The test subject shall repeat the pull described above for a total of three pulls.
32. Revise 8.29.6.1 through 8.29.6.3 to read as follows:

8.29.6.1 The peak pull force value for each individual pull shall be recorded and reported. Any drop in force of greater than 30% in any 0.2 second interval, as measured in the graphical plot of force versus time, shall be recorded and reported.

8.29.6.2 The minimum pull force value occurring after the peak pull force value shall be recorded and reported.

8.29.6.3 The percentage drop between the peak pull force value and the minimum pull force value shall be calculated, recorded, and reported.

33. Revise 8.29.7.1 to read as follows:

8.29.7.1 The individual percentage drop between the peak pull force value and the minimum pull force value shall be used to determine pass or fail performance. Any drop in force of greater than 30% in any 0.2 second interval shall constitute failing performance.

34. Revise text as follows:

8.45.5.2 While standing, each test subject shall grasp the cylinder so that the elbow is against the side of the body throughout the duration of the test and the arm bend creates a right angle.

8.45.5.4 Each test subject shall make five successive attempts to twist the cylinder in the appropriate direction exerting as much force as possible. The range of motion of the subject's arm wrist shall indicate the end of the twisting cycle. The average maximum force over the five attempts shall be the barehanded control value.

Submitter’s Substantiation:

1. The ASTM F 2412 standard needs to be updated to the current edition.

2. These added paragraphs clarify the logical sequence of this section.

3. These added paragraphs clarify the logical sequence of this section.

4, 6, 8, 30, 31, 32, 33 As currently written in the 2013 edition, more information is needed to fully explain how the pulls are to be performed, and also how the graphic results are to be interpreted. After interlaboratory coordination it was determined that the additional language is necessary to perform consistent testing and to ensure a consistent level of compliant products is available to users.

The test method as currently written does not provide sufficient detail in order for the test to be consistently applied in the evaluation of glove grip and requires interpretation of the testing laboratory to determine the appropriate body and hand position, which have a significant impact on the test results. Specific changes have been proposed in the position of the test subject’s body and hands that alter the original instructions for performing the test. The additional details are intended to ensure that laboratories performing this test conduct the test in exactly the same way. Photographs of the proper positioning of the test subject body and hands with respect to the pole are included in the proposed modifications to provide a clear interpretation for running this part of the test.

In addition, it is proposed to base the performance of glove grip on a change in the measured force relative to the time interval in which that change occurs. Consequently, the criteria in paragraphs 7.1.3.5, 7.2.3.5 and 7.3.4.5 have been modified. This modification was necessary because the degree of test subject hand slipping on the pole can occur at varying rates (force over time) leading to widely different application of the test results and potential failure of gloves that are considered to have acceptable performance.

These changes were developed as the result of a meeting between Intertek Testing Services, the North Carolina State University Textile Protection and Comfort Center, and Underwriters’ Laboratories, where these organizations worked together to determine how to consistently run the test method and achieve better precision in test results. The involvement of these organizations and their work on this test method were pursuant to a recommendation made by the Technical Committee on Structural and Proximity Fire Fighting Protective Clothing during a committee teleconference held December 2012 where specific problems with the test method and its application in NFPA 1971 were identified.

5, 7, 9. These changes bring the requirements in line with EN ISO 20345:2011.

10. This change brings all the footwear flame requirements in line together.
11. The water levels for garment, materials and gloves needs to be specified in order to allow for the front load wash machines to be properly programmed at the testing laboratories.

12. This change is adding a tolerance and provides the temperature conversion.

13, 15, 18, 20, 22. These changes clarify the requirements for CBRN laundering and reference the correct section for pouch conditioning.

14. This change references the correct section for pouch construction.

16, 19, 26, 27, 28, 29 These changes reference the correct sections in the standard related to glove test areas and the helmet positioning index.

17. This change references the correct laundry preconditioning for glove samples.

21, 23 These changes reference the correct pouch construction section for moisture barrier with seams.

24, 25. These changes clarify the deployment of the internal faceshield when it is an integral part of the structural integrity of the helmet.

34. The test apparatus will be maxed out if the test subject uses their arm’s range of motion to perform this test. In order to achieve more accurate results it is important the test subject use their wrist’s range of motion to perform this test.

**Emergency Nature:** This TIA seeks to correct errors and omissions that were overlooked during the Fall 2013 revision cycle process of NFPA 1951. Additionally, some parts of this TIA correct circumstances in which the standard could adversely impact a method or product that was inadvertently overlooked in the total revision process.
According to 5.4 in the NFPA (RGCP), the final results show this TIA **HAS** achieved the necessary votes on both Question 1 (**Correlation Issues**) and Question 2 (**Emergency Nature**).

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

\[
[27 \text{ eligible to vote} – 8 \text{ (not returned)} – 0 \text{ (abstentions)} = 19 \times 0.75 = 14.25]
\]

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

\[
[27 \text{ eligible ÷ 2} = 13.5 = 14 \text{ (this is the simple majority)}]
\]

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</thead>
<tbody>
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<td>8</td>
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**CC FINAL** Ballot results for **Correlation Issues** are as follows:

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<tr>
<th>Agree</th>
<th>Disagree</th>
<th>Abstentions</th>
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</thead>
<tbody>
<tr>
<td>19</td>
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**FINAL ACTION: PASSED**

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

<table>
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<th>Agree</th>
<th>Disagree</th>
<th>Abstentions</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>0</td>
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**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 **12**.

\[
[24 \text{ (eligible to vote)} - 8 \text{ (not returned)} - 0 \text{ (abstentions)} = 16 \times 0.75 = 12]
\]

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

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

<table>
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<th>Eligible to Vote</th>
<th>24</th>
<th>Not Returned (Byrne, Davis, Geraghty, Howard, Nelson, Paderick, Reall, Stanhope)</th>
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**TC FINAL** Ballot results for **Technical Merit** are as follows:

- 16 Agree
- 0 Disagree
- 0 Abstentions

**FINAL ACTION: PASSED**

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

- 16 Agree
- 0 Disagree
- 0 Abstentions

**FINAL ACTION: PASSED**
Item 13-8-22
1. Revise 8.2.5(1) as follows:

8.2.5 Procedure. Thermal protective performance testing shall be performed in accordance with ASTM F 2700, Standard Test Method for Unsteady-State Heat Transfer Evaluation of Flame Resistant Materials for Clothing with Continuous Heating, with the following modifications:

(1) The contact spaced configuration shall be used for testing of all material specimens.

(2) The heat transfer performance value calculations using the heat flux in calories/cm²/sec shall be reported as the TPP rating.

Submitter’s Substantiation: In ROP 1951-2 Log #CP7 FAE-SCE, the TPP test was altered to switch from the spaced to the contact configuration. This change to the test method moved the sensor from 0.25 inches away from the sample to contacting the sample during the test. This change in test procedure results in a lower heat transfer performance or TPP value due to the location of the sensor.

In previous editions of NFPA 1951, only the spaced configuration was tested, and from a safety perspective, no justification has been given for this particular change. The purpose of the original accepted committee proposal was to use ASTM test method F2700 in order to correct known deficiencies with the previous method. The substantiation for the changes in the committee proposal does not address switching from the spaced to the contact configuration.

Emergency Nature: 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. As stated above, there is no technical justification in the ROP for altering the conduct of the test from the spaced to the contact configuration. This unintended change has resulted in an adverse impact on products in that currently compliant products can no longer be certified.
TIA FINAL CC 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 (Correlation Issues) and Question 2 (Emergency Nature).

The number of affirmative votes needed to obtain a recommendation to issue the TIA is 14.

\[
\text{[27 (eligible to vote) – 9 (not returned) – 0 (abstentions) = 18 \times 0.75 = 13.5]}
\]

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

\[
\text{[27 eligible ÷ 2 = 13.5 = 14 (this is the simple majority)]}
\]

27 Eligible to Vote
9 Not Returned (Duffy, Fargo, Haston, Johnson, Legendre, McKenna, Neilson, Putorti, Reall)

CC FINAL Ballot results for Correlation Issues are as follows:
18 Agree
0 Disagree
0 Abstentions

FINAL ACTION: PASSED

CC FINAL Ballot results for Emergency Nature are as follows:
18 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 12.

\[
24 \text{ (eligible to vote)} - 8 \text{ (not returned)} - 0 \text{ (abstentions)} = 16 \times 0.75 = 12
\]

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  
8 Not Returned (Byrne, Davis, Geraghty, Howard, Nelson, Paderick, Reall, Stanhope)

TC FINAL Ballot results for Technical Merit are as follows:

16 Agree  
0 Disagree  
0 Abstentions

FINAL ACTION: PASSED

TC FINAL Ballot results for Emergency Nature are as follows:

16 Agree  
0 Disagree  
0 Abstentions

FINAL ACTION: PASSED
Item 13-8-23
1. Revise 7.7.22 to read as follows:

7.7.22 Gloves shall be tested for grip as specified in Section 8.38, Grip Test, and shall not have a drop of force of more than 30 percent from the peak pull force value in any 0.2 second interval.

2. Revise Section 8.38 to read as follows:

8.38.2.1 Samples for conditioning shall be whole gloves pairs.

8.38.3.4 Specimen glove pairs shall be tested after being wet conditioned for wet conditions as specified in 8.1.9.

8.38.4.1 Pulling Device. The pulling device shall be a 3.2 cm (1¼ in.) diameter fiberglass pole attached to an overhead calibrated force measuring device in such a fashion that pulls on the pole will be perpendicular to the ground and downward in direction. This pole shall be used until surface degradation occurs. The force measuring system shall provide a graphical plot of force-vs-time.

8.38.5.1 Test subjects shall be selected so that their hand dimensions are as close as possible to the middle of the range for hand length and hand circumference as specified in Table 6.7.6.1 (a) and Table 6.7.6.1(d) for size small and size large gloves. At least three test subjects shall be selected for both size small and size large.

8.38.5.4 The test subject and the test subject’s hand shall be positioned as shown in Figure 8.38.5.4(a) and Figure 8.38.5.4(b), and as described below: shall then make three pulls on the pulling device with gloves with peak and minimum pull force values measured. Pulls shall be performed as described 8.38.5.4.1 through 8.38.5.4.6. The test subject shall extend the arms in front of the body at shoulder height to grab the pulling device for pulling vertically down from the ceiling.

Figure 8.38.5.4 (a) Position of test subject body, arms, and hands with respect to pole. Photo Courtesy Intertek Testing Services, Used by Permission.
8.38.5.4.1 The test subject shall stand facing the pole with feet shoulder width apart, with feet together, firmly planted on the ground, and knees slightly bent.

8.38.5.4.2 While wearing specimen gloves, the test subject shall grasp the pole with the bottom of the bottom hand at a height equal to the height of the subject. The stand shall be adjusted such that the cushioned bar is touching the test subject’s chest. The stand shall prevent the test subject’s forward movement during the pull.

8.38.5.4.3 The hands shall be stacked on each other and the thumbs shall not overlap the fingers. The test subject shall stand in a comfortable pulling position with the arms bent at an angle of approximately 90 degrees and, in any case, the arms shall not be completely extended or touching the body.

8.38.5.4.4 The body shall be distanced from the pole so that the forearms are approaching vertical and in plane with the pole. The test subject shall grasp the pulling device with hands next to each other. Thumbs shall not overlap the fingers.

8.38.5.4.5 The elbows shall be shoulder width apart, rotated neither fully in (arms parallel to the pole) nor fully out (arms perpendicular to the pole). The test subject shall pull the rope or pole with as much pulling force as possible in a smooth, steady, swift, and non-jerking action. The test subject shall not bend the knees further or pull down with body weight during the pull.

8.38.5.4.6 The test subject shall continuously pull on the pulling device for a minimum of 5 seconds, ± 1/0 seconds. The test subject shall continue to pull until the test facilitator observes a peak pulling force and instructs the test subject to end the pull.

8.38.5.5 The test subject shall pull the pole with as much pulling force as possible in a smooth, steady, swift, and non-jerking action for 5 +1/-0 seconds. The test subject shall minimize forward or backward movement during the pull as much as possible. The test subject shall not bend the knees or pull down with body weight during the pull. The test subject shall continue to pull until the test facilitator instructs the test subject to end the pull at 5 +1/-0 seconds.

8.38.5.6 The test subject shall repeat the pull described above for a total of three pulls.

8.38.6.1 The peak pull force value for each individual pull shall be recorded and reported. Any drop in force of greater than 30% in any 0.2-second interval, as measured in the graphical plot of force-vs-time, shall be recorded and reported.

8.38.6.2 The minimum pull force value occurring after the peak pull force value shall be recorded and reported.

8.38.6.3 The percentage drop between the peak pull force value and the minimum pull force value shall be calculated, recorded, and reported.

8.38.7.1 The individual percentage drop between the peak pull force value and the minimum pull force value shall be used to determine pass or fail performance. Any drop in force of greater than 30% in any 0.2-second interval shall constitute failing performance.
Submitter’s Substantiation: As currently written, more information is needed to fully explain how the pulls are to be performed, and also how the graphic results are to be interpreted. This is necessary to ensure consistent testing is performed.

The test method as currently written does not provide sufficient detail in order for the test to be consistently applied in the evaluation of glove grip and requires interpretation of the testing laboratory to determine the appropriate body and hand position, which have a significant impact on the test results. Specific changes have been proposed in the position of the test subject’s body and hands that alter the original instructions for performing the test. The additional details are intended to ensure that laboratories performing this test conduct the test in exactly the same way. Photographs of the proper positioning of the test subject body and hands with respect to the pole are included in the proposed modifications to provide a clear interpretation for running this part of the test.

In addition, it is proposed to base the performance of glove grip on a change in the measured force relative to the time interval in which that change occurs. Consequently, the criteria in paragraph 7.7.22 have been modified. This modification was necessary because the degree of test subject hand slipping on the pole can occur at varying rates (force over time) leading to widely different application of the test results and potential failure of gloves that are considered to have acceptable performance.

These changes were developed as the result of a meeting between Intertek Testing Services, the North Carolina State University Textile Protection and Comfort Center, and Underwriters’ Laboratories, where these organizations worked together to determine how to consistently run the test method and achieve better precision in test results. The involvement of these organizations and their work on this test method were pursuant to a recommendation made by the Technical Committee on Structural and Proximity Fire Fighting Protective Clothing during a committee teleconference held December 2012 where specific problems with the test method and its application in NFPA 1971 were identified.

Emergency Nature: The document contains an error or an omission that was overlooked during a regular revision process. After interlaboratory coordination it was determined that the additional language is necessary to perform consistent testing and to ensure a consistent level of compliant product available to users.
TIA FINAL CC 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 (Correlation Issues) and Question 2 (Emergency Nature).

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

$$[27 \text{ (eligible to vote)} - 7 \text{ (not returned)} - 0 \text{ (abstentions)} = 20 \times 0.75 = 15]$$

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

$$[27 \text{ eligible} ÷ 2 = 13.5 = 14 \text{ (this is the simple majority)}]$$

27 Eligible to Vote
7 Not Returned (Duffy, Haston, Johnson, Legendre, Neilson, Putorti, Reall)

CC FINAL Ballot results for Correlation Issues are as follows:
20 Agree (Matthews, Stull w/comment)
0 Disagree
0 Abstentions

FINAL ACTION: PASSED

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

FINAL ACTION: PASSED

Final FAE-SPF 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 25.

\[36 \text{ (eligible to vote)} - 2 \text{ (not returned)} - 1 \text{ (abstention)} = 33 \times 0.75 = 24.75\]

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

\[36 \text{ eligible} \div 2 = 18 + 1 = 19 \text{ (this is the simple majority)}\]

36 Eligible to Vote  
2 Not Returned (David, Doan)

TC FINAL Ballot results for Technical Merit are as follows:
33 Agree  
0 Disagree  
1 Abstention (Pegg)

FINAL ACTION: PASSED

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

FINAL ACTION: PASSED
CORRELATING COMMITTEE on Fire and Emergency Services Protective Clothing and Equipment

PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1100
Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting

July 22, 2013

Supplemental Agenda July 29-August 1, 2013

Page 1242 of 1861

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.

✓_______ 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.

I believe field trials to assess the impact would be beneficial

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

✓_______ AGREE  ___________ DISAGREE*  ___________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

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

D. G. Matthews
Signature
DAVID GLYNN MATTHEWS
Name (Please Print)
16th May 2013
Date

Please return the ballot on or before Friday, May 24, 2013.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7056
E-mail: vsmith@nfpa.org
CORRELATING COMMITTEE on Fire and Emergency Services Protective Clothing and Equipment
LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1100
Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting

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.

This test method has still not been subject to a complete validation in terms of the performance criteria that have been set as part of this standard. A field study or other type of evaluation should be conducted to establish the relevance of the proposed measurements to fire service issues for grip with gloves.

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.

______________________________

______________________________

______________________________

Jeffrey O. Stull

Signature
Jeffrey O. Stull
Name (Please Print)
15 May 2013
Date

Please return the ballot on or before Friday, May 24, 2013.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7056
E-mail: ysmith@nfpa.org
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1100
Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise sections 7.7.22 and 8.38.

| AGREE | DISAGREE* | ABSTAIN* |

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I DO NOT FEEL ADEQUATELY INFORMED TO MAKE AN EDUCATED OR DEFENSIBLE DECISION

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 DO NOT FEEL ADEQUATELY INFORMED TO MAKE AN EDUCATED OR DEFENSIBLE DECISION

[Signature]

Name (Please Print)

[Name]

Date

[Date: May 10, 2013]

Please return the ballot on or before Friday, May 10, 2013.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169

FAX: (617) 984-7056
E-mail: ysmith@nfpa.org
Item 13-8-24
1. Revise 4.1.11 and 4.1.12 to read as follows:

4.1.11 The certification organization shall not permit any manufacturer to label any SCBA as compliant with the 2007 edition of this standard on or after 31 August 2013, except when replacement labels or replacement components that bear the certification organization’s label are required.

4.1.12 The certification organization shall require manufacturers to remove all certification labels and product labels indicating compliance with the 2007 edition of this standard from all SCBA that are under the control of the manufacturer on 31 August 2013, except when replacement labels or replacement components that bear the certification organization’s label are required. The certification organization shall verify that this action is taken.

Submitter’s Substantiation: The purpose of this TIA is to update on the National Institute for Occupational Safety and Health (NIOSH) testing of CBRN SCBAs. Some unanticipated delays have the potential to negatively impact the timeliness of completion of NIOSH SCBA approvals. These delays could impact approvals and certification of SCBAs by the relevant certification organization (SEI) to the NFPA 1981 standard, 2013 edition. That standard states in paragraph 4.1.11 that “The certification organizations shall not permit any manufacturer to label any SCBA as compliant with the 2007 edition of this standard on or after 31 August 2013, except when replacement labels or replacement components that bear the certification organization’s label are required.” The presumption in the Technical Committee choosing this date was that it would provide sufficient time for manufacturers’ new designs to have successfully completed the evaluations for the certification authorities to be able to issue certifications for compliance to the NIOSH and NFPA standards by that date.

Emergency Nature: NIOSH testing to the Statement of Standard for Self Contained Breathing Apparatus (SCBA) with Chemical, Biological, Radiological, and Nuclear (CBRN) Protection used to Protect Emergency Responders Against CBRN Agents in Terrorist Attacks in conjunction with the National Fire Protection Association (NFPA) Standard 1981 for Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters contain three interlocked activities. One is NIOSH certification under 42 CFR Part 84, Subpart H; two is compliance with National Fire Protection Association (NFPA) Standard 1981 for Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters, current edition; and three is special tests under NIOSH 42 CFR 84.63(c): Chemical Agent Permeation and Penetration Resistance Against Distilled Sulfur Mustard (HD) and Sarin (GB), performed by The US Army Edgewood Chemical Biological Center (ECBC) Testing Center and Laboratory Respirator Protection Level (LRPL), performed by NPPTL. To minimize the total time for CBRN approvals, NIOSH and SEI have a simultaneous test and approval protocol.

The National Personal Protective Technology Laboratory (NPPTL) has allocated its resources provide for the completion of all 9 internally-conducted tests, evaluations and issuance of approvals for SCBA manufacturer applications submitted prior to 1 June 2013 by September 1st. SEI has also allocated resources to provide for completion of the NFPA 1981 compliance testing for apparatus received by the same date.

However, the availability of ECBC testing resources to complete the HD and GB testing has been negatively impacted by the Federal Government Budget Sequestration. Consequently, delays are anticipated. Representatives from NPPTL and ECBC are working closely to develop a projected testing schedule.

A delay past the August 31st date poses a significant impact on fire departments or first responder organizations that planned 4th quarter of 2013 purchases or need an emergency purchase of compliant SCBA. These organizations may not have access to the manufacturer of their current inventory SCBA, posing the dilemma of purchasing another manufacturers product or foregoing purchase until compliant product is available. Either of these approaches will impact firefighter safety, by requiring additional training and creating a mixed inventory of SCBA with compromised interoperability of SCBA units. Departments may be faced with either an inadequate number of compliant SCBAs for operations or sending responders into a hazardous situation with safety equipment that is no longer compliant with NFPA 1981. Additionally, there is concern that without this compliance date extension, products compliant to the 2007 edition of NFPA 1981 will no longer be available after August 31, 2013.
According to 5.4 in the NFPA (RGCP), the final results show this TIA **HAS/HAS NOT** achieved the necessary votes on both Question 1 (*Correlation Issues*) and Question 2 (*Emergency Nature*).

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

\[\text{[___ (eligible to vote) – ___ (not returned) – ___ (abstentions) = ___ \times 0.75 = ___]}\]

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

\[\text{[___ eligible ÷ 2 = ___ + 1 = 14 (this is the simple majority)}\]

---

**TIA PRELIMINARY CC BALLOT RESULTS (due on 7/26/13)**

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**CC FINAL** Ballot results for *Correlation Issues* are as follows:

- ___ Agree
- ___ Disagree
- ___ Abstentions

**FINAL ACTION: PASSED/FAILED**

---

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

- ___ Agree
- ___ Disagree
- ___ Abstentions

**FINAL ACTION: PASSED**

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*Final FAE-RPE 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 22.

\[
[31 \text{ (eligible to vote)} - 2 \text{ (not returned)} - 0 \text{ (abstentions)} = 29 \times 0.75 = 21.75]
\]

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

\[
[31 \text{ eligible} \div 2 = 15.5 = 16 \text{ (this is the simple majority)}]
\]

<table>
<thead>
<tr>
<th>31</th>
<th>Eligible to Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Not Returned (Dickson, Kaller)</td>
</tr>
</tbody>
</table>

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

- 28 Agree
- 1 Disagree (Bull)
- 0 Abstentions

**FINAL ACTION: PASSED**

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

- 28 Agree (Putorti w/comment)
- 1 Disagree (Bull)
- 0 Abstentions

**FINAL ACTION: PASSED**
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1111
To Revise Sections 4.1.11 and 4.1.12 of the 2013 and Proposed 2018 Editions of NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Sections 4.1.11 and 4.1.12.

__________ AGREE __________ X______ DISAGREE* ____________ ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

_It is not our responsibility to modify our timeline to accommodate the federal government's inability to do their job and meet obligations. Federal, State and local government's all are dealing with budgetary issues and must plan accordingly, no different for fire departments who do planning. With two of the three agencies finding solutions to their issues, there is little reason to give special consideration to the third. It is absurd to think departments will be without certified SCBA's given the many avenues to purchases used equipment, rent such units and or borrow as necessary when the sky starts falling. Perhaps the best solution would be too move as the committee originally wanted and make CBRN certification optional for departments that think they need it by separating 1981 in various levels of protection._

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 do not see where this proposed TIA has anything to do with clarifying or addressing a safety issue that pertains to a SCBA unit or the enforcement of the regulations. It seems to be addressing a possible marketing and sales issues which is not an NFPA concern._

__________________________________________
_A Paul Bull__
Signature

__________________________________________
_A Paul Bull__
Name (Please Print)

__________ 11 July 2013 ____________
Date

Please return the ballot on or before Friday, July 12, 2013.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7056
E-mail: vsmith@nfpa.org
June 27, 2013

C #001

NFPA 1981 & 1982

Mr. Daniel Rossos,
Chairman
Technical Committee on Respiratory Protection Equipment (FAE-RPE)
National Fire Protection Association
Protective Clothing and Equipment
1 Battrymarch Park
Quincy, MA 02169
drossofict@gmail.com

Dear Mr. Rossos:

The purpose of this letter is to provide NFPA an update on the National Institute for Occupational Safety and Health (NIOSH) testing of CBRN SCBAs. I want to inform you of some unanticipated delays that have the potential to negatively impact the timeliness of completion of NIOSH SCBA approvals. These delays could in turn impact approvals and certification of SCBAs by the relevant certification organization (SEI) to the NFPA 1981 Standard, 2013 Edition. That standard states in paragraph 4.1.11 that “The certification organizations shall not permit any manufacturer to label any SCBA as compliant with the 2007 edition of this standard on or after 31 August 2013, except when replacement labels or replacement components that bear the certification organization’s label are required.” The presumption in the Technical Committee choosing this date was that it would provide sufficient time for manufacturers’ new designs to have successfully completed the evaluations for the certification authorities to be able to issue certifications for compliance to the NIOSH and NFPA standards by that date.

As you know the NIOSH testing to the Statement of Standard for Self Contained Breathing Apparatus (SCBA) with Chemical, Biological, Radiological, and Nuclear (CBRN) Protection used to Protect Emergency Responders Against CBRN Agents in Terrorist Attacks in conjunction with the National Fire Protection Association (NFPA) Standard 1981 for Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters contain three interlocked activities. One is NIOSH certification under 42 CFR Part 84, Subpart H; two is compliance with National Fire Protection Association (NFPA) Standard 1981 for Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters, current edition; and three is special tests under NIOSH 42 CFR 84.63(c): Chemical Agent Permeation and Penetration Resistance Against Distilled Sulfur Mustard (HD) and Sarin (GB), performed by The US Army Edgewood Chemical Biological Center (ECBC) Testing Center and Laboratory Respirator Protection Level (LRPL), performed
Page 2 – Mr. Rossos – CBRN SCBA Testing Delays

by NPPTL. To minimize the total time for CBRN approvals, NIOSH and SEI have a simultaneous test and approval protocol.

The National Personal Protective Technology Laboratory (NPPTL) has allocated its resources to provide for the completion of all internally-conducted tests, evaluations and issuance of approvals for SCBA manufacturer applications submitted prior to 1 June 2013 by September 1st. SEI has also allocated resources to provide for completion of the NFPA 1981 compliance testing for apparatus received by the same date.

However, the availability of ECBC testing resources to complete the HD and GB testing has been negatively impacted by the Federal Government Budget Sequestration. Consequently, delays are anticipated. Representatives from NPPTL and ECBC are working closely to develop a projected testing schedule.

NIOSH requests that NFPA expedite action to revise NFPA 1981 Standard, 2013 Edition paragraph 4.1.1.1 to move out the 31 August 2013 date by six (6) months. This time extension would allow SCBA manufacturers to sell units compliant to the 2007 edition while NIOSH and NFPA evaluations and approvals to the 2013 edition of the standard are completed and issued to manufacturers.

Please contact Roland Berry Ann at rfb6@cdc.gov or 412-386-4033 for questions regarding the content of this letter.

Sincerely yours,

Maryann M. D’Alessandro, Ph.D.
Director, NIOSH NPPTL

cc: Mr. David Trebisacci, NFPA Staff Liaison, Technical Committee on Respiratory Protection Equipment (FAB-RPE), dtrebisacci@nfpa.org

Mr. Kenneth Willette, NFPA, Division Manager, Public Fire Protection, kwillette@nfpa.org

Ms. Amy Cronin, NFPA, Division Manager, Codes and Standards Administration, Secretary Standards Council, acronin@nfpa.org

Mr. William Haskell, Chairman, NFPA Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment (FAB-AAC), whaskell@cdc.gov

Mr. Roland Berry Ann, Deputy Director, NIOSH NPPTL, rfb6@cdc.gov
Page 3 – Mr. Rossos – CBRN SCBA Testing Delays

Mary F. McNally, Chief, Protective Equipment Test Branch, U.S. Army ECBC,
mary.f.mcnally.civ@mail.mil

Stephen R. Sanders, Technical Director, Safety Equipment Institute,
ssanders@SEInet.org
July 22, 2013

Supplemental Agenda July 29-August 1, 2013

Page 1253 of 1861
From: Joseph Zemek [jzemek@brooklynohio.gov]
Sent: Friday, July 12, 2013 3:46 PM
To: TIAs
Subject: Comment on Proposed TIA 1111

What I am getting, is that due to bureaucratic BS, (federal sequestering), in order to spend my AFG grant money in the required time limit I am to put my firefighters in 1 standard back SCBA units. This is certainly not acceptable and I cannot believe that the NFPA would sit idly by and allow this to happen. My present SCBA units are two standards back (three counting the 2013 standard) why would I want to start out one standard back with a new purchase. Someone needs to get this issue solved quicker to provide firefighters with the latest and best technology.

Joseph F Zemek, Chief
jzemek@brooklynohio.gov
City of Brooklyn Fire Department
8400 Memphis Ave.
Brooklyn, Ohio 44144
Office - (216) 635-4226
Fax - (216) 351-0760
Cell - 216-406-8108
From: Rick Griffin [RGriffin@oshtemo.org]
Sent: Monday, July 15, 2013 3:04 PM
To: TIAs
Subject: Comment on Proposed TIA 1111

Although I understand that the sequestration might have caused this part of this delay, but the lack of the CBRN completion will cost our department money that it originally would not have cost us. We are part of a successful regional grant for all new SCBA. Our committee does not want to purchase SCBA’s on the 2007 standard and already be a cycle behind. We all agreed to wait until the new standard was out. We now have an additional delay and with federal budgeting around the corner will this be delayed again? We postponed our annual service tests of all our SCBA masks, and harnesses because we were getting the new SCBA. Now that the 2007 standard has been extended we will have to expend money out of our budget for equipment that will be “scrapped” during the grant purchase.

What does this mean for the grant? NIOSH, NPPTL, SEI and ECBC all knew that this equipment under the 2013 standard would need to be tested prior to this date. If there is continuous delays are we going to be forced to purchase from the old standard? If approval of the extension is granted, we feel that the testing should be completed expeditiously so departments do not have to absorb unfunded costs due to this delay.

Respectfully,

Richard D Griffin
Deputy Fire Chief
Charter Township of Oshtemo
Fire/Rescue Department
7275 West Main St Kalamazoo, MI 49009
P: 269-375-0487  F: 269-544-2085
rgriffin@oshtemo.org
http://www.oshtemofire.org

Confidentiality Notice: The information contained in this electronic mail message and any attachments is intended only for the use of the individual or entity to which it is addressed and may contain legally privileged, confidential information or work product. If the reader of this message is not the intended recipient, you are hereby notified that any use, dissemination, distribution, or forwarding of the e-mail message is strictly prohibited. If you have received this message in error, please notify me by e-mail reply, and delete the original message from your system.
Dear Sirs,

It is very disappointing that the certification of the "new" SCBA is being proposed to be pushed back. Our fire district has just accepted a bid for the 2103 compliant air packs and it is a regional grant that affects four other fire departments. We also have two other area fire departments within our county that have also accepted their bids on the 2103 compliant air packs. We are all under a time deadline to finish these projects with FEMA. The manufacturers all submitted their products as requested, now it's time for NIOSH to uphold their end of this process. Personally, I am sick and tired of hearing that sequestration is the problem. That is old news and we should not be hearing this excuse this late in the process. I strongly urge you to decline this request and pressure NIOSH to complete the testing on time.

Thank You

Scott Pritchard

Scott Pritchard
First Assistant Chief
Town of Oswego Fire Department
station - 315-343-2030
cell - 315-591-1508
July 11, 2013

Secretary, Standards Council
1 BATTERYMARCH PARK
Quincy, MA 02169-7471

Re: NFPA 1981-2013
TIA 1111

Gentlemen:

I am writing to express my concern regarding the requirements of the implementation of NFPA 1981 - 2013 Edition. Our Department continues to strive to comply with the newer standards, especially ones that will be “enforced” by the Texas Commission on Fire Protection. However, the requirement of matching a new AV3000 mask with the new SCBA designs is ludicrous. If there is an issue with the safety of the air masks presently being used, I would urge you to require the manufacturer to issue a recall and replace the masks.

We began a replacement program last year to replace 5 SCBA packs a year to move to the newer design guidelines. With the requirement to match a new mask to the new air packs, I will reluctantly abandon the project. We issue and fit test a mask to every firefighter, not an air pack. The cost of replacing the masks alone is over twice the cost of replacing 5 packs. Since any of our employees could be assigned to the truck with the new packs, we would have to replace everyone’s masks simultaneously.

If this is the intent of the new guideline, I will need an explanation from a member of the committee other than a manufacturer’s representative. I will need to explain to him the lack of thought being given to the financial impact being thrust upon the fire service of these requirements. If the masks currently being utilized are safe with the current SCBA, why are they not safe with the new SCBAs?

Sincerely,

Randall F. Parr
Item 13-8-25
1. Revise 4.1.8 and 4.1.9 to read as follows:

4.1.8 The certification organization shall not permit any manufacturer to label any PASS as compliant with the 2007 edition of this standard on or after August 31, 2013. February 28, 2014.

4.1.9 The certification organization shall require manufacturers to remove all certification labels and product labels indicating compliance with the 2007 edition of this standard from all PASS that are under the control of the manufacturer on August 31, 2013. February 28, 2014. The certification organization shall verify this action is taken.

Submitter’s Substantiation: This TIA is related to a similar TIA being submitted to NFPA 1981. The testing and certification of an integrated PASS device is directly related to the testing and certification of the SCBA. The submitters emphasize the importance of the two documents continuing to have the same compliance dates.

The purpose of this TIA is to update on the National Institute for Occupational Safety and Health (NIOSH) testing of CBRN SCBAs. Some unanticipated delays have the potential to negatively impact the timeliness of completion of NIOSH SCBA approvals. These delays could in turn impact approvals and certification of SCBAs by the relevant certification organization (SEI) to the NFPA 1981 standard, 2013 edition. That standard states in paragraph 4.1.11 that “The certification organizations shall not permit any manufacturer to label any SCBA as compliant with the 2007 edition of this standard on or after 31 August 2013, except when replacement labels or replacement components that bear the certification organization’s label are required.” The presumption in the Technical Committee choosing this date was that it would provide sufficient time for manufacturers’ new designs to have successfully completed the evaluations for the certification authorities to be able to issue certifications for compliance to the NIOSH and NFPA standards by that date.

Emergency Nature: NIOSH testing to the Statement of Standard for Self Contained Breathing Apparatus (SCBA) with Chemical, Biological, Radiological, and Nuclear (CBRN) Protection used to Protect Emergency Responders Against CBRN Agents in Terrorist Attacks in conjunction with the National Fire Protection Association (NFPA) Standard 1981 for Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters contain three interlocked activities. One is NIOSH certification under 42 CFR Part 84, Subpart H; two is compliance with National Fire Protection Association (NFPA) Standard 1981 for Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters, current edition; and three is special tests under NIOSH 42 CFR 84.63(c): Chemical Agent Permeation and Penetration Resistance Against Distilled Sulfur Mustard (HD) and Sarin (GB), performed by The US Army Edgewood Chemical Biological Center (ECBC) Testing Center and Laboratory Respirator Protection Level (LRPL), performed by NPPTL. To minimize the total time for CBRN approvals, NIOSH and SEI have a simultaneous test and approval protocol.

The National Personal Protective Technology Laboratory (NPPTL) has allocated its resources to provide for the completion of all 9 internally-conducted tests, evaluations and issuance of approvals for SCBA manufacturer applications submitted prior to 1 June 2013 by September 1st. SEI has also allocated resources to provide for completion of the NFPA 1981 compliance testing for apparatus received by the same date.

However, the availability of ECBC testing resources to complete the HD and GB testing has been negatively impacted by the Federal Government Budget Sequestration. Consequently, delays are anticipated. Representatives from NPPTL and ECBC are working closely to develop a projected testing schedule.

A delay past the August 31st date poses a significant impact on fire departments or first responder organizations that planned 4th quarter of 2013 purchases or need an emergency purchase of compliant SCBA with integrated PASS. These organizations may not have access to the manufacturer of their current inventory SCBA, posing the dilemma of purchasing another manufacturer’s product or foregoing purchase until compliant product is available. Either of these approaches will impact firefighter safety, by requiring additional training and creating a mixed inventory of SCBA with compromised interoperability of SCBA units. Departments may be faced with either an inadequate number of compliant SCBAs for operations or sending responders into a hazardous situation with safety equipment that is no longer compliant with NFPA 1981. Additionally, there is concern that without this compliance date extension, products compliant to the 2007 edition of NFPA 1981 will no longer be available after August 31, 2013.
TIA 1982-2013
Reference: 4.1.8 and 4.1.9
(TIA Log 1112)

Comment Closing: 8/12/2013
1 Public Comment Received

TIA PRELIMINARY CC BALLOT RESULTS (due on 7/26/13)

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

The number of affirmative votes needed to obtain a recommendation to issue the TIA is ___.
[27 (eligible to vote) – ___ (not returned) – ___ (abstentions) = ___ × 0.75 = ___]

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
[27 eligible ÷ 2 = 13.5 = 14 (this is the simple majority)]

27 Eligible to Vote
___ Not Returned

CC FINAL Ballot results for Correlation Issues are as follows:
___ Agree
___ Disagree
___ Abstentions

FINAL ACTION: PASSED/FAILED

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

FINAL ACTION: PASSED/FAILED

Final FAE-ELS 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 **17**.

\[
[29 \text{ (eligible to vote)} - 7 \text{ (not returned)} - 0 \text{ (abstentions)} = 22 \times 0.75 = 16.5]
\]

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

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

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**29 Eligible to Vote**  
**7 Not Returned** (Berger, Busa, Facella, Makky, Roche, Varner, Wolf)

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

**FINAL ACTION: PASSED**

**TC FINAL** Ballot results for *Emergency Nature* are as follows:  
22 Agree (Putorti w/comment)  
0 Disagree  
0 Abstentions  

**FINAL ACTION: PASSED**
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1112
To Revise Sections 4.1.8 and 4.1.9 of the 2013 and Proposed 2018 Editions of NFPA 1982,
Standard on Personal Alert Safety Systems (PASS)

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to revise Sections 4.1.8
and 4.1.9.

_____ 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.
The vote to “AGREE” is based on the assumption that there may not be NFPA 1981
compliant / NIOSH certified SCBAs available on/after 31 August 2013 due to delays at the
US Army Edgewood Chemical Biological Center from sequestration. The fire service
should be encouraged to choose NFPA 1981-2013 edition compliant / NIOSH certified
SCBAs when they become available, even if 2007 edition compliant SCBAs are still
available due to the TIA.

________________________________________________________________________

Signature

____ Anthony Putorti __________________________
Name (Please Print)

____ 10 July 2013 __________________________
Date

Please return the ballot on or before Friday, July 12, 2013.

PLEASE RETURN TO:
Yvonne Smith, Project Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169
FAX: (617) 984-7056 E-mail: ysmith@nfpa.org
Mr. Daniel Rossos,
Chairman
Technical Committee on Respiratory Protection Equipment (FAE-RPE)
National Fire Protection Association
Protective Clothing and Equipment
1 Batterymarch Park
Quincy, MA 02169
drossofict@gmail.com

Dear Mr. Rossos:

The purpose of this letter is to provide NFPA an update on the National Institute for Occupational Safety and Health (NIOSH) testing of CBRN SCBAs. I want to inform you of some unanticipated delays that have the potential to negatively impact the timeliness of completion of NIOSH SCBA approvals. These delays could in turn impact approvals and certification of SCBAs by the relevant certification organization (SEI) to the NFPA 1981 Standard, 2013 Edition. That standard states in paragraph 4.1.11 that "The certification organizations shall not permit any manufacturer to label any SCBA as compliant with the 2007 edition of this standard on or after 31 August 2013, except when replacement labels or replacement components that bear the certification organization's label are required." The presumption in the Technical Committee choosing this date was that it would provide sufficient time for manufacturers' new designs to have successfully completed the evaluations for the certification authorities to be able to issue certifications for compliance to the NIOSH and NFPA standards by that date.

As you know the NIOSH testing to the Statement of Standard for Self Contained Breathing Apparatus (SCBA) with Chemical, Biological, Radiological, and Nuclear (CBRN) Protection used to Protect Emergency Responders Against CBRN Agents in Terrorist Attacks in conjunction with the National Fire Protection Association (NFPA) Standard 1981 for Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters contain three interlocked activities. One is NIOSH certification under 42 CFR Part 84, Subpart H; two is compliance with National Fire Protection Association (NFPA) Standard 1981 for Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters, current edition; and three is special tests under NIOSH 42 CFR 84.63(c): Chemical Agent Permeation and Penetration Resistance Against Distilled Sulfur Mustard (HD) and Sarin (GB), performed by The US Army Edgewood Chemical Biological Center (ECBC) Testing Center and Laboratory Respirator Protection Level (LRPL), performed
July 22, 2013

Supplemental Agenda July 29-August 1, 2013

Page 2 of 3 ADDITION

Page 2 – Mr. Rossos – CBRN SCBA Testing Delays

by NPPTL. To minimize the total time for CBRN approvals, NIOSH and SEI have a simultaneous test and approval protocol.

The National Personal Protective Technology Laboratory (NPPTL) has allocated its resources to provide for the completion of all internally-conducted tests, evaluations and issuance of approvals for SCBA manufacturer applications submitted prior to 1 June 2013 by September 1st. SEI has also allocated resources to provide for completion of the NFPA 1981 compliance testing for apparatus received by the same date.

However, the availability of ECBC testing resources to complete the HD and GB testing has been negatively impacted by the Federal Government Budget Sequestration. Consequently, delays are anticipated. Representatives from NPPTL and ECBC are working closely to develop a projected testing schedule.

NIOSH requests that NFPA expedite action to revise NFPA 1981 Standard, 2013 Edition paragraph 4.1.11 to move out the 31 August 2013 date by six (6) months. This time extension would allow SCBA manufacturers to sell units compliant to the 2007 edition while NIOSH and NFPA evaluations and approvals to the 2013 edition of the standard are completed and issued to manufacturers.

Please contact Roland Berry Ann at rfb6@cdc.gov or 412-386-4033 for questions regarding the content of this letter.

Sincerely yours,

Maryann M. D'Alessandro, Ph.D.
Director, NIOSH NPPTL

cc: Mr. David Trebisacci, NFPA Staff Liaison, Technical Committee on Respiratory Protection Equipment (FAB-RPE), dtrebisacci@nfpa.org

Mr. Kenneth Willette, NFPA, Division Manager, Public Fire Protection, kwillette@nfpa.org

Ms. Amy Cronin, NFPA, Division Manager, Codes and Standards Administration, Secretary Standards Council, acronin@nfpa.org

Mr. William Haskell, Chairman, NFPA Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment (FAB-AAC), whaskell@cdc.gov

Mr. Roland Berry Ann, Deputy Director, NIOSH NPPTL, rfb6@cdc.gov
Page 3 – Mr. Rossos – CBRN SCBA Testing Delays

Mary F. McNally, Chief, Protective Equipment Test Branch, U.S. Army ECBC,
mary.f.mcnelly.civ@mail.mil

Stephen R. Sanders, Technical Director, Safety Equipment Institute,
ssanders@SEI.net.org
1. Revise 3.3.6, A.3.3.6, and 3.3.20, and add a new A.3.3.20 to read as follows:

**3.3.6 Cold Weather Insulation Material.** A fabric that consists of one or more nonseparable layers that is used for protection in a low-temperature environment. A cold weather insulation material is not an interlining (see interlining).

**A.3.3.6 Cold Weather Insulation Material.** Examples of insulation materials are include textile battings(s) alone or batting(s) that are attached to a face cloth. For example, an insulation material consisting of two layers are considered nonseparable by the attachment that combines the two layers. The insulation material may or may not have a face cloth. Cold weather insulation materials generally are provided within the garment such that their area of coverage coincides with the majority of garment area covering the wearer’s body.

Cold weather insulation material as defined in this standard does not preclude the use of intermediate layers for additional protection against thermal hazards.

**3.3.20 Interlining.** Any textile that is incorporated into any garment as a layer between outer and inner layers that only covers a small portion of the overall garment. [1975, 2009]

**A.3.3.20 Interlining.** The outer and inner layers are compliant to the fabric requirements of this standard. Examples of an interlining are a fabric layer used to stiffen the waist band in a pair of pants or a facing fabric used inside the closure flap of a coverall. Interlining materials do not come in contact with the wearer’s skin or underclothing.

2. Revise subsections 5.1.2, 5.1.9(7), and 5.1.12, and add a new 5.1.13 to read as follows:

**5.1.2** At least one product label shall be conspicuously located inside each flame-resistant garment, when the item is properly assembled with all layers and components in place.

**5.1.9(7)** Fiber content for each primary fabric layer including cold weather insulation materials, but excluding interlinings and labels.

**5.1.12** Garments with multiple layers, including an outer layer and removable cold weather insulation layer, shall specify the certified wearable configurations on the label configuration and include a warning on the label stating that all layers must be properly secured and worn in accordance with the manufacturer’s instructions.

**5.1.13** For garments with multiple layers that include an outer layer and a removable cold weather insulation layer, a label shall be conspicuously attached to the removable insulation layer that states “DO NOT WEAR THIS LINER BY ITSELF. FOR COMPLIANCE WITH THE FLASH FIRE REQUIREMENTS OF NFPA 2112, THE COMPLETE GARMENT MUST BE WORN. FOR COMPLIANCE INFORMATION, SEE THE PRODUCT LABEL ON OUTER GARMENT.”

3. Add new Section 6.4 and subsections 6.4.1, and A.6.4.1 to read as follows:

**6.4 Use of a Liner for Cold Weather Insulation.** Garments shall be permitted to include liners in their construction including cold weather insulation materials where the liner is either integral to the garment or removable.

**6.4.1** Where garments incorporate a cold weather insulation material as part of a removable lining system, the garment shall be designed such that the removable liner consisting of the cold weather insulation material cannot be independently worn.
A.6.4.1 Removable liners are permitted to be worn separately if the liner material(s) independently meets the appropriate fabric requirements in Chapter 7 including 7.1.1 for heat transfer performance and 7.1.5 for overall flash fire performance. If the liner contains cold weather insulation materials that are not evaluated to 7.1.1 and 7.1.5 and do not pass the thermal shrinkage resistance requirement in 7.1.3, then the manufacturer must label the liner as specified in 5.1.13 and provide a design that does not allow separate wearing of the liner without the outer layer. This may be demonstrated by the absence of a means of closure for the closure area of shirts, pants, and coveralls.

4. Add new subsections 7.1.1.1 and 7.1.1.2 to read as follows:

7.1.1.1 Where the flame-resistant garment consists of multiple and separable layers intended to be worn separately, the outer layer and the inner layer or layers shall be separately tested.

7.1.1.2 Where the flame-resistant garment consists of multiple layers intended only to be worn together, only the outer layer shall be tested.

5. Revise subsections 7.1.2 and 7.1.3 to read as follows:

7.1.2 Fabric, cold weather insulation material, and reflective striping utilized in the construction of flame-resistant garments shall be tested for flame resistance as specified in Section 8.3, and shall have a char length of not more than 100 mm (4 in.) and an after-flame of not more than 2 seconds, and shall not melt and drip.

7.1.3 Fabric utilized in the construction of flame-resistant garments, excluding manufacturer’s labels, interlinings, and cold weather insulation materials, shall be individually tested for thermal shrinkage resistance as specified in Section 8.4, and shall not shrink more than 10 percent in any direction.

6. Delete existing subsection 7.1.3.1 as follows:

7.1.3.1 Cold weather insulation materials utilized in the construction of flame-resistant garments shall be tested in accordance with Section 8.4 and shall not shrink more than 20 percent in any direction.

7. Revise subsection 7.1.4 to read as follows:

7.1.4 Fabric, cold weather insulation materials, other textile materials, and reflective striping other than those items described in 7.1.4.1 and 7.1.4.2, used in the construction of flame-resistant garments shall be individually tested for heat resistance in their original form as specified in Section 8.4, and shall not melt and drip, separate, or ignite.

8. Add a new subsection 8.3.1.7 to read as follows:

8.3.1.7 Modifications to this test method for testing cold weather insulation materials shall be as specified in 8.3.13.

9. Revise subsections 8.3.3.1, 8.3.3.2, and 8.3.3.3 to read as follows:

8.3.3.1 For fabrics and cold weather insulation materials that are designated on the flame-resistant garment label to be washed, specimens shall be tested before and after 100 cycles of washing and drying as specified in 8.1.3.

8.3.3.2 For fabrics and cold weather insulation materials that are designated on the flame-resistant garment label to be dry-cleaned, specimens shall be tested before and after 100 cycles of dry cleaning as specified in 8.1.4.

8.3.3.3 For fabrics and cold weather insulation materials that are designated on the flame-resistant garment label to be either washed or dry-cleaned, specimens shall be tested before and after 100 cycles of washing and drying as specified in 8.1.3, or after 100 cycles of dry cleaning as specified in 8.1.4.
10. Add new subsections to 8.3.13 to read as follows:

**8.3.13 Specific Requirements for Testing Cold Weather Insulation Materials.**

8.3.13.1 Samples for wash or dry-clean conditioning shall be prepared by cutting a 66-cm × 66-cm (26-in. × 26-in.) panel of the cold weather insulation material. A similar-sized piece of 200-g/m² to 270-g/m² (6.0-oz/yd² to 8.0-oz/yd²) flame-resistant fabric meeting all requirements of this standard shall be sewn around the perimeter of the cold weather insulation material such that the batting side is covered by the fabric.

8.3.13.2 Following wash or dry-clean conditioning, 5 specimens measuring 75 mm × 300 mm (3 in. × 12 in.) from each of the warp and filling direction shall be removed from the cold weather insulation material layer of the conditioned panels.

8.3.13.3 If applicable, all specimens shall be prepared for testing by trimming the scrim material, batting, or other layer(s) away from the face cloth by 50 mm ± 3 mm (2.0 in. ± 1/8 in.) such that the face cloth can be folded back covering the scrim, batting, or other layer(s) by 50 mm ± 3 mm (2.0 in. ± 1/8 in.); the folded specimen shall be secured in the specimen holder.

8.3.13.4 Testing shall be performed as described in 8.3.2 through 8.3.7.

11. Revise subsection 8.4.1 and add new subsections 8.4.1.1 through 8.4.1.5 to read as follows:

**8.4.1 Application.** The heat and thermal shrinkage resistance test method shall apply to flame resistant garment fabrics, components, and hardware.

8.4.1.1 This test method shall apply to flame-resistant garment fabrics, components, hardware, and cold weather insulation materials.

8.4.1.2 Modifications to this test method for testing flame-resistant garment textile materials shall be as specified in 8.4.8.

8.4.1.3 Modifications to this test method for testing other flame-resistant garment materials, including reflective striping, shall be as specified in 8.4.9.

8.4.1.4 Modifications to this test method for testing hardware shall be as specified in 8.4.10.

8.4.1.5 Modifications to this test method for testing cold weather insulation materials shall be as specified in 8.4.11.

12. Revise subsections 8.4.2.1 and 8.4.3.1 through 8.4.3.3 to read as follows:

8.4.2.1 Only heat resistance testing shall be conducted on not fewer than three specimens for each hardware item, label material, and other flame-resistant garment fabrics, and cold weather insulation materials not listed in 8.4.2.2 and 8.4.2.3.

8.4.3.1 For fabrics and cold weather insulation materials that are designated on the flame-resistant garment label to be washed, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3.

8.4.3.2 For fabrics and cold weather insulation materials that are designated on the flame-resistant garment label to be dry-cleaned, specimens shall be tested before and after three cycles of dry-cleaning as specified in 8.1.4.

8.4.3.3 For fabrics and cold weather insulation materials that are designated on the flame-resistant garment label to be either washed or dry-cleaned, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3, after three cycles of dry-cleaning as specified in 8.1.4.

13. Delete existing subsection 8.4.8.2 and renumber 8.4.8.3 to 8.4.8.2 to read as follows:
8.4.8.2 Measurements of cold weather insulation material thermal shrinkage shall be made on the side of the fabric facing the wearer as used in the construction of the garment.

8.4.8.3 Testing shall be performed in accordance with 8.4.2 through 8.4.7.

14. Add new subsection 8.4.11 to read as follows:

8.4.11 Specific Requirements for Testing Cold Weather Insulation Materials.

8.4.11.1 Samples for wash or dry-clean conditioning shall be prepared by cutting a 50-cm × 20-cm (20-in. × 8-in.) panel of the cold weather insulation material. A similar-sized cloth piece of 200-g/m² to 270-g/m² (6.0-oz/yd² to 8.0-oz/yd²) flame-resistant fabric meeting all requirements of this standard shall be sewn around the perimeter of the cold weather insulation material such that the batting side is covered by the fabric.

8.4.11.2 Following wash or dry-clean conditioning, 3 specimens measuring 152 mm × 152 mm (6 in. × 6 in.) shall be removed from the cold weather insulation material layer of the conditioned panel.

8.4.11.3 Testing shall be performed in accordance with 8.4.2 through 8.4.7, and thermal shrinkage shall not be measured.

Submitter’s Substantiation: The current criteria in NFPA 2112-2012 are not workable to support the inclusion of cold weather insulation materials that provide safe and effective protection of flame resistant garments used for protection of workers against accident flash fires. Changes were made to the 2012 edition of NFPA 2112 without the benefit of a full validation effort. An effort intended to meet this purpose has now been completed by a task group under the direction of the Technical Committee where several prospective cold weather insulation materials were evaluated using existing and proposed test methods that included both current and modified flame resistance and heat/thermal shrinkage resistance testing. Additional evaluations were carried out using full scale manikin testing with garments incorporating the selected cold weather insulation materials in jackets of a simple design to assess effects of simulated flash fires on the clothing and insulation materials.

This effort produced the following two primary findings:

1. One of the cold weather insulation materials included in the investigation exhibited average afterflame times in excess of the 2-second requirement using the current flame resistance test procedures. When tested according to the proposed modified flame resistance test procedures, afterflame times were compliant or near compliant. In addition, the manikin-based testing for the same fabric exhibiting extended afterflame times, showed no unusual burning behavior during manikin testing of full garments where the liner consisted of the cold weather insulation material or showed shrinkage that differed radically from garments using materials that qualify to current NFPA 2112 performance criteria. Based on these findings, the modified flame resistance testing can be utilized for the evaluation of cold weather insulation materials.

It was observed that after flame times were observed to be generally shorter when a 50 mm folded edge was used as compared to a 25 mm folded edge. It was also rationalized that more consistent results would be provided with the 50 mm folded edge for the modified flame test because the specimen is positioned 19 mm into a 38 mm high flame leaving only a 6 mm space between the top of the flame and the beginning of the unprotected (by the folded edge) batting. It was therefore reasoned and consistent with the observed test results that the modified flame resistance test should use a 50 mm folded edge.

Specific changes to NFPA 2112 have been proposed in proposed modifications shown in Section 8.3.

2. Certain cold weather insulation materials exhibited significant distortion in heat/thermal shrinkage resistance testing and thermal shrinkage. Yet, these same materials when employed in the form of a liner in a flame resistant jacket utilizing a lightweight shell material did not show significant differences in their shrinkage (of the liner) with materials that would otherwise pass the NFPA 2112-2013 thermal shrinkage resistance criteria. This further included testing with the jacket samples inverted (turned inside out)
representing a “worst case” exposure and wearing configuration where no adverse safety issues were observed. From these results, the exemption of cold weather insulation materials from the thermal shrinkage resistance requirement can be justified. Specific changes to NFPA 2112 implementing these modifications are provided as in paragraphs 7.1.3, 7.1.3.1 (deletion), 7.1.4, and Section 8.4.

It is important to point out that the cold weather insulation material is required to meet a heat resistance requirement and is always covered by an outer (shell) material (paragraph 7.1.4). If it is not, it would not qualify as a cold weather insulation material. It is also important to point out that while these changes were based on testing that did not show any safety of the protective garment to be compromised when presented to a simulated flash fire, conditions may exist for which cold weather insulation materials (and other garment materials) will fail to provide intended levels of protection.

The following substantiations are proposed for the additional changes in this amendment to address cold weather insulation material definitions, labeling, design criteria, performance criteria, and test methods:

- A clarification was added to the definition of cold weather insulation material to indicate that the material is not an interlining. Additional language was also added to distinguish an interlining that is not tested for heat resistance or thermal shrinkage resistance from a cold weather insulation material, which is tested for heat resistance but not thermal shrinkage resistance (paragraphs 3.3.6, 3.3.20, A.3.3.6, and A.3.3.20).

- Additional labeling language was added to require the identification of the cold weather insulation material fiber content, the inclusion of a warning that garments with cold weather insulation materials must be properly secured and that a separate label must be provided on the liner if detachable, that indicates that the liner must not be worn by itself. These changes are covered in paragraph 5.1.2, 5.1.9, 5.1.12, and 5.1.13.

- Design criteria were added to permit garment with sewn-in or detachable liners that utilize cold weather insulation materials but that manufacturers must design removable liners so that the liner cannot be worn without the outer layer (paragraphs 6.4 and A.6.4).

- Changes were made in the performance criteria to clarify to which requirements cold weather insulation materials are tested (paragraphs 7.1.2, 7.1.3, and 7.1.4).

- A clarification was provided to specify that the cold weather insulation material is not tested for thermal protective performance (paragraphs 7.1.1.1 and 7.1.1.2).

- Specific procedures were added to address the modified testing of the cold weather insulation material as specified in U.S. Air Force purchase description NCTRF PD N2-01-3A, Batting, Quilted, Aramid, involving the removal of 50 mm of batting and folding of the face cloth over the remaining batting, as supported by the test information provided above (paragraph 8.3.1.7 and Section 8.3.13). Additional instructions were provided for preparing samples for conditioning by sewing a layer of flame resistant fabric to the cold weather insulation material prior to laundering with its removal following laundering or dry cleaning (paragraphs 8.3.13.1 and 8.3.13.2).

- Modifications for the heat and thermal shrinkage resistance test method were made to clarify that the cold weather insulation materials are not evaluated for thermal shrinkage resistance as supported by the test information above (paragraphs 8.4.1.1 through 8.4.1.5, paragraph 8.4.2.1, and section 8.4.11). Additional instructions were provided for preparing samples for conditioning by sewing a layer of flame resistant fabric to the cold weather insulation material prior to laundering with its removal following laundering or dry cleaning (paragraphs 8.4.3.1 through 8.4.3.3).

For supporting documentation see the doc info pages at www.nfpa.org/2112.

Emergency Nature: The proposed TIA intends to correct a circumstance in which the revised NFPA Standard 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. As currently written, NFPA 2112 includes
criteria that create a bias against cold weather insulation materials that is inconsistent with their use and in consistent with demonstrated levels of safety.

The OSHA interpretation of March 2010 encouraging employers to provide their employees with garments certified to a consensus standard like NFPA 2112 has created a need and demand for outerwear garments for cold weather protection that are certified to the NFPA 2112 standard. The current edition of the NFPA 2112 standard does not provide clear methods to properly test and certify garments that incorporate insulation for additional protection from cold weather.
TIA TC 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 13.

\[21 \text{ (eligible to vote)} - 4 \text{ (not returned)} - 0 \text{ (abstentions)} = 17 \times 0.75 = 12.75\]

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

\[21 \text{ eligible} \div 2 = 10.5 = 11 \text{ (this is the simple majority)}\]

21  Eligible to Vote
4  Not Returned (Swiss, Wedge, Womble, Wu)

TC FINAL Ballot results for Technical Merit are as follows:
17  Agree (Saner w/comment)
0  Disagree
0  Abstentions

FINAL ACTION: PASSED

TC FINAL Ballot results for Emergency Nature are as follows:
17  Agree (Saner w/comment)
0  Disagree
0  Abstentions

FINAL ACTION: PASSED
TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1105

To Revise Sections 3.3.6, A.3.3.6, 3.3.20 and Add new A.3.3.20; Revise Subsections 5.1.2, 5.1.9(7), and 5.1.12 and Add new 5.1.13; Add new Section 6.4, Subsections 6.4.1 and A.6.4.1; Add new Subsections 7.1.1.1 and 7.1.1.2; Revise Subsections 7.1.2 and 7.1.3; Delete Subsection 7.1.3.1; Revise Subsection 7.1.4; Add new Subsection 8.3.1.7; Revise Subsections 8.3.3.1, 8.3.3.2, and 8.3.3.3; Add new Subsections to 8.3.13; Revise Subsection 8.4.1 and Add new 8.4.1.1 through 8.4.1.5; Revise Subsections 8.4.2.1 and 8.4.3.1 through 8.4.3.3; Delete Subsection 8.4.8.2 and renumber 8.4.8.3 to 8.4.8.2; and Add new Subsection 8.4.11 of the 2012 and Proposed 2016 Editions of NFPA 2112, Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire.

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA to make the changes indicated above.

[ ] AGREE [ ] DISAGREE* [ ] ABSTAIN*

EXPLANATION OF VOTE - Please type or print your comments:

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

To my knowledge there have been no incidents in the field where an FR insulated garment has contributed to worsening a burn injury.

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.]

Since the OSHA memo regarding oil & gas drilling and servicing in 2012, BlackHawk has been asked to provide insulated garments certified to NFPA 2112.

Mark Saner
Signature

Mark Saner
Name (Please Print)

5/6/2013
Date

Please return the ballot on or before Friday, May 17, 2013.

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

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

July 22, 2013 Supplemental Agenda July 29-August 1, 2013 Page 1274 of 1861
Item 13-8-27
RE: Public Input 25 submitted for document 33-2011

Dear Ms. Cronin,

I independently submitted Public Input 25/33-2011. On March 18, 2013 the NFPA 33 committee took action on my Public Input 25/33-2011. They split the input into a 1st Draft with a committee statement and a 1st Revision on the indoor portion. After the committee had voted on the indoor enclosure provisions and formulated a committee statement, but not voted on it, Nancy Pearce suddenly produced a March 15th NFPA 13 Task Group (13TG) memo and asked how the committee wanted to handle it. A committee member representing the suppression industry moved to include it in the committee statement and it was agreed upon by the membership. They had been at this input for over 2-hours and wanted to move on. In retrospect this appears to have been an orchestrated intrusion by staff into the ANSI public development process.

- The NFPA 33 Committee did not have the opportunity to review the memo in its entirety since it was pasted into the partial screen template by the staff member. It was not distributed.

- The NFPA 33 Committee did not have the opportunity to see my memo that details the errors in the first memo that were repeated in the second. It was never distributed to the committee.

- The 13TG comments go from what was a membrane enclosure material performance test to stating that sprinklers are required.

- They improperly classify the membrane enclosure as a structure instead of an enclosure. Their failure to heed my memorandum’s explanation of what the NFPA 33 Committee as a whole had classified as an enclosure is mired in arrogance.

- The memorandum from the 13TG not the Technical Committee in its last paragraph presupposes that the full NFPA 13 committee will not take action unless the 8 conditions listed in item 5 are completed and submitted for review by the committee. The 13TG provides no substantiation as to why they demanded these 8 conditions be satisfied. Nowhere in the Regulations Governing Committee Projects can I find where a Task Group can direct a standing committee to follow its direction.
• The memo takes the tone that the NFPA 13 Committee-as-a-whole has no desire to look at the published draft and investigate further when in fact they know little if anything about this improper 13TG action.

• The first 13TG memo from Matt Klaus dated February 12, 2013 is in truth a memo solely from Matt Klaus since the first person is used throughout. The memo violates NFPA policy on direct staff involvement in the standards process and is misrepresented as a 13TG memo. No 13TG names are included and initialed comments which are disjointed and incomplete follow. It is not known who it was distributed to beyond the NFPA 33 TG.

Here is why I am writing.

The NFPA 13 Task Group and its actions are a violation of the Regulations Governing Committee Projects. This informal TG does not have the ability to issue the comments in memorandum form to the NFPA 33 committee or its Task Groups. Specifically:

"3.1.3.4 Task Groups. A TC or TCC may create Task Groups to address a specific topic or problem. The Task Group shall be appointed and discharged by the Chair. Persons serving on a Task Group need not be Members of the TC or TCC. Such a group need not be balanced by interest. The Task Group shall forward recommendations along with a report of underlying issues to the TC or TCC for action. Task Group reports shall not be submitted in the name of the Task Group as proposals, comments, TIAS, or FLs."

1. The informal NFPA 13 Task Group did not have the ability to issue the memorandums to the NFPA 33 Technical Committee on February 12 or March 15.

2. If an argument is made that they were issued to Nancy Pearce as staff liaison of NFPA 33 then you must find that she erred in providing it to the full committee as well.

Here is what I am requesting of you, as Standards Secretary.

1. Have the 13 TG memorandum summary expunged from Public Input 25/33-2011 because it violates the spirit, intent and provisions of the Regulations Governing Committee Projects Section 3.1.3.4. The publication of the memorandum in any form expresses a prejudice against the ANSI consensus process that NFPA embraces. In light of the Matt Klaus insertion of personal statements in the first memo both should be rescinded.

2. Direct the NFPA 13 Technical Committee to establish a new Task Group consistent with NFPA TC regulations to review the indoor portion of Public Input 25/33-2011 once published by the NFPA 33 Technical Committee. The NFPA Technical Committee Chair should invite the participation of interested parties in the new 13TG including representatives from the NFPA 33 committee and the marine industry. I and Jim Parks of LMC have an interest in participating.

July 22, 2013

Supplemental Agenda July 29-August 1, 2013
Page 1277 of 1861
a. The 13TG should take the opportunity to visit the Ft. Lauderdale Marine facility as part of the work to see in-place fire sprinkler protection now installed in compliance with NFPA 1 and NFPA 13 requirements to protect boats in storage and evaluate vessels in membrane enclosures placed there based upon 4 FPE evaluations and recommendations. (LMC encouraged and offered their facility at the recent 1st Draft meeting.)

b. The new 13TG in compliance with 3.1.3.4 of the Regulations Governing Committee Projects shall submit findings to the NFPA 13 Technical Committee for a vote by the full committee. Recommendations or comments on Public Input 25 submitted for document 33-2011 shall come from the Technical Committee.

3. Strong consideration should be given to the use of a neutral NFPA staff member for the new 13TG since Matt Klaus clearly demonstrated in his February 12 memo that he believes his voice should be the one heard over the NFPA Standards Rules and Regulations and the fair and ordered process that it has always upheld.

**Why This is Important**

This 11th hour 13TG memo’s go against the integrity and transparent process of code writing at NFPA, an ANSI recognized standard making organization. This informal task group sat in on two one-hour 33TG meetings and made a snap decision to close the door on the NFPA 33 Technical Committee’s consideration of the proper installation of fire sprinklers in marina buildings where spray painting is occurring. This has no recognition of existing fully compliant NFPA 13 sprinklered marina buildings in the U.S. and overseas that have been painting in sprinklered buildings without incident for nearly two decades. Public Input 25 proposes to standardize safe procedures that further reduce the potential for fire.

The 13TG memorandum attempts to supersede the sound engineering judgment of registered fire protection engineers who have spent hundreds of hours evaluating the hazards present, materials used and safety systems needed before designing paint spray process. Fire sprinkler systems to counter any fire threat in those existing buildings are consistent with the NFPA 13 requirements as they now exist for boats in buildings under NFPA 303. Ken Bush, FPE performed the LMC 3rd party review, while not representing the committee in his review, is the current chair of NFPA 303 and has served multiple decades on that committee. I can think of no better qualified FPE to have independently validated the levels of protection in these buildings under the NFPA provisions including those in NFPA 13. The 13TG memos call Mr. Bush’s work into question and potentially open him to personal liability to marina owners for their expenditure on compliant NFPA 13 sprinkler systems. The 13TG memorandum in sending the NFPA 33 Committee to the NFPA 303 Committee demonstrates no understanding of what has gone before.
Further, the comments in the March 15th memorandum, if published, could be prematurely interpreted by AHJ’s as negating existing equivalent method approvals in the marine industry and result in lost income to marina’s still recovering from the recession. Registered Fire Protection Engineers who designed sprinkler systems for these occupancies could face legal actions by marina clients because of the unsupported claims in the memorandum that call into question the installation of fire sprinklers under NFPA 13 in marina buildings for boat storage. Nancy Pearce has already gotten a request from a fire marshal on the indoor requirements.

I look for your timely resolution of this matter and the reestablishment of a positive code making environment where the goals of fire safety can move forward for all concerned. Please contact me directly should you need any clarification of my concerns.

Sincerely,

[Signature]

Gregory J. Cahanin

Attachments:

A. March 15, 2013 Task Group Memorandum
B. February 27, 2013 Cahanin Response Memorandum
C. February 12, 2013 Memorandum
Attachment A
MEMORANDUM

TO: Nancy Pearce – NFPA 33 Staff Liaison

FROM: Matt Klaus (NFPA Staff) on Behalf of the NFPA 13 Task Group for Membrane Structures

DATE: March 15, 2013

SUBJECT: Membrane Structure Review

The NFPA 13 task group for membrane structures has reviewed the information provided by the NFPA 33 task group and has prepared the following comments for review by the NFPA 33 Technical Committee at their upcoming First Draft Meeting (March 18-19, 2013):

1. The information garnered from the initial testing on the membrane structure is a good starting point for learning more about the impact of membrane structures.

2. The membrane structures shown in the photos distributed to the NFPA 13 task group and used in the testing conducted as part of this project create an obstruction to sprinkler discharge. Obstructions in excess of 4 feet in width would require sprinkler protection beneath them in accordance with Chapter 8 of NFPA 13.

3. In addition, the obstruction to spray pattern development that is created by the membrane itself, there are additional obstructions that exist underneath the membrane (the boat itself, scaffolding...etc) that must also be considered.

4. Identifying the appropriate NFPA 13 hazard classification for NFPA 303 occupancies is extremely challenging due to the limited information on the commodity and its arrangement. Adding additional hazards (obstructions such as membrane structures and scaffolding) into these occupancies without providing complete sprinkler protection in accordance with the rules of the design and installation standard only serves to complicate an already challenging situation.

5. In order to confirm if it is appropriate to eliminate sprinklers underneath an indoor membrane structure, additional testing must be conducted in an enclosed, full-scale testing environment. The full scale testing must consider the variables that will impact the effectiveness of a sprinkler system that is being obstructed. The variables that should be considered to include, but are not limited to, the following:

   - Ceiling Height
   - Sprinkler Height
   - Clearance Between Membrane and Sprinkler System
   - Delivered Density
   - Fire Size
- Ignition Locations
- Obstructions Under the Membrane (boat, fuel, scaffolding...etc)
- Validation or Justification of Fire Source (boat, crib, burner...etc)

6. Based on the information that is available to date, including the information discussed by the NFPA 33 and NFPA 13 task groups during conference calls, the NFPA 13 task group does not feel that there is sufficient information available for the NFPA 33 Technical Committee to take an action that would allow for the omission of sprinklers underneath membrane structures that are used indoors. Additional information, including the information described in Item #5 above, would be necessary to make such a determination.
Attachment B
MEMORANDUM

Date: 27 February 2013

From: Gregory J. Cahanin

Subject: Response to Matt Klaus “Upcoming Test of Membrane Structure” Memo on Behalf of the NFPA 13 Task Group for Membrane Structures.

The 12 February 2013 by the NFPA 13 Task Group, while well intentioned, fails to grasp the work of the Membrane Enclosure Task Group or the reason for the test procedure upon which comments were based. The conclusions reached and comments offered have no validity in relation to the test proposal or efforts being made in testing. The 13 Task Group if they wish to become involved in this effort should simply start again after gaining a proper understanding of what is now being done and what is being proposed. I for one welcome considered opinion based upon technical fact. First let us gain an understanding of the basis for the proposed standard, existing code and standards requirements as they relate to the goal of the test.

The question answered in the first paragraph of the memo was one that was not asked by the NFPA 33 task group. “The NFPA 13 task group members do not feel that the test protocol, as currently described, would yield sufficient information to determine whether or not sprinklers can be omitted from underneath the membrane structure ceiling.” I am at a loss to find anywhere a statement or comment that supports that this was the intent of testing. This statement fails in any way to define even a basic understanding of test intent.

Rather than spend time detailing the faulty logic of the memorandum I think that is more important to establish what we have and what we are moving to accomplish so that this informal task group may contribute in a positive way in what we are moving to accomplish.

1. The 13 Task Group shows no knowledge of my original proposal for membrane enclosures or the current task group draft for outdoor spray painting enclosures. The first step is to read and understand what we have for indoors.

   a. Then the take those same conditions and placing that enclosure with all of its protection, checks and balances inside a building with specific requirements that include fire sprinklers above the enclosure.

   b. There currently exists within NFPA 13 provisions addressing the possible impediments to sprinkler activation and operation with regards to permeable fabrics such as those found in mall kiosks and drop out panels in ceilings with sprinkler above.
c. The use of a membrane enclosure around a boat or workpiece to be painted should not inhibit the activation of fire sprinklers or prevent their proper operation.

2. The proposal of a new chapter in NFPA 33 to address spray painting in membrane enclosures has its roots in the Marine industry where for well over a decade large motor yachts were spray painted by a process that used scaffolding around the boat encased in shrink wrap material. This process is being used throughout the world and throughout the United States outside of the covenants of any recognized standard. There has never been a reported fire in a temporary membrane enclosure during spray painting. In 2010 I began working with the largest marina in south Florida to establish an acceptable equivalency to the requirements for spray painting in NFPA 33. The fire marshal, county fire code committee and the appeals board all found the process acceptable after much deliberation. Besides my work that of two registered fire protection engineers found that the shrink wrap material did not sustain combustion, did not contribute significantly to the fuel load present without the enclosure or inhibit sprinkler activation or operation. Ken Bush, FPE and independent third party reviewer concurred. Ken Bush is the current chairman of the Marina and Boayard committee that have wrestled with dry storage of boats and the fire hazard they present in addition to the proper installation of fire sprinklers. Similar procedures were developed in other jurisdictions in south Florida at the same time that carries the same considerations.

3. The resulting procedure became the basis for the NFPA 33 submittal for spray painting marine vessels in temporary membrane enclosures that the committee is evaluating at this time.

4. Early on the NFPA committee expressed a desire to make such a chapter for use with larger work pieces and the task group proposed language moved away from marina use only for outdoor painting. The current task group is looking at the proper requirements for use of these enclosures indoors.

   a. The task group is considering the taking of these enclosures approved for outdoor use with all of its checks and balances into buildings.

      i. A base requirement for buildings would be fire sprinkler protection in the building.

         1. In the case of marina’s the existing buildings for boat storage had fire sprinklers installed when constructed to comply with building requirements that were Extra Hazard Group 2.

   b. There exists no need to establish if sprinklers mounted as high as 70 feet from grade with boats as little as 10 feet from sprinklers would work properly since the fire sprinklers at the LMC marina are designed and installed in accordance with NFPA 13.

      i. These buildings are open on one side with the properly designed sprinklers so that questions about their operation are not valid.
ii. There is a metal building with no sides and only a roof with Extra Hazard Group 2 fire sprinklers installed.

a. The evaluation of the effectiveness of sprinklers above a boat in a membrane enclosure begins with the question – will the addition of a membrane enclosure inhibit the sprinkler effectiveness.

iii. For other uses no clear sprinkler classification has been identified. There could be a desire by some users to erect a membrane enclosure in a building with ESFR sprinklers present and the NFPA 13 Task Group should address that separately in addition to any other sprinkler classification for other occupancies.

c. As a part of a pre-first draft meeting the testing of the shrink wrap to determine how it would react to a fire exposure and if it would contribute to the fuel load in the enclosure, inhibit the flow of hot gases and plumes to the ceiling of the enclosure was discussed and testing to that end planned. The test procedure was simply that, not to test fire sprinkler effectiveness, but to see how this material responded in a horizontal orientation. Fire sprinkler effectiveness has already been established by the NFPA 13 standard that requires their installation in the building before an enclosure is placed in the building.

5. The NFPA 13 task group improperly classifies the membrane enclose as a Membrane Structure when in fact it is a Membrane Enclosure and a temporary one at that. What we have for spray painting does not meet the definition of Structure. I have spent considerable time and effort in South Florida establishing this before several building and fire boards and committees successfully based upon the IBC definition and commentary. The IBC defines structure as, “That which is built or constructed.” The commentary states, “This definition is intentionally broad so as to include within its scope and therefore the scope of the code everything that is built as an improvement to real property. Note the underlining that says a structure is an improvement to real property.

a. These enclosures are to be erected for 180 days or less.

b. The membrane enclosure for spray painting proposal before the committee is not a structure and the 13 Task Group response to it as a structure is not appropriate.

6. NFPA 33, 14.3.1 has for decades allowed curtains for limited finish work stations to use a material that has passed the NFPA 701, Test 2 test. These curtains under this section are in sprinklered and non-sprinklered buildings and can be of any height from several feet to near ceiling level.

a. The material to be tested meets these same requirements that have been in use for decades under NFPA 33 with no limitation by the NFPA 13 standard.

7. A reading of the proposed NFPA 33 requirements will detail the monitoring, ventilation, material limitations, electrical requirements, and LFL threshold that result in an enclosure
outdoors that is nearly equal to the presence of a suppression system.

a. Because of the checks and balance system put in place for these enclosures the potential for a fire is greatly diminished outdoors and indoors with sprinklers present in particular with regard to marine vessels.

b. Each enclosure for marinas is constructed for the particular boat within it using scaffolding. Other uses may use something other than scaffolding.

i. The volume and size of each enclosure varies and a standard sprinkler system cannot be designed to be placed inside of the enclosures, but would require the design of a system for each vessel.

ii. The weight of a piping system with water could not be safely carried by the scaffolding system.

iii. The scaffolding with metal and some wood planking are in place to hold the membrane material and provide access for painting of the hull or boat in marinas.

iv. Spray painting of marine vessels is from the water line up on surfaces that are nearly horizontal. Spray painting is not performed below the water line and is therefore not an area of concern. Combustibles at grade are extremely low. The total quantity of flammable liquids in the form of paint which is approximately 65% solids and any other liquids is limited to 10 gallons or less for any enclosure.

1. The IBC in its Use and Hazard Classification of Occupancies in Section 307 and Table 307.1 limit flammable liquids in the class of these paints to 30 gallons or less before a High Hazard Group classification is embraced. We are reducing allowed quantities to one third of this allowable quantity.

a. These enclosures do not meet the criteria of either a H-1 or H-2 classification in the IBC.

Testing was performed on an enclosure as requested by the NFPA 33 Committee in order to meet deadlines. The results show the material performed as intended and as described in manufacturer literature attached. Film of the testing is also available. Again, I would welcome an informed discussion of the effectiveness of fire sprinklers with this material in place with the NFPA 13 Task Group once they have reviewed the proposed new chapter and have a clear understanding of the conditions under which these enclosures will be placed in buildings with fire sprinklers.
FLAME RETARDANT POLYETHYLENE SHRINKWRAP

Suited for heavy-duty applications where two directional shrink properties and toughness are required. Formulated from premium grade polyethylene and includes maximum UV inhibitors and other additives which are designed to resist degradation due to sunlight, rain, chemicals, and heat.

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**MEETS WITH THE REQUIREMENTS OF NFPA 701 (1999)**

Test 2 flammability
Poly-Amercia's shrink-wrap is suited for heavy-duty applications where excellent two directional shrink properties and toughness is required. Our Shrink-Wrap is formulated from premium grade polyethylene, UV inhibitors, and other additives, which are designed to resist degradation due to sunlight, rain, chemicals, and heat. Poly-America’s Shrink-Wrap is manufactured to the highest QC standards and is backed by a proven track record of success.

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MEETS WITH THE REQUIREMENTS OF NFPA 701
Test 2 flammability
Material Specification for Shrink Wrap

Definition:

US Shrink Wrap’s shrink wrap is a modern thermo plastic film formulated with both linear and low density heat sensitive resins. When heated, the shrink wrap will shrink 25% to 30% of its surface dimension. Our shrink film is manufactured to our specifications from virgin resins and fractional melt low density polyethylene resulting in uniform bi-axial shrinking and super strength. The UVI in our shrink wrap is a hindered amine to protect against film deterioration by the sun. Hindered amine protects the film by remaining within the molecular structure of the film. In addition to the fractional melt and linear low density polyethylene, our specially formulated films contain Ethyl Vinyl Acetate (EVA). Shrink film containing EVA retains more elasticity and does not become brittle when exposed to cold temperatures. Puncture resistance is greater, burn holes do not propagate and will not split easily in the machine direction when whipped by the wind.

Flame Resistance:

US Shrink Wrap’s 9 mil shrink films are formulated and manufactured to satisfy the flammability requirements of the National Fire Protection Association’s 701 large and small scale tests and British Standard BS 476 Part 12 ignition source G. Flammability test per ASTM E-94 for flame spread and smoke developed places this product into the class A category for interior wall and ceiling finish. Flame spread: 5, smoke development 25.

Specifications and Film Properties:

US Shrink Wrap’s material conforms to the following Federal Specifications:

1. L-P-378E - Types IV and V - Class 3

FILM PROPERTIES:

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US Shrink Wrap, Inc.  
13230 Grant Logan Lane. Jacksonville, Fl.32225  
http://www.usswinc.com  
info@usshrinkwrapinc.com 877-812-1242

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NOTE: The data presented above are nominal values for the product type described based on actual tests performed on random samples, and is being provided for information only. Please be advised that there is no guarantee, expressed or implied, regarding the use of this information, or its suitability for a particular application.

**Applications**

US Shrink Wrap's Flame Retardant Thermo Plastic Film is used in construction of environmental containment systems. USSW's specially formulated films confirms to Class One containment requirements specified by the Steel Structures Painting Council Guide 6 (95). Class One provides a high level of emissions control with impenetrable walls, fully sealed joints, airlocks or re-sealed airways, and negative air achievement.
Material Specifications for 10.5 mil F/R Shrink Film

**General Product Specifications**

Product Code/Form: C#0214493

Product Size: 26' x 100' x .0105"

Product Color: White

Raw Materials: Polyethylene formulated with F/R additives to meet the requirements of NFPA 701, and UV additives to protect the film for up to 3 months.

**Film Properties**

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<td>900/1,500</td>
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<td>Tensile Strength</td>
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<td>psi</td>
<td>2,400/2,500</td>
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<td></td>
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<td>Elongation</td>
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<tr>
<td>Dart Impact</td>
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<td>1,250</td>
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</tr>
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<td>Puncture Resistance</td>
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<td></td>
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<td>% Shrinkage</td>
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<td>50-80/0-20</td>
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<td>Slip Level/COF</td>
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<td>g/200g</td>
<td>High Slip, COF&lt;.150</td>
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</table>

*Note: The data presented above are nominal values for the product type described based on random tests performed at the time of manufacture, and should not be considered as limiting specifications. There is no guaranty expressed or implied regarding the use of this information or its suitability for a particular application.*
Thermo Polyethylene Film

The OSHA Hazard Communication Standard 29 CFR 1910.1200 requires that the information contained on this sheet be made available to your workers. Instruct your workers to handle this product properly.

For Industrial Use Only

Issued / Revised : March 4, 2008

SECTION I - Identification:

Product : Polyethylene Film – White/UV/FR
Synonyms : Flame Retardant Polyethylene
Chemical Family : Polyolefins
Formula : Proprietary blend of resins

SECTION II - Ingredients (Hazardous Components):

Hazardous Components: None.

SECTION III - Typical Physical/Chemical Data:

Appearance : Clear or tinted plastic film
Odor : None
Solubility In Water : None
Specific Gravity : .915 to .930
Melting Point : 225 F - 265 F
### SECTION IV - Fire and Explosion Hazard Data:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash Point</td>
<td>Over 500 F</td>
</tr>
<tr>
<td>Extinguishing Media</td>
<td>Water spray, dry chemical, foam, carbon dioxide, water fog</td>
</tr>
</tbody>
</table>

### SECTION IV - Fire and Explosion Hazard Data (cont'd):

- **Special Fire Fighting Procedures:** For fires in enclosed areas, fire-fighters must wear positive pressure, self-contained breathing apparatus.

- **Unusual Fire/Explosion Hazards:** None

### SECTION V - Health Hazard Data:

- **Inhalation:** None
- **Ingestion:** None
- **Skin:** None
- **Health Hazards - (Acute and Chronic):** None
- **Effects of over-exposure:** None
- **Carcinogenicity:** None
- **NTP:** None
- **IARC Monographs:** None
- **OSHA Regulated:** No

**Emergency First Aid Procedures:**
- **Inhalation:** Remove to fresh air;
- **Dermal/eye:** Flush with large amounts of water
SECTION VI - Reactivity Data:

Stability : Stable
Conditions to avoid : High temperatures greater than 500 F.
Incompatibility : Strong oxidizing agents
Hazardous combustion/decomposition products: Thermal decomposition may produce carbon monoxide, aldehydes and other organic vapors.

SECTION VI - Reactivity Data (cont’d):

Hazardous polymerization : Will not occur

SECTION VII - Precautions For Safe Handling And Use:

Spills : Sweep up and discard
Waste disposal method : Recycled, material should be packaged, labeled, transported and disposed of in accordance with local, State and Federal regulations.

SECTION VIII - Special Protection Information And Control Measures:

Respiratory Protection: Use NIOSH approved respirator if unable to control air-borne fumes or vapors.
Ventilation : Local exhaust should be used over heating operations.
Special Exhaust : None required under ordinary conditions of use, and with adequate ventilation.
Skin : Wear gloves (film may be tacky).
Eye : Wear safety glasses that meet applicable ANSI standards.
Other protective equipment: None

SECTION IX - Other Special Precautions:
DO NOT STORE NEAR HEAT, OPEN FLAME, NOR STRONG OXIDIZING MATERIALS.

SECTION X - Regulatory Information:

EPA Regulations for the Protection of Stratospheric Ozone.

SECTION XI - Other Information:

In accordance with TSCA this product contains the following registered chemicals:

<table>
<thead>
<tr>
<th>CAS #</th>
<th>CHEMICAL NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>9002-88-4</td>
<td>Polyethylene Homopolymer</td>
</tr>
<tr>
<td>09019-29-8</td>
<td>Ethylene/Butene Copolymer</td>
</tr>
<tr>
<td>13463-67-7</td>
<td>White Pigment Masterbatch/PE</td>
</tr>
<tr>
<td></td>
<td>UVI Masterbatch/PE</td>
</tr>
<tr>
<td></td>
<td>Flame Retardant Masterbatch containing Antimony and Arsenic</td>
</tr>
</tbody>
</table>

In accordance with SARA Title III, Section 313, this product contains the following chemicals subject to reporting:

None

**Most of the data contained herein was obtained from raw materials suppliers.**
Attachment C
MEMORANDUM

TO: Nancy Pearce – NFPA 33 Staff Liaison

FROM: Matt Klaus (NFPA Staff) on Behalf of the NFPA 13 Task Group for Membrane Structures

DATE: February 12, 2013

SUBJECT: Upcoming Test of Membrane Structure

The NFPA 13 Task Group that was developed to work with the NFPA 33 task group for membrane structures has reviewed the proposed test plan (and photos of the structures) for the membrane enclosure. The NFPA 13 task group members do not feel that the test protocol, as currently described, would yield sufficient information to determine whether or not sprinklers can be omitted from underneath the membrane structure ceiling. This is not to say that there will be no value in conducting the test (see note #4 below), only that the test as described will not provide a level of comfort for the task group to make a determination on the need for sprinklers.

The specific comments and questions that have been posed by the NFPA 13 task group are as follows:

1. Will a fire in the larger enclosures shown in the attached photos react differently than in the one used for the test?
   • I would assume it would. The heat plume that is expected to eventually breach the membrane could do so at any point in the enclosure, but probably at a high point and not necessarily directly above the fire. If the fire is along a wall of the membrane, then it could be expected that the hole would be in the wall. What if the fire occurs under the boat? In any of these cases, the hole may not be directly over the fire, and a sprinkler discharging at the roof will not directly impinge on the fire. It’s possible that the water discharging from the sprinkler will sufficiently cool the membrane for a period of time to keep additional holes from forming, and yet allowing heat to continue to spill out, opening additional sprinklers. If the fuel source is large enough, the fire could burn out of control, opening additional holes in the membrane, and activating more and more sprinklers at the roof and eventually over-taxing the system.

2. Will the spray from a single outside sprinkler above the test enclosure provide an adequate simulation of a sprinkler system discharging in an enclosed building?
   • I don’t see how it can. A sprinkler discharging outside will be subjected to winds which will affect the discharge spray pattern. In a real fire scenario, additional sprinklers will activate, especially since it’s anticipated that the membrane will shield the fire.

3. Will the fire used during the test be of sufficient size to simulate an extra hazard group 2 occupancy?
   • Based on the description of the fire in the test plan and as described on the conference call, it doesn’t sound like it will. Extra hazard group 2 is one of the severest fires anticipated in NFPA 13 and the fuel load is expected to include “… moderate to substantial amounts of flammable or
combustible liquids ...”. A small wood crib or diesel pan fire with just enough heat to impact the fabric will not simulate the size of the anticipated fire.

4. No this (test) will not provide enough information to determine if sprinklers would or would not be needed under the membrane. I would state that I suppose it’s a starting point of some sort. With so many other questions that need to be addressed for this type of operation I’m not sure where else to start. I’m just guessing that the life safety/egress has already been addressed for these temp enclosures? Seems like these protected buildings that store these large marine vessels have a similar situation when the vessel is just stored and the sprinkler protection not reaching the inside. I completely understand we’re talking about a specific operation that is taking place under the shrink wrap, but would this test at least shed some light on how it will react in an actual flaming fire? Granted I concur with the issues that it’s not a measurable type of fire (but in real fire’s that I deal with not too many meet that measurable criteria anyway).

5. I have read the proposed membrane enclosure testing and the concerns of some of the other Task Group members and generally agree that the proposed test plan will not be adequate to determine if sprinklers can be omitted from within the membrane structure, when the membrane structure is located within a sprinklered building.

In my opinion large scale fire testing would be the most accurate method to determine the answer to the question. In a large scale test environment (such as the facility at UL) the proposed test enclosure with the shrink wrapped membrane would be placed within the test building below a moveable ceiling with a specified sprinkler system installed below the ceiling and over the test enclosure. Multiple tests could be conducted in a relatively short period of time, the ceiling height above the test enclosure could be varied, the fire type and size could be varied, etc.

6. Several references and recommendations are made for the use of ESFR sprinklers for the protection of the paint spray operation. As the provisions of NFPA 33, 9.4.2 requires the use of Extra Hazard Group 2 design criteria for these operations, the use of ESFR sprinklers is not allowed by NFPA 13, 12.6.7.1.

7. The desired performance of the membrane material is similar to that of a drop out type ceiling allowed under the provisions of NFPA 13, 8.15.15. This requires the drop out panels be listed and has restrictions on the use of QR or Extended Coverage sprinklers above the ceiling. The UL Standard for the Listing and FM Approval Standard for Approval of such drop out ceiling panels are UL 723S and FM 4651 respectively. These standards require an exposure to a specific fire source with and without an operating sprinkler above to ensure the panels will drop out within a specific time period. See attached FM 4651. Consideration should be given to a similar test in this case to determine performance of the membrane material in question.

8. As it is anticipated that the membrane enclosure will be provided with a ventilation system, the impact of such operation must be considered in the displacement of the rising fire plume and subsequent impingement on the membrane. Additionally, as the provisions of NFPA 33, 9.4.6 would require the protection of the ducts and stacks, how will this protection be addressed by the testing?

9. What types of obstructions might be created by the scaffolding system used to support the membrane material? Are there walkways, stairs, etc.?
10. Is there any consideration that must be given to the significant obstruction created by the vessel itself? Or does the Extra Hazard designation address this issue? NFPA 409 does not require any specific increase for a paint hanger used to paint large aircraft provided the aircraft is defueled.

11. If a full scale fire test is to be performed then:
- What is the appropriate fire size/fuel package to represent the range of anticipated fire sizes that might be expected? Not sure the reference to UL 711 criteria is appropriate as this is for portable fire extinguisher testing and would not necessarily be representative of the hazards here.
- Where should the fuel package be located within the enclosure? Should shielding of the fuel package be considered to represent fire beneath the vessel?
- Are sprinklers to be installed above the membrane enclosure? If so at what spacing? What design density? What clearance? What sprinkler K-Factor, temperature rating, RTI, etc.? If the effectiveness of the sprinkler protection is to be evaluated the specific operation of the sprinkler must be defined and maintained.

12. Is there a concern with the reaction of the membrane material causing an obstruction to the means of egress or draping across the vessel once the tension is released?

13. With ceiling heights of up to 57 ft, I would expect some significant delay in the operation of overhead sprinklers.

14. Will the application of heat from a fire cause additional shrinkage of the membrane with undesired stresses on the supporting scaffolding structure?

15. Is there concern about paint overspray deposits on the membrane impacting the performance?

In addition to the comments/questions listed above, NFPA 13 task group members Bill Sheppard and Chris LaFleur have also marked up a copy of the test plan with their questions and comments. This review, with the embedded comments, is provided on the subsequent pages of this memo.
1. Membrane Enclosure Testing

The goal of fire testing in a membrane enclosure is to determine failure modes for membrane material thus far identified as fire resistant shrink wrap material passing the NFPA 701 test. (which test method, 1 or 2?) It would seem that either test method is too small scale to be meaningful for the heights and size of the boat enclosures.

Jws—02/01/13

2.1. The reason for testing is to determine how the membrane would react to a fire within the membrane. Antidotal and fire test data indicate that the material will shrink or open up upon heat exposure.

b. Test data indicates the material does not sustain flame.

c. Test data and FPE opinions are that the material does not add a significant fire fuel load since it does not sustain combustion. (I believe that the fuel load for the test must be specifically arranged either from the UL small corner test or the FM large corner test. I agree that the placement of the test crib needs to be clarified. Jws—02/01/13)

3.2. Testing is to demonstrate a heat plume will be established within an enclosure to the point that the membrane will be breached by a hole. (If you are providing a vent at one corner and incoming air through some access port at another spot, and you set the crib on fire, I believe that the smoke and heat will build up somewhat and travel to this vent, rather than burn a hole somewhere in the membrane. You are guessing that a hole will occur right above the crib, and that may not be the case. Jws—02/01/13)

a. The hole created by a fire’s heat plume will be large enough activate sprinklers at the ceiling level. (How many heads do you plan? Only one? How will you monitor amount of water flow to assure that the sprinkler is discharging water density as design? Jws—02/01/13)

4.3. Testing with sprinkler water spray is to demonstrate: a. The hole created will allow enough water into the membrane to contain or extinguish an expected fire.

b. The cooling effect of the water will not prevent the membrane from continuing to expand if heat is present.

5.4. This test is a “bench” style test using a smaller framework and height than might be found in a marina or other facility. a. The enclosure size is sufficiently large to allow a fire to develop a heat plume versus direct or nearly direct flame impingement. i. The enclosure will also be structurally stable in this size versus a smaller enclosure.

b. The enclosure will be scaffolding to a height of ~24 feet.

c. The width of each side will be ~21 feet.

d. The membrane will be shrink-wrapped over scaffolding with ribs over the top to snug up the shrink wrap as done on boats.

e. An access door at the bottom will provide for air for the fire and a small vent at the top side will be used to simulate an extraction method.

f. Testing will utilize a wood crib or diesel pan fire as a heat source in various tests. (How many megawatts of energy will be estimated from the burning source? It should be a known quantity from current testing data that is recognized in the testing methodology currently in use. See my comment at Item No. 2.c. Jws—02/01/13)

6.5. Testing will be filmed at several points and temperatures measured at the seat of the fire and at the ceiling of the enclosure. a. The goal is to determine how the membrane material reacts to a fire and at what temperature a hole opens to then release heat to sprinklers at ceiling level.

7.6. Testing is focused upon using a fire source that generates enough heat to impact the fabric. The size of a wood crib fire or a pan fire will be kept small to preserve...
if possible the sides of the structure. We will likely use both a wood crib and a pan in rotation to see if there is a noticeable difference.

8.7. Simulated fire sprinkler spray. a. A large orifice sprinkler on a hose line will be used in testing to simulate water flow from a sprinkler after activation and determine if it reduces or stops the ‘opening up’ of the membrane enclosure. i. The membrane enclosures at LMC can peak within several feet of sprinklers at about 57 feet. The average distance of a fire sprinkler from the membrane is about 20 feet. We propose to therefore use a sprinkler at a height of ~20 feet above the membrane test enclosure. (Will the test fit the height limitations of the ESFR sprinkler? Jws—02/01/13)

1. This is also reasonable to use because if an enclosure for other than high bay uses is in a warehouse— an enclosure of 15-20 feet would likely have a maximum of ~20 above it as well.

2/1/20135
4.2.1 Marine Vessel Spray Painting. Marine Repair Facilities subject to OSHA CFR 1915 provisions for shipbuilding or repairing shall be permitted to paint vessels in temporary membrane enclosures in accordance with Chapter XX. Painting of vessel components or parts removed from vessels or designed for installation on vessels shall utilize spray application operations and processes confined to spray booths, spray rooms, or spray areas as defined in this standard.

Insert a new Chapter 18.

18.1 Scope. Paint spraying in temporary membrane enclosures shall follow the requirements established in this Chapter. Only Marine Repair Facilities subject to OSHA CFR 1915 provisions for shipbuilding or repairing shall be permitted to paint vessels in temporary membrane enclosures in accordance with this chapter.

18.1.1 Painting of vessel components or parts removed from vessels or designed for installation on vessels shall utilize spray application operations and processes confined to spray booths, spray rooms, or spray areas as defined elsewhere in this standard.

18.1.2 Small paint stands or booths outside of vessel membrane enclosures are not to be permitted under this chapter.

18.2 General. Temporary Membrane Enclosures shall be erected for 180 days or less.

18.3 Location. Membrane enclosures may be constructed for spray painting in buildings or outdoors at marine facilities subject to OSHA CFR 1915.

18.4 Membrane enclosure occupancy.

18.4.1 Only personnel required for spray painting shall enter the membrane enclosure during spray painting.

18.4.2 Vessels within membrane enclosures shall not be occupied during spray paint operations.

18.4.3 A ship watch aboard vessels when the vessel is encapsulated shall be permitted except when spray painting is being performed.

18.4.4 Vessels shall not be occupied for sleeping at any time within a membrane enclosure.

18.3 Construction and Design of Temporary Structures

18.3.1 The spray paint area shall consist of the temporary membrane enclosure and a 5-foot zone outside of the enclosure.

18.3.1.1 No hot work, welding, grinding or cutting shall take place in the spray paint area while it is permitted for spray painting.

18.3.1.2 No vehicles, ordinary combustibles, portable buildings or container storage shall be located in the 5-foot safety zone during spray operations.

18.3.1.3 No smoking or open flames shall be allowed in the paint spray area including the membrane enclosure while it is permitted for spray painting.

18.3.1.4 Membrane enclosures shall be permitted to be used for activities other than spray painting. Other uses of the membrane enclosure shall comply with applicable codes or standards.

18.3.1.5 Travel distance to an exit from within a membrane structure shall comply with NFPA 101-Table 40.6 for General Industrial Occupancies.

18.4 Membrane Material

18.4.1 Membrane shrink wrap material used for membrane enclosures shall have been tested and passed the NFPA 701 Test 2 requirements. Testing shall have been performed by an independent test laboratory.

18.4.2 Contractors installing shrink wrap shall provide documentation of the shrink wrap material they are using on membrane enclosures to the marina and have such documentation available for review by any AHJ when requested. Any substitution of any other manufactures material shall require a separate letter and documentation before installation.

18.4.3 Membrane enclosures having shrink wrap that does not have NFPA 701 Test 2 compliant material shall not be permitted for spray painting.

18.5 Electrical and Sources of Ignition

18.5.1 Electrical wiring and utilization equipment used in membrane enclosures during spray painting shall comply with Chapter 6.

18.5.2 All lighting, electrical power cords, and any related equipment within the membrane enclosure and five-feet...
horizontally from the exterior of the membrane enclosure that is energized shall be rated for Class I Division 1 as defined by NFPA 70 when used during spray paint operations.

18.5.3 Vessels shall be grounded. Grounding by vessel shore power cords neutral ground, independently outside by attachment of a rod driven into the ground or any other appropriate method consistent with 6.2.1 referenced requirements.

18.5.4 Scaffolding shall be grounded to the vessel, to an appropriate grounding rod, or other approved method consistent with 6.2.1 referenced requirements.

18.5.5 Spray paint equipment shall be grounded.

18.5.6 Vessels and membrane enclosures without active spray painting tasks in buildings and outdoors shall have power cords and lighting rated for outdoor use. Ordinary portable electrical tools and equipment may be used in these areas.

18.5.7 For building electrical systems more than 18-inches from the floor outlets and switches shall be permitted to be NEMA 3. (annex note: NEMA 3 is a weatherproof classification for outdoor electrical and appropriate due to the water wash-down of vessels in preparation for painting.

18.5.8 Building electrical systems less than 18-inches from the floor and outside of a membrane enclosure and its 5 foot safety zone shall be considered Class I Division 2 locations as defined by NFPA 70.

18.6 Spray Paint Ventilation

18.6.1 Each membrane enclosure shall be provided with mechanical exhaust ventilation that is capable of confining and removing vapors and mists to a safe location and is capable of confining and controlling combustible residues, dusts, and deposits consistent with Chapter 7 requirements as they apply to portable ventilation equipment.

18.6.2 Ventilation equipment shall be installed in accordance with Section 5.6.

18.6.3 Ventilation equipment containing overspray collection filters shall have visible gauges, audible alarms, approved interlocks, or an effective inspection program to ensure that the required air velocity is being maintained.

18.6.4 Spray Painting and ventilation equipment shall have interlocks between ventilation and all paint spray equipment via a connection on the ventilation fan or an NFPA 70 compliant junction box such that a shutoff of the ventilation fans will turn off spray painting equipment.

18.6.4.1 Where interlocks cannot be effectively provided for ventilation equipment that uses plant air, large air storage tanks, or equipment that cannot be instantly shutoff an audible alarm upon loss of ventilation that will alert all spray paint operators shall be permitted with AHJ approval.

18.6.5 The concentration of the vapors and mists in the exhaust stream of the ventilation system during spray painting operations shall not exceed 10 percent of the lower flammable limit under OSHA 1915.35.

18.7 Spray Paint Equipment Requirements

18.7.1 Any contractor supplying exhaust equipment for painting and coating work in membrane structures to provide documentation that equipment complies with NFPA 91 and Chapter 7 requirements. Records shall be made available to the AHU or any inspecting authority upon request.

18.7.2 All equipment shall bear a permanent unique number or other designation to identify equipment in use.

18.7.3 Marinas shall keep records on file of approved equipment. Such records may be in the form of a memorandum stating the equipment number, the owner of the equipment and the leaser of the equipment if any and state that the marina has accepted the equipment for use at the facility. Records shall be made available to the AHJ or any inspecting authority upon request.

18.6 Storage and Handling of Flammable and Combustible Liquids

18.6.1 Coating Material Handling. Flammable and combustible paints, coatings, and cleaning agents for equipment within the membrane enclosure and its 5-foot safety zone shall not exceed 10 gallons total at any time.

18.6.1.1 All mixing and storage shall be done outside the membrane enclosure area.

18.6.1.2 Mixing rooms and storage rooms shall comply with Chapter 8.

18.6.1.3 Flammable liquid storage cabinets in fixed building locations shall be in accordance with NFPA 30 requirements.

18.6.1.4 Portable containers used for the storage of combustible and flammable liquids shall be in accordance with Chapter 8 and NFPA 30 requirements.

18.6.1.5 Containers for servicing vessels stored outside shall not be placed within five feet of any membrane enclosure.

18.7 Permitting

18.7.1* Permits for spray painting shall be issued for each spray paint activity on a daily basis. Paint Spray Permit Records shall be kept for 12 months for review by the AHJ. [Note * for sample form in annex]

18.7.2 Competent Persons, certified as an OSHA Competent Person under OSHA 1915.7, shall perform all Spray Paint Permitting for membrane structures.

18.7.3 Spray Painting shall not be performed in any membrane enclosure until the Paint Spray Permit Record is signed by a Competent Person and posted at the entrance to the enclosure.
18.7.4 The Competent Person shall have the authority to stop the spray painting operation if any equipment malfunctions, if combustible gas detection readings exceed 10 percent of LFL readings, or if any spray operations are deemed unsafe by the Competent Person.

18.7.5 No spray paint operations shall take place without permitting by a Competent Person present at all times that spray painting is in progress.

18.7.6 Combustible Gas Testing in accordance with OSHA 1915.35, Surface Preparation and Preservation shall be performed by the competent person prior to the start of spray painting and during spray painting operations.

18.7.7 The Competent Person shall inspect all electrical connections within the membrane enclosure as a part of permitting.

18.7.8 The Competent Person shall insure that any electrical equipment energized within the membrane structure and the 5-foot safety zone is rated Class I Division 1 per NFPA 70 and the vessel, scaffolding, ventilation equipment, and spray equipment are grounded.

18.7.9 The Competent Person shall insure that ventilation exhaust equipment and paint spray compressors are interlocked. For spray painting within membrane enclosures interlocked shall mean that the spray application equipment cannot be operated unless the exhaust ventilation system is operating and functioning properly and spray application is automatically stopped if the exhaust ventilation system fails. (note-taken from NFPA 33-14.3.5.2)

The Competent Person shall have the authority to stop the spray painting operation if any equipment malfunctions, if the combustible gas detection exceeds 10 percent of LFL readings, or if any spray operations are deemed unsafe by the Competent Person.

18.8.1 Portable fire extinguishers shall be placed within the membrane enclosure in the vicinity of spray paint operations.

18.8.1.1 Extinguishers shall be inspected and maintained in accordance with NFPA 10.

18.8.1.2 Extinguishers shall be permitted to be covered in clear plastic bags to protect them from overspray.

18.8.1.3 The minimum size of all extinguishers shall be 4A-20B-C and spaced no more than 30-feet from the spray painting operator. Where several spray guns are being used at one time, fire extinguishers for each spray gun shall be provided when separated by more than 30-feet or the width of the vessel.

18.8.2 Fire sprinkler systems in buildings where membrane enclosures are used shall be capable of providing a density of 0.40 gpm/sq.ft. over the most remote 2,500 sq.ft. with a 500 gpm hose allowance for a duration of 2 hours. Fire Sprinklers shall be designed and installed in accordance with NFPA 13.

18.8.3 Fire systems on vessels that include engine room fire suppression and fire alarm and detection systems are to remain active during spray painting.

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**Insert Artwork Here**

Annex A Spray Permit Record Form

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**Substantiation:** The marine industry world-wide has developed a method of spray painting in temporary membrane enclosures that currently exist outside of any nationally published standard. Marina’s in the United States have been using this method for more than a decade with no national standard in place. There has never been a fire during spray painting in a membrane enclosure recorded in the U.S. or abroad. As this method of painting large boats gained traction in the industry there is a likelihood of smaller facilities adopting some of the practices with a resulting exposure to fire loss unless a national standard is established. Local AHJ’s may lack the expertise to adequately determine that a safe environment is created for spray painting that a national standard provides.

This proposal is based upon an equivalent method developed for a marina and accepted in full by the local jurisdiction. The equivalent method was developed by me with equal involvement of Steve Kowkabany, FPE of Neptune Fire Protection. A third party review by Kenneth Bush, FPE was also performed with a finding that paint spraying could be performed safely when procedures were followed as found in this new proposed chapter.

The new proposed chapter incorporates methods and procedures now found in NFPA 33 with consideration to the

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**Printed on 7/9/2013**

July 22, 2013
Supplemental Agenda July 29-August 1, 2013
Page 1305 of 1861
membrane enclosure limits and the in-place OSHA requirements for safe spray painting in marine environments that must be adhered to.
Chapter 18  Spray Application Operations in Membrane Enclosures

18.1  Scope,

18.1.1*  
This chapter shall apply to spray application operations and processes for coating the exterior of a workpiece conducted in temporary membrane enclosures outside buildings and structures.

18.1.2  
Spray application operations and processes within the enclosure shall only be permitted for the workpiece for which the enclosure was erected. Spray application operations for parts removed from the workpiece shall be conducted in accordance with the other provisions of NFPA 33.

18.2  General,

Temporary membrane enclosures shall be erected for 180 days or less.

18.2.1*  
Enclosures erected under this chapter shall only be used for the duration of a spray operation at a fixed location which can involve multiple coats for a single workpiece.

18.2.1.1  
Spray application operations for parts removed from the workpiece shall be conducted in accordance with the other provisions of NFPA 33.

18.2.2  
Membrane material shall not be reused for any other spray application operations.

18.2.3*  
Operations conducted within the enclosure other than spray applications shall meet the fire and safety requirements for those operations. These operations shall not take place while the spray application operation is in progress.

18.2.3.1  
Hot work shall be in compliance with Chapter 10.

18.3  Location,

The spray area shall be separated from permanent structures by a minimum of 4.6 m (15 ft) or exposure protection shall be provided to allow for separations less than 4.6 m (15 ft).

18.4  Membrane Enclosure Occupancy.

18.4.1  
During the spray process, only personnel required for the process shall enter the membrane enclosure.

18.4.2  
If a marine vessel or other workpiece is being sprayed within the membrane enclosure and has living quarters, they shall not be occupied during spray operations.

18.4.3  
A ship watch aboard encapsulated marine vessels shall be permitted, except when the spray process is being performed. Their occupancy shall be reported to the competent person.

18.4.4  
Marine vessels or other workpiece with sleeping quarters, shall not be occupied for sleeping at any time within the membrane enclosure.
18.4.5
Travel distance to an exit from within a membrane enclosure shall comply with NFPA 101, Life Safety Code, Table 40.2.6 for General Industrial Occupancies.

18.5 Operations and Maintenance within Temporary Enclosures.

18.5.1
The spray paint area shall consist of the temporary membrane enclosure and a 1.5 m (5 ft) zone outside of the enclosure.

18.5.1.1
No hot work, welding, grinding, or cutting shall take place in the spray paint area while it is permitted for spray painting per Section 18.11.

18.5.1.2
No vehicles, ordinary combustibles, portable buildings, or container storage shall be located in the 1.5 m (5 ft) safety zone during spray operations.

18.5.1.3
No smoking or open flames shall be allowed in the paint spray area including the membrane enclosure while it is permitted for spray painting per Section 18.11.

18.5.1.4
Membrane enclosures shall be permitted to be used for activities other than spray painting. Other uses of the membrane enclosure shall comply with applicable codes or standards.

18.5.1.5
Hot work shall be performed only when authorized by the competent person to minimize the possibility of ignition of adjacent spray painting operations.

18.5.1.6
Membrane enclosures without active spray painting tasks shall have power cords and lighting rated for outdoor use. Ordinary portable electrical tools and equipment can be used in these areas.

18.6 Membrane Material.
Material used for membrane enclosures shall have been tested and passed the NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films, Test 2 requirements. Testing shall have been performed by an independent test laboratory.

18.7 Electrical and Other Sources of Ignition.

18.7.1
Electrical wiring and utilization equipment used in membrane enclosures during spray painting shall comply with Chapter 6 except as amended below.
18.7.1.1
The spray area shall consist of the area within the temporary membrane enclosure, and shall be considered a Class I, Division 1 area. A 1.5 m (5 ft) zone outside of the temporary membrane enclosure shall be considered Class I, Division 2. See Figure 18.7.1.1.

Figure 18.7.1.1 Electrical Classifications for Outdoor Membrane Enclosures.

18.7.2
All lighting, electrical power cords, and any related equipment within the membrane enclosure shall be rated for Class I Division 1 as defined by NFPA 70, National Electrical Code, when used during spray paint operations.

18.7.2.1
All lighting, electrical power cords, and any related equipment within the 1.5 m (5 ft) distance horizontally from the exterior of the membrane enclosure shall be listed for Class I Division 2 as defined by NFPA 70, National Electrical Code, when used during spray paint operations.

18.7.3
All power to the workpiece shall be removed during spray painting.

18.7.4*
Workpieces shall be grounded.

18.7.5
Scaffolding shall be grounded to the workpiece, to an appropriate grounding rod, or other approved method consistent with 6.2.1 referenced requirements.

18.7.6
Spray paint equipment shall be grounded.

18.7.7
Equipment used to monitor the concentration of solvent vapors shall be calibrated for the solvents used. The calibration frequency shall be per the manufacturer's recommendations.

18.8 Spray Paint Ventilation.

18.8.1
Each membrane enclosure shall be provided with mechanical ventilation consistent with requirements in Section 5.5 and Chapter 7, except as amended by the requirements of this chapter.
18.8.1.1*
The ventilation system shall be designed and installed to ensure that the enclosure is maintained at a pressure that is neutral or negative relative to the surrounding environs.

18.8.2*
The concentration of the vapors and mists in the exhaust stream of the ventilation system during spray operations and ambient air drying operations shall not exceed 10 percent of the lower flammable limit.

18.8.2.1
All spray operations within the membrane enclosure shall cease operations when the concentration of the vapors and mists in the exhaust stream of the ventilation system reaches or exceeds 10 percent of the lower flammable limit.

18.8.2.2
An interlock shall be provided so that the spray apparatus is automatically stopped if the ventilation system fails to maintain the concentration of the vapors and mists in the exhaust stream below 10 percent of the lower flammable limit.

18.8.2.3
Where interlocks cannot be effectively provided for ventilation equipment that uses plant air, large air storage tanks, or equipment that cannot be instantly shutoff, an audible alarm upon loss of ventilation that will alert all spray paint operators shall be permitted with AHJ approval.

18.8.3
Exhaust air shall be taken from one or more points within 300 mm (12 in.) of the floor of the enclosure.

18.8.4
An adequate supply of clean make-up air shall be provided per the requirements of Section 7.3.

18.8.5*
The location of both the exhaust and make-up air openings shall be arranged to provide air movement throughout the enclosure and across all portions of the floor to prevent accumulation of flammable vapors.

18.8.6
Ventilation equipment containing overspray collection filters shall follow the requirements of 7.2.1.

18.8.7
Air exhausted from the membrane enclosure shall not be recirculated.

18.8.8 Drying.

18.8.8.1
Membrane enclosures used for spray application of flammable or combustible materials shall not be used for drying, curing, or fusing operations at elevated temperature.

18.8.8.2
Freshly sprayed workpieces shall be dried only in spaces that are ventilated to prevent the concentration of vapors from exceeding 10 percent of the lower flammable limit.

18.9 Recordkeeping.

18.9.1
Any contractor supplying exhaust equipment for painting and coating work within membrane enclosures shall provide documentation that the equipment complies with Chapter 7 requirements.
18.9.2
All equipment shall bear a permanent unique number or other designation to identify equipment in use.

18.9.3
Records of approved equipment shall be kept on file for 12 months. Such records shall be in the form of a memorandum stating the equipment number, the owner of the equipment, and the lessee of the equipment, if any, and state that the owner has accepted the equipment for use at the facility.

18.9.4
Installers shall provide NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films, Test 2 documentation of the membrane material to the owner before installation.

18.9.5
Records shall be made available to the AHJ or any inspecting authority upon request.

18.10 Storage and Handling of Flammable and Combustible Liquids.
18.10.1 Coating Material Handling.
Flammable and combustible paints, coatings, and cleaning agents for equipment within the membrane enclosure and its 1.5 m (5 ft) safety zone shall not exceed 37.9 L (10 gal) total at any time.

18.10.1.1
All mixing and storage shall be done outside the membrane enclosure area.

18.10.1.2
Mixing rooms and storage rooms shall comply with Chapter 8.

18.11 Facilities Compliance Permitting.
18.11.1 Permits for spray painting shall be issued for each spray paint activity on a daily basis. Paint spray permit records shall be kept for 12 months for review by the AHJ.

18.11.2 Competent persons shall perform all spray paint permitting for membrane enclosures.

18.11.3 Spray painting shall not be performed in any membrane enclosure until the Paint Spray Permit, as shown in Figure A, 18.11.1, is signed by a competent person and posted at the entrance to the enclosure.

18.11.4 The competent person shall have the authority to stop the spray painting operation if any equipment malfunctions, if combustible gas detection readings exceed 10 percent of LFL readings, or if any spray operations are deemed unsafe by the competent person.

18.11.5 No spray paint operations shall take place without permitting by a competent person present at all times that spray painting is in progress.

18.11.6 Combustible gas testing shall be performed by the competent person prior to the start of spray painting, during spray painting operations, and 10 minutes after the ventilation has been shut down.

18.11.6.1 Equipment used to monitor the concentration of solvent vapors shall be calibrated for the solvents used. The calibration frequency shall be per the manufacturer's recommendations.
18.11.7
The competent person shall inspect all electrical connections within the membrane enclosure as a part of permitting.

18.11.8
The competent person shall ensure that energized electrical equipment is in compliance with the requirements in Section 18.7.

18.11.9
The competent person shall ensure that ventilation exhaust equipment and paint spray compressors are interlocked. For spray painting within membrane enclosures, interlocked shall mean that the spray application equipment cannot be operated unless the exhaust ventilation system is operating and functioning properly and spray application is automatically stopped if the exhaust ventilation system fails.

18.12 Protection.

18.12.1 Portable fire extinguishers shall be installed, inspected, and maintained in accordance with NFPA 10, Standard for Portable Fire Extinguishers.

18.12.1.1 Portable fire extinguisher placement shall be determined for each level where multiple work area levels exist within a temporary membrane enclosure.

18.12.2 The minimum size of all extinguishers shall be 4A:80B:C.

18.12.1.3 Pre-engineered extinguishing systems shall not be utilized for fire protection unless specifically listed for use in temporary membrane enclosures.

Supplemental Information

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Submitter Information Verification

Submitter Full Name: Nancy Pearce
Organization: National Fire Protection Assoc
Submittal Date: Thu Jun 06 09:55:31 EDT 2013

Committee Statement and Meeting Notes

Committee Statement: The Committee addressed the concern of membrane enclosure painting used in the marine industry as submitted in PI 25 and PI 26. The Committee extended the application to include other large workpieces that do not readily fit into spray paint booths. The Committee has not fully considered all the concerns for indoor membrane enclosures and therefore this first revision only addresses outdoor enclosures. A committee input has been submitted for indoor membrane enclosures in order to solicit public comment. New Chapter 18 and associated diagrams and annex material is attached.
Committee Input No. 14-NFPA 33-2013 [Global Input]

Type your content here ...

Supplemental Information

File Name: IndoorDraftforCl.docx
Description: This committee input would be added to new Chapter 18 and would cover indoor membrane enclosures.

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Submittal Date: Mon Mar 18 14:24:39 EDT 2013

Committee Statement and Meeting Notes

Committee Statement: The origination of this proposal came from the current use of these enclosures in the Marina Industry. Marina spray painting is occurring in the US and throughout the world in temporary membrane enclosures outdoors and within buildings. There is a desire and need to establish a standardized practice for fire safety officials and users. The outdoor provisions being put forth in a new chapter for safe membrane enclosure spray painting contains a set of checks and balances that are greater than what is normally found in a spray paint booth that contains a suppression system. The intent is to mitigate the potential for fire. The challenge is the placement of these outdoor enclosures with all the checks and balances present, INSIDE of a building. They must also insure that the building is not at greater risk in a fire event. The presence of fire sprinklers in the building to protect the building and the commodities being placed within it must be capable of reaching within the membrane enclosure to contain and possibly extinguish a fire. Testing of a membrane enclosure using a crib fire and fire sprinklers outside the enclosure were completed and recorded. A video of this testing can be found at http://www.youtube.com/watch?v=bNpMqWMBfo4. The test was modeled around the marine industry use of fire resistive shrink wrap material for an enclosure with fire sprinklers designed for Extra Hazard Group 2. A small TG of NFPA 13 members did a preliminary review of the proposal for indoor membrane enclosures within buildings with sprinklers and was concerned that the membrane would create an obstruction to sprinkler discharge. The sprinkler task group indicated that while the small scale test showing the behavior of the membrane under test conditions was a start, that additional full scale testing may be needed to look at factors such as ceiling and sprinkler height, clearance between the membrane and sprinkler system and delivered density, Ignition locations, obstructions under the membrane and validation or justification of the fire source. The Committee and membrane task group will continue working with the NFPA 13 committee on the issues of concern.

Response Message: /TerraView/Content/33-2011.ditamap/2/C1363631079617.xml
May 30, 2013

Mr. Gregory J. Cahanin
Fire & Code Consulting
2522 M.L. King Street, North
St. Petersburg, FL 33704
gcahanin@assuredfiresafety.com

Dear Mr. Cahanin,

This is in response to your letter regarding NFPA 33 received on April 9, 2013. I have made inquiries regarding the events you describe in your letter. It is my understanding that you participated in two pre-First Draft Meetings (during one of which you led a tour of the Lauderdale Marine Center), that you were a member of the NFPA 33 Membrane Enclosures Task Group, and made a presentation to the TC during their First Draft meeting. It is also my understanding that appreciable time was spent discussing your issue during multiple NFPA 33 meetings; as a result, two actions were taken: 1) a First Revision was created for a new chapter on outdoor membrane enclosures and 2) a Committee Input was created for indoor membrane enclosures that will be reflected in the First Draft Report.

With respect to your suggestion about forming a new NFPA 13 Task Group, with a different staff liaison, I decline to take the action you suggested in your letter. You also suggested that the findings of the NFPA 13 Task Group reported in response to PI 25 on NFPA 33 be “expunged” from the public record. It would not be appropriate to alter the public record on this matter, nor is this alteration something that NFPA Staff would be able to do.

With respect to other matters, I would recommend that the issues for which you are advocating should go through the full revision process for resolution. I know you are familiar with the NFPA Regulations and processes, and you can appropriately raise your concerns through the NFPA process.

Of course this response is not determinative of any complaint by you. Complaints concerning the process are not for NFPA staff to resolve, but are within the purview of the Standards Council. If you believe that some violation of NFPA rules or other unfairness has occurred that can be addressed by some action of the Standards Council, you should file an appeal with the Council. As a matter of practice, the Council doesn’t generally intervene in the standards development process in mid-cycle, and will frequently defer consideration of all matters concerning the document development process until the end of the cycle when the document is forwarded to the Council for consideration of issuance and the disposition of appeals. You may wish, therefore, to wait until the processing of the document is complete before deciding whether an appeal is in order. However, the Council has the authority to consider appeals at any time. Please note that any appeal for the August meeting would need to be reviewed by my office no later than June 21, 2013.

Sincerely,

Amy Beasley Cronin
Division Manager, Codes & Standards Administration
Secretary to the Standards Council
From: Greg Cahanin [mailto:gcahanin@assuredfiresafety.com]  
Sent: Tuesday, May 07, 2013 12:08 PM  
To: Cronin, Amy  
Cc: Shannon, Jim  
Subject: NFPA 33 Public Input Letter  
Importance: High

Amy-

On April 2nd in the email below you stated no request is insignificant. I sent you a letter on my Public Input on NFPA 33 dated April 5th- a month ago.

I am puzzled as to why Rosanne sent me an email stating it had been forwarded to the appropriate staff for input when the letter was written to you as Standards Secretary- the appropriate gatekeeper of the standards process. I would be disappointed in anything but a direct response from you.

The marina’s which my public input will effect are a multi-billion dollar industry whose desire for relevant standards should not brushed aside by partisan ego that has crept into the process. I am open to having this issue resolved before the Standards Council in their meeting at the end of July if you are having difficulty in making a decision on the rules they establish. My letter to you is straightforward and should result in nothing less than it delineates. Naturally, if this course is considered, it would be inappropriate to ballot and publish the challenged text since it would improperly hinder the Standards Council’s ability to act.

Please feel free to phone me directly to discuss this matter further if need be.

With kindest regards,

Greg Cahanin  
Gregory J. Cahanin  
Cahanin Fire & Code Consulting  
2522 M.L. King St. N.  
St. Petersburg, FL  33704  
727-896-7719  
gcahanin@assuredfiresafety.com  
www.assuredfiresafety.com
MEMORANDUM

TO: Nancy Pearce – NFPA 33 Staff Liaison

FROM: Matt Klaus (NFPA Staff) on Behalf of the NFPA 13 Task Group for Membrane Structures

DATE: February 12, 2013

SUBJECT: Upcoming Test of Membrane Structure

The NFPA 13 Task Group that was developed to work with the NFPA 33 task group for membrane structures has reviewed the proposed test plan (and photos of the structures) for the membrane enclosure. The NFPA 13 task group members do not feel that the test protocol, as currently described, would yield sufficient information to determine whether or not sprinklers can be omitted from underneath the membrane structure ceiling. This is not to say that there will be no value in conducting the test (see note #4 below), only that the test as described will not provide a level of comfort for the task group to make a determination on the need for sprinklers.

The specific comments and questions that have been posed by the NFPA 13 task group are as follows:

1. Will a fire in the larger enclosures shown in the attached photos react differently than in the one used for the test?
   - I would assume it would. The heat plume that is expected to eventually breach the membrane could do so at any point in the enclosure, but probably at a high point and not necessarily directly above the fire. If the fire is along a wall of the membrane, then it could be expected that the hole would be in the wall. What if the fire occurs under the boat? In any of these cases, the hole may not be directly over the fire, and a sprinkler discharging at the roof will not directly impinge on the fire. It’s possible that the water discharging from the sprinkler will sufficiently cool the membrane for a period of time to keep additional holes from forming, and yet allowing heat to continue to spill out, opening additional sprinklers. If the fuel source is large enough, the fire could burn out of control, opening additional holes in the membrane, and activating more and more sprinklers at the roof and eventually over-taxing the system.

2. Will the spray from a single outside sprinkler above the test enclosure provide an adequate simulation of a sprinkler system discharging in an enclosed building?
   - I don’t see how it can. A sprinkler discharging outside will be subjected to winds which will affect the discharge spray pattern. In a real fire scenario, additional sprinklers will activate, especially since it’s anticipated that the membrane will shield the fire.

3. Will the fire used during the test be of sufficient size to simulate an extra hazard group 2 occupancy?
   - Based on the description of the fire in the test plan and as described on the conference call, it doesn’t sound like it will. Extra hazard group 2 is one of the severest fires anticipated in NFPA 13 and the fuel load is expected to include “… moderate to substantial amounts of flammable or combustible liquids …”. A small wood crib or diesel
pan fire with just enough heat to impact the fabric will not simulate the size of the anticipated fire.

4. No this (test) will not provide enough information to determine if sprinklers would or would not be needed under the membrane. I would state that I suppose it’s a starting point of some sort. With so many other questions that need to be addressed for this type of operation I’m not sure where else to start. I’m just guessing that the life safety/egress has already been addressed for these temp enclosures? Seems like these protected buildings that store these large marine vessels have a similar situation when the vessel is just stored and the sprinkler protection not reaching the inside. I completely understand we’re talking about a specific operation that is taking place under the shrink wrap, but would this test at least shed some light on how it will react in an actual flaming fire? Granted I concur with the issues that it’s not a measurable type of fire (but in real fire’s that I deal with not too many meet that measurable criteria anyway).

5. I have read the proposed membrane enclosure testing and the concerns of some of the other Task Group members and generally agree that the proposed test plan will not be adequate to determine if sprinklers can be omitted from within the membrane structure, when the membrane structure is located within a sprinklered building.

In my opinion large scale fire testing would be the most accurate method to determine the answer to the question. In a large scale test environment (such as the facility at UL) the proposed test enclosure with the shrink wrapped membrane would be placed within the test building below a moveable ceiling with a specified sprinkler system installed below the ceiling and over the test enclosure. Multiple tests could be conducted in a relatively short period of time, the ceiling height above the test enclosure could be varied, the fire type and size could be varied, etc.

6. Several references and recommendations are made for the use of ESFR sprinklers for the protection of the paint spray operation. As the provisions of NFPA 33, 9.4.2 requires the use of Extra Hazard Group 2 design criteria for these operations, the use of ESFR sprinklers is not allowed by NFPA 13, 12.6.7.1.

7. The desired performance of the membrane material is similar to that of a drop out type ceiling allowed under the provisions of NFPA 13, 8.15.15. This requires the drop out panels be listed and has restrictions on the use of QR or Extended Coverage sprinklers above the ceiling. The UL Standard for the Listing and FM Approval Standard for Approval of such drop out ceiling panels are UL 723S and FM 4651 respectively. These standards require an exposure to a specific fire source with and without an operating sprinkler above to ensure the panels will drop out within a specific time period. See attached FM 4651. Consideration should be given to a similar test in this case to determine performance of the membrane material in question.

8. As it is anticipated that the membrane enclosure will be provided with a ventilation system, the impact of such operation must be considered in the displacement of the rising fire plume and subsequent impingement on the membrane. Additionally, as the provisions of NFPA 33, 9.4.6 would require the protection of the ducts and stacks, how will this protection be addressed by the testing?

9. What types of obstructions might be created by the scaffolding system used to support the membrane material? Are there walkways, stairs, etc.?
10. Is there any consideration that must be given to the significant obstruction created by the vessel itself? Or does the Extra Hazard designation address this issue? NFPA 409 does not require any specific increase for a paint hanger used to paint large aircraft provided the aircraft is defueled.

11. If a full scale fire test is to be performed then:
   - What is the appropriate fire size/fuel package to represent the range of anticipated fire sizes that might be expected? Not sure the reference to UL 711 criteria is appropriate as this is for portable fire extinguisher testing and would not necessarily be representative of the hazards here.
   - Where should be fuel package be located within the enclosure? Should shielding of the fuel package be considered to represent fire beneath the vessel?
   - Are sprinklers to be installed above the membrane enclosure? If so at what spacing? What design density? What clearance? What sprinkler K-Factor, temperature rating, RTI, etc.? If the effectiveness of the sprinkler protection is to be evaluated the specific operation of the sprinkler must be defined and maintained.

12. Is there a concern with the reaction of the membrane material causing an obstruction to the means of egress or draping across the vessel once the tension is released?

13. With ceiling heights of up to 57 ft, I would expect some significant delay in the operation of overhead sprinklers.

14. Will the application of heat from a fire cause additional shrinkage of the membrane with undesired stresses on the supporting scaffolding structure?

15. Is there concern about paint overspray deposits on the membrane impacting the performance?

In addition to the comments/questions listed above, NFPA 13 task group members Bill Sheppard and Chris LaFleur have also marked up a copy of the test plan with their questions and comments. This review, with the embedded comments, is provided on the subsequent pages of this memo.
MEMORANDUM

TO: Nancy Pearce – NFPA 33 Staff Liaison

FROM: Matt Klaus (NFPA Staff) on Behalf of the NFPA 13 Task Group for Membrane Structures

DATE: March 15, 2013

SUBJECT: Membrane Structure Review

The NFPA 13 task group for membrane structures has reviewed the information provided by the NFPA 33 task group and has prepared the following comments for review by the NFPA 33 Technical Committee at their upcoming First Draft Meeting (March 18-19, 2013):

1. The information garnered from the initial testing on the membrane structure is a good starting point for learning more about the impact of membrane structures.

2. The membrane structures shown in the photos distributed to the NFPA 13 task group and used in the testing conducted as part of this project create an obstruction to sprinkler discharge. Obstructions in excess of 4 feet in width would require sprinkler protection beneath them in accordance with Chapter 8 of NFPA 13.

3. In addition the obstruction to spray pattern development that is created by the membrane itself, there are additional obstructions that exist underneath the membrane (the boat itself, scaffolding…etc) that must also be considered.

4. Identifying the appropriate NFPA 13 hazard classification for NFPA 303 occupancies is extremely challenging due to the limited information on the commodity and its arrangement. Adding additional hazards (obstructions such as membrane structures and scaffolding) into these occupancies without providing complete sprinkler protection in accordance with the rules of the design and installation standard only serves to complicate an already challenging situation.

5. In order to confirm if it is appropriate to eliminate sprinklers underneath an indoor membrane structure, additional testing must be conducted in an enclosed, full-scale testing environment. The full scale testing must consider the variables that will impact the effectiveness of a sprinkler system that is being obstructed. The variables that should be considered to include, but are not limited to, the following:
   - Ceiling Height
   - Sprinkler Height
   - Clearance Between Membrane and Sprinkler System
   - Delivered Density
   - Fire Size
- Ignition Locations
- Obstructions Under the Membrane (boat, fuel, scaffolding…etc)
- Validation or Justification of Fire Source (boat, crib, burner…etc)

6. Based on the information that is available to date, including the information discussed by the NFPA 33 and NFPA 13 task groups during conference calls, the NFPA 13 task group does not feel that there is sufficient information available for the NFPA 33 Technical Committee to take an action that would allow for the omission of sprinklers underneath membrane structures that are used indoors. Additional information, including the information described in Item #5 above, would be necessary to make such a determination.
After reviewing the proposed test protocol and associated documentation for the Membrane Enclosed Paint Spray Operation I have the following comments:

- Several references and recommendations are made for the use of ESFR sprinklers for the protection of the paint spray operation. As the provisions of NFPA 33, 9.4.2 requires the use of Extra Hazard Group 2 design criteria for these operations, the use of ESFR sprinklers is not allowed by NFPA 13, 12.6.7.1.

- The desired performance of the membrane material is similar to that of a drop out type ceiling allowed under the provisions of NFPA 13, 8.15.15. This requires the drop out panels be listed and has restrictions on the use of QR or Extended Coverage sprinklers above the ceiling. The UL Standard for the Listing and FM Approval Standard for Approval of such drop out ceiling panels are UL 723S and FM 4651 respectively. These standards require an exposure to a specific fire source with and without an operating sprinkler above to ensure the panels will drop out within a specific time period. See attached FM 4651. Consideration should be given to a similar test in this case to determine performance of the membrane material in question.

- As it is anticipated that the membrane enclosure will be provided with a ventilation system, the impact of such operation must be considered in the displacement of the rising fire plume and subsequent impingement on the membrane. Additionally, as the provisions of NFPA 33, 9.4.6 would require the protection of the ducts and stacks, how will this protection be addressed by the testing?

- What types of obstructions might be created by the scaffolding system used to support the membrane material? Are there walkways, stairs, etc.?

- Is there any consideration that must be given to the significant obstruction created by the vessel itself? Or does the Extra Hazard designation address this issue? NFPA 409 does not require any specific increase for a paint hanger used to paint large aircraft provided the aircraft is defueled.

- If a full scale fire test is to be performed then:
  - What is the appropriate fire size/fuel package to represent the range of anticipated fire sizes that might be expected? Not sure the reference to UL 711 criteria is appropriate as this is for portable fire extinguisher testing and would not necessarily be representative of the hazards here.
  - Where should be fuel package be located within the enclosure? Should shielding of the fuel package be considered to represent fire beneath the vessel?
  - Are sprinklers to be installed above the membrane enclosure? If so at what spacing?

- Is there a concern with the reaction of the membrane material causing a obstruction to the
means of egress or draping across the vessel once the tension is released?
· With ceiling heights of up to 57 ft, I would expect some significant delay in the operation of overhead sprinklers.
· Will the application of heat from a fire cause additional shrinkage of the membrane with undesired stresses on the supporting scaffolding structure?
· Is there concern about paint overspray deposits on the membrane impacting the performance?

Tracey

---

**Tracey Bellamy** CFPS, PE
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🌳 Please consider the environment before printing this email.
Dear Matt,

I have read the proposed membrane enclosure testing and the concerns of some of the other Task Group members and generally agree that the proposed test plan will not be adequate to determine if sprinklers can be omitted from within the membrane structure, when the membrane structure is located within a sprinklered building.

In my opinion large scale fire testing would be the most accurate method to determine the answer to the question. In a large scale test environment (such as the facility at UL) the proposed test enclosure with the shrink wrapped membrane would be placed within the test building below a moveable ceiling with a specified sprinkler system installed below the ceiling and over the test enclosure. Multiple tests could be conducted in a relatively short period of time, the ceiling height above the test enclosure could be varied, the fire type and size could be varied, etc.

Thanks,

Scott

Scott Franson
V.P. Research & Development
The Viking Corporation

Office: 269-945-8256
Cell: 616-481-0154

>>> "Klaus, Matthew" <MKlaus@nfpa.org> 2/8/2013 10:11 AM >>>

Dear Task Group Members-

For those of you that were on the call, you should now have an understanding of what the NFPA 33 Task Group is looking at for the testing of the membrane structure in question. I have had communication with some of you and there is some concern as to whether or not the proposed test plan provides enough information to determine if sprinklers can be omitted from underneath these membrane structures.

In order to provide the NFPA 33 Task Group (and eventually the Technical Committee) with some perspective from the NFPA 13 TCs and CC, I would appreciate it if you could each respond to the following question so that I can develop a memo to the NFPA 33 Task Group. I have attached the test plan to this email for your review, along with several photos of the membrane structures we are dealing with and a third party review of the membrane material. While the majority of the photos I have attached show the membrane structure protecting a boat outdoors, the concept we are concerned with is when a membrane structure is protecting a boat within a building/structure. It is also important to note that NFPA 33 is not limited to boats, but all paint spray applications. The testing being conducted involves boat paint spraying, however this issue may also apply to other objects.

1) Will a test conducted to the proposed test plan yield enough information to determine if sprinklers can
be omitted from within the membrane structure, when the membrane structure is located within a sprinklered building?

If you could please respond by the end of the day Tuesday, February 12, I would greatly appreciate it. I would also ask that you "reply to all" if you have any commentary you would like to add to describe why you think this test plan will or will not provide sufficient information to make a determination on the need for sprinklers underneath the membrane structure. Also, keep in mind that this test is not being conducted by the NFPA 33 TG or TC and is not a "code fund project", but rather is test being conducted by a guest of the TC.

As always I greatly appreciate your involvement in this task group. These are the types of task groups that not only aid in the development of codes and standards, but lead to higher levels of life safety and property protection in our buildings. Thank you.

Regards,

Matt Klaus
Senior Fire Protection Engineer
NFPA

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The answer is, No this will not provide enough information to answer the question that Matt has asked. I would state that I suppose it’s a starting point of some sort. With so many other questions that need to be addressed for this type of operation I’m not sure where else to start. I’m just guessing that the life safety/egress has already been addressed for these temp enclosures? 

Seems like these protected buildings that store these large marine vessels have a similar situation when the vessel is just stored and the sprinkler protection not reaching the inside. I completely understand we’re talking about a specific operation that is taking place under the shrink wrap, but would this test at least shed some light on how it will react in an actual flaming fire? Granted I concur with the issues that it’s not a measurable type of fire (but in real fire’s that I deal with not too many meet that measurable criteria anyway).

Just my thoughts, I don’t disagree with anything anyone else has sent out thus fire.

David L.
perspective from the NFPA 13 TCs and CC, I would appreciate it if you could each respond to the following question so that I can develop a memo to the NFPA 33 Task Group. I have attached the test plan to this email for your review, along with several photos of the membrane structures we are dealing with and a third party review of the membrane material. While the majority of the photos I have attached show the membrane structure protecting a boat outdoors, the concept we are concerned with is when a membrane structure is protecting a boat within a building/structure. It is also important to note that NFPA 33 is not limited to boats, but all paint spray applications. The testing being conducted involves boat paint spraying, however this issue may also apply to other objects.

1) Will a test conducted to the proposed test plan yield enough information to determine if sprinklers can be omitted from within the membrane structure, when the membrane structure is located within a sprinklered building?

If you could please respond by the end of the day Tuesday, February 12, I would greatly appreciate it. I would also ask that you “reply to all” if you have any commentary you would like to add to describe why you think this test plan will or will not provide sufficient information to make a determination on the need for sprinklers underneath the membrane structure. Also, keep in mind that this test is not being conducted by the NFPA 33 TG or TC and is not a “code fund project”, but rather is test being conducted by a guest of the TC.

As always I greatly appreciate your involvement in this task group. These are the types of task groups that not only aid in the development of codes and standards, but lead to higher levels of life safety and property protection in our buildings. Thank you.

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Matt:

See my memo and attachment that I sent to you this past Monday. This test proposal as presented originally by Greg needs modifications and questions answered before we (NFPA 13 TC and TCC) endorse any test.

Further, having seen the photos, it would be helpful to see photos inside the membrane in order to get a feel for the scaffolding obstructions that must surely be there that would impede smoke and heat to the top of the membrane. Depending upon the layout and where you would start ignition, you may get different results in the test series. It would surely take more than one test.

Please forward my Monday memo to all of the above.

Thanks.

Bill

J William Sheppard, FSFPE
Sheppard & Associates, LLC
24756 Tudor Lane
Franklin, MI 48025
Email: jw_sheppard@yahoo.com
313 701 3653
248 757 2739
perspective from the NFPA 13 TCs and CC, I would appreciate it if you could each respond to the following question so that I can develop a memo to the NFPA 33 Task Group. I have attached the test plan to this email for your review, along with several photos of the membrane structures we are dealing with and a third party review of the membrane material. While the majority of the photos I have attached show the membrane structure protecting a boat outdoors, the concept we are concerned with is when a membrane structure is protecting a boat within a building/structure. It is also important to note that NFPA 33 is not limited to boats, but all paint spray applications. The testing being conducted involves boat paint spraying, however this issue may also apply to other objects.

1) Will a test conducted to the proposed test plan yield enough information to determine if sprinklers can be omitted from within the membrane structure, when the membrane structure is located within a sprinklered building?  (Not as proposed; see my memo to you of this past Monday--JWS 020813)

If you could please respond by the end of the day Tuesday, February 12, I would greatly appreciate it. I would also ask that you “reply to all” if you have any commentary you would like to add to describe why you think this test plan will or will not provide sufficient information to make a determination on the need for sprinklers underneath the membrane structure. Also, keep in mind that this test is not being conducted by the NFPA 33 TG or TC and is not a “code fund project”, but rather is test being conducted by a guest of the TC.

As always I greatly appreciate your involvement in this task group. These are the types of task groups that not only aid in the development of codes and standards, but lead to higher levels of life safety and property protection in our buildings. Thank you.

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Matt Klaus
Senior Fire Protection Engineer
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Matt,

To answer your question as stated below, I do NOT believe the proposed test plan will yield sufficient data to determine if sprinklers can be omitted within the membrane structure. Concerns that I have that will not be addressed using the small scale envelope and undetermined size of the heat source:

1. **Will a fire in the larger enclosures shown in the attached photos react differently than in the one used for the test?**
   I would assume it would. The heat plume that is expected to eventually breach the membrane could do so at any point in the enclosure, but probably at a high point and not necessarily directly above the fire. If the fire is along a wall of the membrane, then it could be expected that the hole would be in the wall. What if the fire occurs under the boat? In any of these cases, the hole may not be directly over the fire, and a sprinkler discharging at the roof will not directly impinge on the fire. It’s possible that the water discharging from the sprinkler will sufficiently cool the membrane for a period of time to keep additional holes from forming, and yet allowing heat to continue to spill out, opening additional sprinklers. If the fuel source is large enough, the fire could burn out of control, opening additional holes in the membrane, and activating more and more sprinklers at the roof and eventually over-taxing the system.

2. **Will the spray from a single outside sprinkler above the test enclosure provide an adequate simulation of a sprinkler system discharging in an enclosed building?**
   I don’t see how it can. A sprinkler discharging outside will be subjected to winds which will affect the discharge spray pattern. In a real fire scenario, additional sprinklers will activate, especially since it’s anticipated that the membrane will shield the fire.

3. **Will the fire used during the test be of sufficient size to simulate an extra hazard group 2 occupancy?**
   Based on the description of the fire in the test plan and as described on the conference call, it doesn’t sound like it will. Extra hazard group 2 is one of the severest fires anticipated in NFPA 13 and the fuel load is expected to include “… moderate to substantial amounts of flammable or combustible liquids ...”. A small wood crib or diesel pan fire with just enough heat to impact the fabric will not simulate the size of the anticipated fire.

There are many “what ifs” that can’t be answered using the test plan proposed. Only a full scale fire test can adequately address the questions that NFPA technical committees must ask and consider before allowing an alternative protection scheme.

Terry L Victor  /  National Manager - Sprinkler Business Process  /  SimplexGrinnell
Tel: 410-401-2245  /  Mobile: 443-286-4038
705 Digital Drive, Suite N  /  Linthicum, MD 21090  /  USA
tvictor@simplexgrinnell.com  /  www.simplexgrinnell.com
Dear Task Group Members-

For those of you that were on the call, you should now have an understanding of what the NFPA 33 Task Group is looking at for the testing of the membrane structure in question. I have had communication with some of you and there is some concern as to whether or not the proposed test plan provides enough information to determine if sprinklers can be omitted from underneath these membrane structures.

In order to provide the NFPA 33 Task Group (and eventually the Technical Committee) with some perspective from the NFPA 13 TCs and CC, I would appreciate it if you could each respond to the following question so that I can develop a memo to the NFPA 33 Task Group. I have attached the test plan to this email for your review, along with several photos of the membrane structures we are dealing with and a third party review of the membrane material. While the majority of the photos I have attached show the membrane structure protecting a boat outdoors, the concept we are concerned with is when a membrane structure is protecting a boat within a building/structure. It is also important to note that NFPA 33 is not limited to boats, but all paint spray applications. The testing being conducted involves boat paint spraying, however this issue may also apply to other objects.

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As always I greatly appreciate your involvement in this task group. These are the types of task
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Matt Klaus
Senior Fire Protection Engineer
NFPA

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Mary,

In conjunction with the appeal requested by Mr. Greg Cahanin, I would like to comment as Chair of the NFPA Committee on Finishing Processes. Please pass to the Standards Council.

This appeal has not been “formally” discussed by the committee since we have not had a full committee meeting since the appeal was requested. However, I have discussed the appeal letter and the allegations made with a number of committee members and specifically with Mr. Barry Thomas, who was chair of the Task Group dealing with indoor membrane painting enclosures.

The task group was formed during our June 2012 committee meeting. Cahanin, Jim Parks, Bob Arrighetti, Rick Galvez and B. Van Den Breen attended this meeting and presented their case for the NFPA 33 committee to address the issue of membrane painting. The committee took a vote and agreed to accept the task. Cahanin, Arrighetti and Parks were named to the Task Group.

Later Bob Arrighetti applied for and was granted membership to our committee as an “Enforcer”. (Subsequent to the 2012 elections, a change in county officials resulted in Bob losing his position as Fire Marshal and he is no longer on the committee.)

After that, there were approximately 10-12 teleconference meetings and meetings that took place in conjunction with our 2 other regular committee meetings, October, 2012 and March 2013. Our June 1012 meeting was held in Ft. Lauderdale so we could see firsthand the membrane painting operations being done at Lauderdale Marina and Broward Shipyards.

From the start, we recognized that there were 2 distinctly different issues on membrane painting – indoor and outdoor.

We chose to work on outdoor membrane painting because this posed fewer problems and there seemed to be fairly good consensus on what we could accomplish. This would also allow us to get some experience working together and perhaps generate a framework from which to work on indoor membrane painting.

The work on the outdoor membrane painting chapter went very smooth and the committee adapted the recommendations of the task group and established a First Revision along the lines suggested by the membrane painting interest group.

We then started work on the indoor membrane painting issues.

From the start, the task group recognized that there were many issues for which there weren’t easy answers. The single largest issue for us was the protection issue inside a building. Other codes applied and some were in conflict with what the membrane interest group wanted to do. NFPA 303, Fire Protection Standard for Marinas and Boatyards, defines “Buildings” in Section 3.3.3 as any roofed structure with or without walls. This doesn’t give us much room for
interpretation. And, from what I understand, defines what protection must be provided in accordance with NFPA 13, *Standard for the installation of Sprinkler System*.

At this point, I would like to make an editorial, personal comment.

As part of his support for the marinas’ position on membrane painting, Cahanin submitted a “third party” report from Kenneth E. Bush. In his report, Bush identified himself as a “Fire Protection Engineer”. We later found that Bush is the Chair of NFPA 303. He did not identify himself as being affiliated with NFPA 303 in his report. Nor did Cahanin.

My concern with this is that, in my opinion, the definition of “Building” in NFPA 303 is part of the indoor membrane painting problem. And, Bush is pushing this issue completely off to the NFPA 33 committee without having properly identified himself and one of his primary interests in this issue. As such, I do not view his report as “third party”.

If this issue was that important to Bush, why didn’t he address this in his committee?

Why hasn’t Cahanin (assuming he hasn’t) submitted public comment to NFPA 303 addressing the issues in that document that have implications for what he is asking us to do?

In his letter, Cahanin makes a number of assertions that are false.

- No attempt was made to hide or keep secret from the committee any memo from the NFPA 13 task group. No one, specifically Nancy Pearce, erred in any way on this. Cahanin asserts in one place that the memo was kept from the full committee. Later, he asserts that it shouldn’t have been provided to the full committee.

- How else, but in a personal report to the committee, was the 13TG to pass their concerns to us? Perhaps, Cahanin wanted the full NFPA 13 committee to address this issue at their next meeting – which is later this month if I recall correctly. In that case, the indoor membrane proposal would have missed the deadline for close of public comments and would be a non-issue until next cycle.

- The letter summarizing the NFPA 13 TG’s concerns was not expressing Matt Klaus’ personal opinions. Throughout the 13 TG’s discussions, I was in touch with Bill Sheppard, whom I have known and worked with for over 30 years. In addition, I know Chris LaFleur from the time she was with General Motors. I have the utmost professional respect for both Bill and Chris. Bill and I talked many times trying to find a way to make this work.

Contrary to Cahanin’s assertions, Matt Klaus’ memo reflected the opinion of the 13TG as relayed to me by Bill Sheppard.

Bill Sheppard and the other 13TG members were trying to find a way around the sprinkler issues with the membrane enclosures.

- Cahanin, to my knowledge, made no attempt to meet with the NFPA 13 committee to discuss the issues.

- Cahanin, to my knowledge, made no attempt to meet with the NFPA 303 Committee to discuss how changes in their document could impact changes they want in other documents.

- The concerns expressed by the 13TG mirrored in many ways those on our Membrane TG were expressing.
  - The single biggest concern is sprinkler protection in and around a huge yacht, surrounded by multi-layered scaffolding and wrapped in a plastic membrane. And in a “building” as defined by NFPA 303.
Contrary to Cahanin’s assertion, the “test” conducted by Lauderdale Marina was not conclusive to the NFPA 33 committee. (Please note that we served lunch in the meeting room at our March 2013 meeting so Cahanin could show and narrate the test video.)

The test did not come close to demonstrating real world conditions inside a membrane enclosure around a yacht.

The layers of platforms on the scaffolding, which will have a serious effect on the heat getting to the sprinklers and even a more serious effect on the water getting to the fire in a timely manner, were not part of the test.

One sprinkler head inside a small membrane structure with a crib fire (this was correct) without the interference of the platforms was not a meaningful test.

Contrary to Cahanin’s assertion, I do not think that the 13TG is “mired in arrogance”. Cahanin seems to want to consider only the membrane enclosure around the yacht. What about the yacht? An AHJ might conclude that the yacht itself is creating such an interference that the yacht needs obstruction protection below it.

When it became clear that the NFPA 33 Membrane TG was not going to achieve anything near consensus on the indoor membrane issue, Cahanin became increasingly belligerent and argumentative in their meetings. Many of the TG member expressed to me that this was becoming counterproductive.

Cahanin and Jim Parks were invited to join the TG and were given ample time to present their case, even to allowing Cahanin to present a “minority report” to the full committee which differed from the TG report. We made time to view the Lauderdale test video with Cahanin narrating it. The committee did everything possible to make sure Cahanin and the marina interest group had the opportunity to present their case.

Because we regarded this as an important task, we put what work was done on the indoor membrane enclosure work into our First Draft as a “committee input” so we could continue working on it through the public comment phase and after. It was (is) my intent to reconvene the TG to continue discussions.

However, I have decided not to continue any work until this issue is resolved. It is pointless to continue until we know the path to take.

I have talked to Jim Parks, Lauderdale Marine, and asked him if he wishes to continue on the TG. He has said yes and is welcome to participate.

Mr. Cahanin will not be invited to continue participating on the TG.

Please let me know if you have any questions with the above.

Thank you for your consideration.

Tom Euson
Chair, NFPA Committee on Finishing Processes
June 17, 2013

Gregory J. Cahanin  
Cahanin Fire & Code Consulting  
2522 M.L. King St. N.  
St. Petersburg, FL 33704

Dear Mr. Cahanin:

In accordance with 1.6.5 of the Regulations Governing the Development of NFPA Standards, a determination has been made that a hearing on your appeal to the NFPA Standards Council regarding a Public Input submitted on NFPA 33 is unnecessary at this time. Your appeal will be considered by the Council at its July 30-31, 2013 meeting solely on the basis of written submissions. Should the Council, at this meeting, determine that a hearing or other further proceedings are necessary for it to reach a decision, both you and other interested parties will be notified following the meeting.

If you have any questions, please do not hesitate to contact me.

Very truly yours,

Linda Fuller  
Manager, Codes and Standards Administration

c: J. Pauley, M. Brodoff, A. Cronin, R. Bielen, G. Colonna, M. Klaus, N. Pearce, M. Wixted  
TC Finishing Processes  
Standards Council
Item 13-8-28
Technical Committee on Cultural Resources

MEMORANDUM

TO: Amy Cronin, Secretary, Standards Council
FROM: Don Moeller, Chair, Technical Committee on Cultural Resources
DATE: April 29, 2013
SUBJ: Comment on New Standard – Hybrid Gas Fine Water Droplet Systems

At its meeting on April 23, 2013, the Technical Committee on Cultural Resources voted unanimously to submit the following response to the request for public input on a new standard to address hybrid gas fine water droplet systems. I am submitting the response on the committee’s behalf.

The Technical Committee on Cultural Resources supports inclusion of hybrid system technology in NFPA standards. Hybrid-type systems could potentially be used to control and/or extinguish typical hazards that are included in and considered by NFPA 909, Code for the Protection of Cultural Resource Properties – Museums, Libraries, and Places of Worship, and NFPA 914, Code for Fire Protection of Historic Structures. In addition, the committee believes that the technology should be incorporated into the current NFPA 750, Standard on Water Mist Fire Protection Systems, due to its similarity in technology in regards to both fire fighting mechanics and system component mechanics.

The Technical Committee on Cultural Resources recognizes that attempts have been made to include hybrid systems under NFPA 750 and that these attempts have been rejected by the NFPA 750 technical committee. If it is the decision of the Standards Council to not incorporate hybrid system technology into NFPA 750, then we recommend and support the development of a new standard for “hybrid fire suppression systems.”

Although Factory Mutual has approved hybrid systems for use in specific FM insured facilities, the lack of a national standard covering hybrid systems hampers the use of such systems even when the hybrid system provides the best option for fire extinguishment in a given hazard area. Also, lack of guidance for use of hybrid systems leaves authorities who wish to utilize hybrid technology, other than FM, without the type of definitive guidance provided by a nationally recognized consensus standard.

In summary, the Technical Committee on Cultural Resources supports the inclusion of hybrid fire suppression systems technology in NFPA standards.
NFAP Standard Council,

As a fire protection engineer focussed on Special Hazard application, I write in support of new standard for Hybrid Water Mist system.

We (Vipond) are seeing the rapid increase in the demand of all kinds of water mist systems including the Hybrid system, a specific standard for this type of system will be very important document to provide the bases for the Design, Installation and testing.

The new standard will provide a guide to the system designs, AHJ’s, insurance company and the end customer.

Thanks,

Ammar Alkotobe, P. Eng.
Application Engineer
Special Hazard - Vipond Fire Protection
Div. of Vipond Inc.

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F: 905-564-7070
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To Whom it May Concern,

After have worked with this system as product manager during its development and in the field with contractors installing the system, I feel this technology needs its own standard. I don’t feel that the NFPA 750 group has the responsibility nor the expertise to evaluate a gaseous system and NFPA 2001 does not have the responsibility nor the expertise to evaluate a water based system. In my opinion the hybrid system clearly falls outside the jurisdiction of both committees as both the gaseous agent and the water based system take leads in extinguishment in different fire scenarios.

Frank Barstow  
Vortex Sales Specialists  
610-217-0881 Cell  
Visit : Victaulicvortex.com

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NFPA Standards Council,

I write in support of a new standard for hybrid, gas and fine water droplet systems.

Unfortunately this technology is not recognized by NFPA 750 or NFPA 2001/12 which leaves end users, installers, AHJs, insurance companies and 3rd party testing agencies very little by way of guidance for the installation and maintenance of these types of systems. The lack of a standard for these types of systems has prevented the “right” fire protection solution from being applied in some cases. This is one of the best fire protection innovations in years yet the absence of a standard is preventing its application.

I encourage NFPA to seriously consider the establishment of a separate standard for hybrid, gas and fine water droplet systems. API Systems Group would be glad to support this effort in any way we can. Please contact me directly if you have any questions.

Thank you,

Roddy Bieber  
General Manager  
API Systems Group, Inc.  
214.291.1200 Phone  
NFPA Member since 1995  
FSSA Board of Directors  
NICET III
Dear Ms. Cronin,

I am writing per the soliciting request of the Standards Council for public comments for the justification and need for developing a new standard for the application of hybrid, gas and fine water droplet systems.

I am a Professional Engineer working for a nationwide fire protection installer and service provider. In my role I am always looking to bring leading edge technologies to our consultants and customers providing them the best possible solutions to their fire protection needs. As an organization we stand behind and use hybrid suppression systems in many applications across the country. Personally I have presented this technology to many fire protection engineers, insurance risk managers and the society of fire protection engineers all with great interest in adopting this as an alternative to their current suppression methods. Often in these discussions there are inquiries as to where this technology applies to an NFPA standard and we have to describe how it can only be looked at using NFPA 2001 (Clean Agent) and NFPA 750 (Water Mist). These current standards do not properly apply to a hybrid system as it is intended to be used so we are often left with nothing to follow from a standards point of view.

If there could be a new standard and technical committee dedicated to this it would be of great benefit to our ability to provide this solution to more of our customers in such cases where this is the best option but is being held back.

If you have any questions or if I can be of any further help regarding this don’t hesitate to contact me

Regards,

Gerry Bourne, P. Eng.
Business Development Manager
Troy Life & Fire Safety Ltd.
416-427-7360
Gerry.Bourne@troylfs.com
http://www.troylfs.com
Like us on Facebook: www.facebook.com/TroyLFS

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RE:
The NFPA Standards Council is considering a proposal by Victaulic for a proposed new standard for Hybrid, gas and fine water droplet systems. The Council is soliciting public comments on the need for the project, information on resources on the subject matter, those interested in participating on a technical committee if established, and experience in the intended application of this technology. The Council is specifically looking for manufacturers that are actively developing hybrid droplet systems and whether there are enough common installation practices and procedures available to support a standard, and the intended application for this technology. The Council is also seeking input on whether the subject matter could be covered by an existing technical committee or possibly through the creation of a new document. This is an important matter to us and we are soliciting your support for the establishment for a new standard as well as the
creation of a new technical committee to administer the document. Comments are due by May 30th and should be addressed to Amy Cronin, Standards Council Secretary; and sent to mmaynard@nfpa.org.
April 22, 2013

Secretary of the Standards Council
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

To whom it may concern:

In response the request published in the April Fire News for public comments on the need for a new committee project to develop a standard for “hybrid systems” using a combination of inert gas and very fine water droplet, the FSSA is submitting the following comment. The FSSA is an association of manufacturers and installers of special hazards fire extinguishing systems.

The FSSA support the development of a new NFPA standard covering fire extinguishing systems that use a combination of inert gas and very fine water droplets, known as “hybrid systems.” A number of our member companies are involved in either manufacturing such systems or installing such systems. These systems utilize inert gas to reduce the oxygen concentration in the protected space below that required to sustain combustion and very fine water droplets which cool the protected space extracting considerable heat from the fire zone. The two fold attack of oxygen reduction and cooling is extremely effective for many types of fires.

Attempts have been made to include hybrid systems under NFPA 750, the standard on water mist systems. These attempts have been rejected by the NFPA 750 technical committee. 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 spray (mist) that absorbs heat, displaces oxygen, or blocks radiant heat” as required under NFPA 750.

NFPA 2001 on Clean Agent Fire Extinguishing Systems addresses systems which use inert gas to extinguish fire. FSSA, however, opines that hybrid systems are outside the scope of NFPA 2001 because the water component of the hybrid system generally leaves some residual water on surfaces within the protected space. Thus the system does not meet the intent of the definition of a “clean agent” in NFPA 2001.

Although Factory Mutual has approved hybrid systems for use in specific FM insured facilities, our member companies are experiencing difficulties in providing hybrid systems for facilities which are
not insured by FM because there is no national standard covering such systems. Lack of a national standard covering hybrid systems hampers the use of such systems even when the hybrid system provides the best option for fire extinguishment in a given hazard area. Also lack of guidance for use of hybrid systems leaves the authorities, other than FM, who wish to utilize the hybrid technology without the type of definitive guidance provided by a national recognized consensus standard.

For the above reasons, the FSSA requests that the 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.

FSSA would like to be represented on the Technical Committee developing such a new standard and thus support the development.

Best regards,

Crista LeGrand, CAE, CMP
Executive Director
Fire Suppression Systems Association

cc: FSSA Board of Directors
    FSSA Technical Committee
    George Keeley, FSSA legal counsel
    Tom Wysocki, Guardian Services Inc., FSSA Technical Director
Maynard, Mary

From: Anna Gavin [agavin@fireline.com]
Sent: Monday, May 27, 2013 3:04 PM
To: Maynard, Mary
Subject: hybrid gas and fine water droplet systems proposal

Dear NFPA Standards Council,

It has come to my attention that you are considering a proposed new standard for hybrid gas and fine water droplet systems and are soliciting public comments at this time. I would like to state that Fireline is very much in support of this proposal and will contribute if needed. We have been a staple in the fire protection industry for over 65 years and we feel that this form of fire suppression has the potential to be an efficient method for special hazard applications.

There is currently no formal language pertaining to these systems in NFPA 750 or 2001. This leaves many questions and hesitation in the design, installation and maintenance of these systems. Companies like Fireline have grown to trust the guidance of NFPA codes and standards. With a defined set of standards for hybrid gas and fine water droplet systems, much of this can be solved.

Thank you for considering the proposal and the potential technical committees.

Anna Gavin

President
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Ms. Amy Cronin  
Standards Council Secretary  
NFPA  
Quincy, MA

Re: Develop a new standard for the application of hybrid, gas and fine water droplet systems.

Dear Ms. Cronin,

I am writing per the soliciting request of the Standards Council for public comments for the justification and need for developing a new standard for the application of hybrid, gas and fine water droplet systems.

As the Lead Fire Protection Engineer for Nationalgrid with over 29 years of experience, I am constantly looking for new fire protection technologies that will improve our fire protection and reduce our electric generation business interruption exposure. As a Factory Mutual Insured Property achieving a Highly Protected Risk Status, we have worked closely with FM approvals, research and engineers on many fire extinguishing systems ranging from clean agent, foam, water, CO2 and most recently Victaulic’s Vortex Hybrid Water/Nitrogen extinguishing System. Unfortunately without an NFPA standard that specifically details the requirements of such a unique dual suppression agent system, the design requirements and AHJ acceptance were left up to agreed upon performance based extinguishment objectives with respect to fuel and lube oil auto ignition temperatures and O2 monitoring as it applied to our Combustion Turbine Applications.

By utilizing two suppression agents (water and nitrogen) with one or the other being the primary suppressant depending on the volume of the space and the fire scenario, one currently has to design, install and test using NFPA 2001 (Clean Agent) and NFPA 750 (Water Mist) in an ad hoc fashion whether the scope of these standards apply or not being there is no alternative. For these reasons it is imperative that the Standards Council move to establish an NFPA Standard that sets forth minimum requirements for this new and very effective technology.

Should you have any further questions, concerns of if I can be of any further assistance, please do not hesitate to contact me.

Carl E. Gianino, PE  
Lead Fire Protection Engineer  
Nationalgrid Engineering & Survey, LLC  
516-545-6233

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To Whom it May Concern,

I will try to present my interest in seeing a standard developed for this technology in as few points and as briefly as possible. My comments will specifically relate to the Victaulic Vortex system, but some or all of them could be applied to other present or future systems, as well.

(1) The present standards for water mist systems (750) and clean agent systems (2001) are inadequate for the hybrid system(s). NFPA 750 requirements address systems with high pressures and pinhole nozzles requiring much more stringent piping standards than the Vortex system. NFPA 2001 requirements for discharge duration and system design also ignore the advantages of a hybrid system. Since this type of system is not accommodated by either standard, a new standard needs to be developed.

(2) A related issue is the type of hazard that can be protected. The Vortex system uses both cooling and nitrogen to combat fires. This makes it effective in a variety of applications such as flammable liquid fires, IT rooms, and high voltage switchgear rooms (proven through independent testing).

However, to the extent that the Vortex system is identified as a water mist system, the approval agencies limit the type of hazards that can be protected to those typically protected by the traditional water mist systems (machine spaces and turbines).

(3) The hybrid system has other advantages that comparative fire systems do not include. The ability to protect volumes with un-closeable openings with almost no wetting is only one example. The unique qualities of the system need to be recognized and codified.

(4) Another related subject is the application of local application systems using Vortex. To date the only special hazards system with this ability is Carbon Dioxide, and NFPA should consider that use of CO2 may become more restricted in the future. It would be worthwhile to have an alternate system available.

I hope this proves helpful and informative. Feel free to contact me with any questions or for additional comments / discussion.

Thank you.

Jeff Hausmann SET | Engineered Systems Sales
Fire Systems and Gas / Leak Detection Systems
NICET level IV - fire alarm systems | NICET level IV - special hazards systems | Cert #121209

Fire Equipment Company, Inc | Detroit Michigan USA
phone (313) 891-3164 | fax (313) 369-2533 | mobile (313) 300-2123
http://www.fireequipco.com
5/29/2013

Amy Cronin
NFPA Standards Council Secretary
1 Batterymarch Park
Quincy, MA 02169

RE: Proposed Standard: Hybrid Gas and Fine Water Droplet Systems

Dear Ms. Cronin,

This letter is in reference to the proposed standard for Hybrid, gas and fine water droplet systems.

Our company is an integrator for the Victaulic Vortex hybrid water/inert gas fire suppression system. The Vortex system relies on a combination fine water droplet and nitrogen gas which cools to extinguish a fire.

We are finding it difficult to obtain approval for the installation of the hybrid systems from the local AHJ due to the lack of an NFPA standard governing the installation of hybrid water/inert gas systems.

We are unable to submit plans under the guidance of NFPA 750; Standard on Water Mist Fire Protection Systems, due to the primary suppressant being the inert gas.

We are unable to submit plans under the guidance of NFPA 2001; Standard on Clean Agent Fire Extinguishing Systems, because the amount of water in the hybrid system exceeds the minimum allowed by NFPA 2001.

Battalion One Fire Protections encourages the development of a new standard to govern the application of hybrid gas and fine water droplet systems.

Sincerely,

Michael Herbert
President
To NFPA Standards Council:

I have worked in the fire protection industry for 30 years which included installation, contracting and the manufacturing of automatic sprinkler systems, foam, clean agents, halon 1301 and carbon dioxide gaseous fire suppression systems. I have also been responsible for the development and testing, for listing and approval (by UL and FM), of FM-200, IG-55, Novec 1230 and water mist systems.

Recently The NFPA 750 Technical Committee decided that hybrid systems are outside the current scope of NFPA 750 even though the primary extinguishing mechanism of the hybrid systems typically meet the same criteria as many approved water mist systems. 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.

I request that the NFPA Standards Council include a chapter on hybrid systems in NFPA 750 or recommend that the Standards Council and NFPA establish a new committee project to create a standard covering hybrid systems that use a combination of inert gas and very fine water droplets to extinguish fire.

Thank you for this consideration.

Daniel Hubert
Director, Product Development

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Dear Ms. Maynard,

Could you please reference the e-mail below for our support of a new project on Hybrid, Gas and Fine Water Droplet Systems.

Thank you in advance for your assistance.

Robert Kasiski | Senior Engineering Specialist  
Engineering Standards - Protection Grp.| P.O. Box 9102 | 1151 Boston-Providence Tpke. | Norwood, MA 02062 USA  
T: 781.255.4773 | IT: 8121 4773 | F: 781.551.9775 | E: robert.kasiski@fmglobal.com  
www.fmglobal.com

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Codes and Standards Administration,

This is to advise the Standards Council that FM Global is in support of the NFPA developing a new standard for the application of hybrid, gas and fine water droplet systems. Our research has indicated the extinguishing mechanism to be different than that of either an inert gas fire extinguishing system or a water mist fire extinguishing system which is covered by NFPA 2001 and NFPA 750, respectively. Such that it is outside the purpose and application of those two standards and development of a new standard is warranted.

FM Global is the process of developing a specific Property Loss Prevention Data Sheet for hybrid fire extinguishing systems. FM Approvals has developed an independent Approval Standard, Class 5580, Approval Standard for Hybrid (Water and Inert Gas) Fire Extinguishing Systems, November 2012 for the listing of this equipment. There are currently two manufacturers, Victaulic and Tyco which have their Vortex and Aquasonic products currently listed by FM Approvals.

If you should have any further questions, please do not hesitate to contact me directly.

Very truly yours,

Robert Kasiski
Maynard, Mary

From: Kopp, Ruediger [ruediger.kopp@fogtec.com]
Send: Wednesday, May 29, 2013 9:26 AM
To: stds_admin
Cc: Lakkonen, Max
Subject: Comment on New Project

FOGTEC would like to comment on a proposed new standard for the application of hybrid, gas and fine water droplet systems.

As water mist developer and manufacturer FOGTEC has evaluated the requirement for an additional new standard for hybrid, gas and fire water droplet systems. We came to the conclusion that these systems should be covered either by the existing gas extinguishing standard if gas is the dominant extinguishing agent or by the existing water mist standard if the fine water droplets are the main extinguishing agent. We do not see the need for an additional new standard.

Being a member of the NFPA 750 technical committee, we would like to raise the subject in this committee. However, FOGTEC is very interested to become a member of the new standard committee for hybrid systems, in case this is initiated.

Best regards,

ppa. Ruediger Kopp, Dipl.-Ing.
General Manager
Fixed Systems

The Smarter Way of Fire Fighting

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Maynard, Mary

From: Matthew M. Euson [MEuson@3s-incorporated.com]
Sent: Thursday, May 23, 2013 2:23 PM
To: Maynard, Mary
Subject: FW: New NFPA Standard Support - Hybrid, gas and fine water droplet systems

NFPA Standards Council,

As a 14 year veteran of the fire suppression industry and as a Board of Directors member of the Fire Suppression Systems Association, I write in support of a new standard for hybrid, gas and fine water droplet systems.

Unfortunately this technology is not recognized by NFPA 750 or NFPA 2001/12 which leaves end users, installers, AHJs, insurance companies and 3rd party testing agencies very little by way of guidance for the installation and maintenance of these types of systems. The lack of a standard for these types of systems has prevented the “right” fire protection solution from being applied in some cases. This is one of the best fire protection innovations in years yet a the absence of a standard is preventing its application.

I encourage NFPA to seriously consider the establishment of a separate standard for hybrid, gas and fine water droplet systems. 3S would be glad to support this effort in any way we can, including participating as a member of the technical committee. Please contact me directly if you have any questions.

Best,

Matt Euson
President, 3S Incorporated
Board of Directors, FSSA
Alternate NFPA 33
Technical Committee Member, FSSA
Previous Chairmen Installers Division, FSSA
NICET II – Special Hazards

MATT EUSON, President

513-202-5070 (w) | 317-696-2226 (m) | MEUSON@3S-INCORPORATED.COM
8686 Southwest Parkway | Harrison OH | 45030

SPECIAL HAZARD FIRE SUPPRESSION SYSTEMS
Memo

To: National Fire Protection Association
   ATTN: Amy Cronin, Standards Council Secretary
From: Shawn Mullen, SET (NPFA Member #125399)
Page: 1 of 1
Date: May 23, 2013
Re: Support for new standard for hybrid, gas and fine water droplet systems

Amy:

As a 28 year veteran of the special hazards fire suppression industry and from my vantage point as past president of the Fire Suppression Systems Association, I write in support of a new standard for hybrid, gas and fine water droplet systems.

The innovative technology involved with these hybrid systems is not adequately addressed by any existing NFPA standard whether it be NFPA 13, NFPA 15, NFPA 750 or NFPA 2001. Because of the lack of any clear and definitive standard, these new hybrid systems are at a disadvantage in the marketplace. AHJ’s, insurance underwriters, owners, engineers and other stakeholders are reluctant to embrace these systems because of no nationally recognized standard to which they can look for guidance in the design, installation, testing and maintenance of these systems. Moreover, independent third party testing agencies are prevented from listing such systems without the existence of a nationally recognized standard from an organization such as NFPA.

As an installer of special hazards systems including clean agent and water mist systems, I see a clear need for an independent standard. Too often we see applications that have to settle for a less than optimum solution because there is no national standard to which they can turn for reference and support. This is a disservice to a marketplace that is innovating new products and systems, yet is prevented from the benefits of similar fire suppression innovation because of the lack of a standard.

I encourage NFPA to seriously consider the establishment of a separate standard for hybrid, gas and fine water droplet systems. If need be, I would be willing to consider submitting my qualifications and resume for membership on such a new standard committee. Feel free to contact me if I may be of further assistance to the Standards Council in considering this important request.
Amy Cronin, Standards Council Secretary  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02269

Comments on Proposed New Standard for Hybrid, Gas and Fine Water Droplet Systems

Dear Ms Cronin:

Since Victaulic is the company that has requested Council that a new standard for hybrid, gas and fine water droplet systems be established, it seems obvious we support the development of a new document and creation of a separate technical committee to administer it. If Council makes the decision to proceed with a separate TC, we would of course be prepared to participate. I would like to emphasize a few points with respect to our Mr. Reilly’s request for a new standard project based on Council’s request for comments.

There are currently three manufacturers of hybrid water and gas systems with some form of global laboratory Listing. I believe there are enough commonalities with the Victaulic, Siemens, and Tyco’s hybrid systems to successfully develop system design and installation criteria. For example, both Tyco and Victaulic have FM Approvals for machine room and combustion turbine enclosures. There are many other applications and potential application for hybrid systems as stated by Mr. Reilly in his project request including electronic and telecommunication equipment areas, flammable liquids storage and process areas to name a few.

Council has also asked if this subject could be covered by an existing TC. Our first preference would be that a new document is created where the manufacturers, installers, end users, etc. have experience with the design, installation, and maintenance of these types of suppression systems. Our second choice would be that the NFPA 750 Technical committee be directed by Council to include this technology into the body of this standard. Hybrid systems are actually within the current scope of the document, but the TC has rejected proposals made by us to define and include relevant design and installation criteria into this standard. Besides a couple of manufacturers and the test laboratories there doesn’t appear to be anyone on the TC with experience in this technology.
We do not feel the NFPA 2001 standard is the correct document for the inclusion of hybrid system criteria. There would have to be changes made to the scope as well as the existing design criteria (including time delays, disconnect switches which are inappropriate). This TC is not populated with members with expertise in combination water/inert gas technology and this would need to be addressed. The fundamental problem with incorporating hybrid systems in either NFPA 750 or 2001 is the extinguishment mechanism; either through inerting, or heat absorption/cooling, is very much dependent on the hazard being protected. An understanding of both mechanisms and their contribution is necessary.

I would like to thank the Standards Council for its time and consideration in this matter.

Very truly yours,

[Signature]

Peter W. Thomas
Director, Fire Suppression Codes and Standards
Maynard, Mary

From: Paquet, Joan (J.) [jhiggi37@ford.com]
Sent: Monday, May 20, 2013 3:31 PM
To: Maynard, Mary
Subject: Hybrid Suppression Systems

Amy,

I believe that there needs to be a standard on hybrid fire protection systems. I have installed a couple of the systems in our manufacturing plants. As usual, I look for an UL and/or FM approval on the system. In this case, there was only an FM approval. I believe that there needs to be information available on these systems in the NFPA standards. It is difficult for me to always make the right decision when all I have to go on is information from the manufacturer. I like the NFPA standards, because I know that a group of subject matter experts write it.

For example, I was concerned about the level of oxygen in the room after the hybrid system activated for a few minutes. It would be nice to know when and when I can’t install a hybrid system. What about installing a hybrid system next to a standard sprinkler system. NFPA standards have also been a useful tool in helping me make the right decision for Ford.

I am all for NFPA either having a separate standard for hybrids or combining it with another standard.

Just my thoughts.

Regards,

Joan Paquet (Higgins)
Fire Protection Engineering Manager
313-323-6916

Fire Bulletins- access only available on Ford network

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To whom it may concern,

ADA Technologies is a small company currently developing innovative hybrid water mist systems for government customers (NASA, Department of Defense, FAA, etc...). Our mid to long term objectives are to re-engineer and commercialize to a broader customer base these products. We have reviewed the NFPA 750 standard on water mist systems and submitted a number of comments in the last revision cycle (2014 cycle). Our approach to generating water mist is different from currently manufactured water mist systems and our systems will not fit NFPA 750 unless significant and drastic modifications are implemented. Based on our experience, this is very unlikely.

We welcome and enthusiastically support the creation of a separate standard for hybrid water mist systems. Hybrid systems can take many forms, some of them are yet to be developed and commercialized as more manufacturers discover ways to harness the combined capabilities of finely atomized water (or other liquids) with carrier gases to suppress fires. The customer demand for highly effective and specialized fire suppression systems will increase and we believe that hybrid water mist systems will offer a more diverse array of systems to choose from. In turn, once a new standard is established, new systems will be marketed and customers’ needs will be better addressed.

Please convey our support for this new standard to the appropriate review committee members. Should you have any questions or desire to follow up with ADA Technologies, please contact me at your convenience. My contact information is included below in the signature.

Best regards,

Thierry

Thierry Carriere, Ph.D.
Technology Director, Fire Safety Program
ADA Technologies, Inc.
8100 Shaffer Parkway, Suite #130, Littleton, CO 80127
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ThierryC@adatech.com
May 29, 2013

Ms. Amy Cronin
Secretary, Standards Council
National Fire Protection Association
1 Batterymarch Park
Quincy, MA  02169-7471

Re: Hybrid Water Mist Systems – Support for New Standard

Dear Ms. Cronin:

In conjunction with the Standards Council’s request for public comment on the need to establish a new standard for hybrid water mist systems, we would like to express our opinion on this matter. This would have the effect of separating these systems from standard water mist systems in the NFPA standards, specifically NFPA 750.

We are submitting this letter in support of this request for a separate standard.

We are an integrator for two (2) of the water mist manufacturers and have several years experience engineering and installing these systems. We have found that there is a large market for the hybrid water mist technology. However, we constantly run into problems with the insurance companies and AHJs with the “approvals” and conformance to NFPA 750.

Summary: NFPA 750, Standard on Water Mist Fire Protection Systems, was originally written to cover single fluid, high pressure water mist systems. There have been some minor modifications to accommodate other systems. But, these modifications are totally inadequate to properly reflect the unique operating characteristics of the newer hybrid systems and to give the approval agencies (primarily FM), end-users, insurance companies and the AHJs guidance in their use and application. A new standard is required.

Our primary reasons for supporting this request are as follows:

1. The existing Standard on Water Mist Fire Protection Systems, NFPA 750, does not adequately represent the differences between the “single fluid” systems and “twin-fluid” systems.
   a. Specifically, the existing standard does not recognize the use of nitrogen in the extinguishing mechanism for certain systems. Nitrogen is not even mentioned as far as we could find. Air is mentioned. (See Item #4 below.) The standard seems to assume the air (or nitrogen) is merely the “atomizing media”.
   b. For some systems, the nitrogen is an integral part of the extinguishing process and must be recognized as such.
   c. The standard does not address the O₂ depletion in an enclosed space when discharging some of the hybrid (nitrogen / water) systems. This is a critical safety concern. The discharge time must be balanced against the O₂ level in the protected space to achieve the desired O₂ concentration, typically 14 – 16% - safe to breathe, but inert to fire.
d. The existing standard does not adequately represent the piping system needed for hybrid water mist systems that operate at only 1.7 bar (25 psi). (See NFPA 750, 5.4.2.)

2. The wording of the existing standard specifies that the water mist systems must be listed for the intended application. (See NFPA 750, 8.1.1 and 8.2.4.2.)

   a. This is an onerous requirement.

   b. The time and costs involved for specific application listing (FM has the only testing standard) has been a severe restraint on the use of water mist systems in North America. Insurance companies, AHJs and end-users look for “listed” systems in choosing and approving systems. This has severely limited the use and acceptance of water mist systems, especially in a time when there is significant environmental pressure on some of the other agents.

   c. Often, test standards don’t exist and need to be established before testing can even begin. This adds significant cost to an already very expensive approval process and can add a couple years to the process.

   d. The test standards are established around the requirements in NFPA 750, few of which apply to hybrid (nitrogen / water) water mist systems. The result is listed hybrid water mist systems can rarely be used in accordance with the listing. For this reason, the use of water mist systems in general, and hybrid water mist systems in particular, have not gained the wide acceptance that they have in other parts of the world.

   e. No other extinguishing or suppression agent in use has this requirement for individual application listing.

3. The discharge duration time is listed as 30 minutes (See NFPA 750, 10.3.1 (1)), although this is modified by the following 2 sections.

   a. This is modified by 10.2.1 (2), but only for “pre-engineered systems. This section specifies a completely redundant discharge capability or twice the time required to extinguish the fires. The “assumption”, as with standard intermediate and high pressure systems, is that once the discharge stops the capability to extinguish the fires also stops. This gives no credit for the nitrogen content in an enclosure nor to the very small water droplet size that remains suspended and continues to both extinguish and inert.

   b. Section 10.3.1 (3), allows a specific hazard evaluation. This is meaningless for the vast majority of the applications as neither the insurance company nor the AHJ can evaluate the analysis nor has the background or experience to understand it. Thus, they revert to the code – 30 minutes.

   c. The discharge duration makes the hybrid systems very expensive and renders them unsuitable for 99% of the applications without adding any benefit to the capability of the system.

4. NFPA 750, 10.6 is titled Atomizing Media for Twin-Fluid Systems. This lists “Plant Air” (10.6.2) and “Air Compressors” (10.6.8). This completely ignores the dual role the nitrogen plays as both the atomizing media and, more importantly, the role it plays in the extinguishing and inerting of the area.

5. NFPA 750 does not even define a hybrid water mist system correctly. An end-user, insurance company or AHJ will find no reference in NFPA 750 to a “hybrid water mist system”.
a. 3.3.18 defines a “Twin-Fluid System” as having water and the atomizing media mixed at the nozzle. No mention is made of the dual extinguishing characteristics of a true “hybrid” system using nitrogen and water.

b. 3.3.21.2 defines a Hybrid Water Mist Nozzle as having the capability to operate both by automatic and nonautomatic means. This may be the only reference in the standard to “hybrid”.

6. There are numerous design details in the existing standard that are either not pertinent to hybrid systems or ignore design details critical to them. A couple of the items are:

a. The piping charts do not list black steel pipe. Why? Unfortunately, an AHJ will interpret this to exclude the use of black pipe for the nitrogen.

b. Screwed unions cannot be used on pipe larger than 51 mm (2”). Why? This may be a good requirement for intermediate and high pressure systems, but has no meaning for low pressure systems and for nitrogen pipe.

c. The Figure A.11.1.6 (c) shows a schematic representation of a low pressure twin-fluid water mist system. However, this isn’t even close to a hybrid water mist system. A hybrid system is not shown.

We support establishing a new standard on hybrid water mist systems. In our opinion, trying to modify the existing standard to suit the hybrid systems would not be practical and has not yielded results to date.

Should a new standard be approved by the Standards Council, we would be willing to serve on the technical committee.

Please let me know if you have any questions with the above.

Thank you for your consideration.

Very truly yours,

3S Incorporated

[Signature]

Thomas G. Euson
Vice President

Chair, NFPA Committee on Finishing Processes

cc: Matt Euson, 3S
Mrs. Cronin:

I am writing in support of consideration for the development of an NFPA standard for hybrid fire suppression systems. The back and forth between 750 and 2001 is clumsy and not very surefooted. This technology has great potential, especially in remote areas with insufficient water infrastructure.

Respectfully,
--

Curtis E. Troutt
National Park Service
Pacific West Region Fire Marshal
333 Bush Street; Suite 500
San Francisco, CA 94104-2828
Ph: 415 623 2182
-----Original Message-----
From: Robert T. Wickham [mailto:rtwickham@comcast.net]
Sent: Sunday, April 14, 2013 9:14 AM
To: stds_admin
Subject: Comment on New Project

I would like to write in support of a new project for gas and water hybrid systems.

Further, I would like to suggest the creation of a new technical committee for the development of a standard for these systems. I do not believe that the technical committees responsible for NFPA 2001 and NFPA 750 have shown any interest in this subject. In that regard, I would like to point out I am a member of the Technical Committee on Gaseous Fire Extinguishing Systems.

As we learned with the development of NFPA 2010, the Standard for Fixed Aerosol Fire Extinguishing Systems, a technical committee dedicated to the development of that standard completed its assignment in near record time without the distraction of trying to accommodate competing technologies as would be the case if the project were assigned to the technical committee for NFPA 2001 or NFPA 750. I served as the first chair of the Technical Committee on Aerosol Extinguishing Technology and I am prepared to apply for membership on a new committee to develop a new standard for gas and water hybrid systems in the SE member category.

Robert T. Wickham
9 Winding Brook Drive
Stratham, NH 03885 USA
Telephone: 603-772-3229
Mobile: 603-770-1325
mailto:rtwickham@comcast.net
New Project Initiation Form

a. Explain the Scope of the new project/document:

Develop a new standard for the application of hybrid, gas and fine water droplet, systems.

b. Provide an explanation and any evidence of the need for the new project/document:

The hybrid system uses a combination of inert gas and fine water droplets. These two suppressants act together, with one or the other being the primary suppressant depending on enclosure volume and fire size, to extinguish a fire. The technology has some properties of inert gas systems covered by NFPA 2001 and some properties of water mist systems covered by NFPA 750. The technology appears to be outside the scope of NFPA 2001 which specifically excludes systems which use water as a fire extinguishing agent. We have likewise been told that hybrid systems lie outside the scope of NFPA 750 which “addresses the use of fine water sprays for the efficient control, suppression, or extinguishment of fires using limited volumes of water.” The inert gas in the hybrid system may be the primary suppressant.

Hybrid systems have been successfully applied for special hazards protection – but their optimum use and acceptance by authorities having jurisdiction is greatly hampered by lack of a NFPA Standard for these systems. Most authorities having jurisdiction wish to reference an NFPA standard as part of any approval of a fire protection system.

Furthermore, most AHJs require third party listing or approval of fire protection equipment. Nationally recognized testing laboratories generally do not consider systems for listing or approval unless a national standard such as an NFPA Standard exists for the type of system. Our company, Victaulic, has not been given the opportunity to obtain third party listing or approval in part because of lack of a NFPA standard for the hybrid technology.

Therefore in order for the hybrid technology to be used in an optimal manner for public safety an NFPA standard setting forth minimum requirements for application of the technology is needed.

There have been a number of very good applications for hybrid systems which settled for lesser fire protection options because no recognized standard exists for hybrid systems. Among the actual applications for which hybrid was chosen as the preferred fire protection option, but rejected for lack of a standard, are an ink storage room, jet engine test cells, mine control rooms, electric cable spread vaults, a rare book library, microwave repeating stations, a steel pickling line, and pharmaceutical cold storage applications. A list of actual specific projects which would have been served by hybrid technology but were instead served by technologies which were less suitable or proceeded without automatic fire protection because a nationally recognized standard for hybrid systems does not exist is given in Attachment 3.

c. Identify intended users of the new project/document:

Current and potential manufacturers, designers, installers, AHJ’s, and end users of the hybrid system.

Please see Attachment 1 for list of applications which can be served by hybrid systems.

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:

Installers, and AHJ’s as well as risk advisers, including several FM Global field engineers who have asked to be able to use the system. Please see Attachment 2 for contact information.

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:

The hybrid systems currently manufactured by Victaulic, TYCO and Siemens will have a national standard covering the installation and use of these systems.
Underwriters Laboratories will have a standard which may be used to potentially list hybrid systems. FM Global, which currently has a test standard for hybrid systems, will have a national standard for application of these systems.

Insurance underwriters, fire code officials, system integrators and installers, as well as end users will have a standard for application, design, installation and maintenance of hybrid systems.

f. Identify other related documents and projects on the subject both within NFPA and external to NFPA:

As noted above in (b), NFPA 750 and 2001 cover related technologies. NFPA 13 and NFPA 15 are related in that they cover water sprinkler systems. The hybrid technology, however, depends in part on water but also depends in large part on nitrogen which serves as a gaseous extinguishing agent.

g. Identify the technical expertise and interest necessary to develop the project/document, and if the committee membership currently contains this expertise and interest:

Scientists and engineers who have done basic research and testing of hybrid systems available from system manufacturers and from FM Global.

Installation contractors for hybrid systems. Submitter can supply list of potential contributors from installation contractors.

Fire protection engineers experienced in protection of special hazards

AHJs and end users with an interest in protection of special hazards

h. Provide an estimate on the amount of time needed to develop the new project/document:

Six to nine months from initiation of project to develop a draft document for public review.

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:

Victaulic will share test data developed by Factory Mutual Research as well as testing done by Victaulic and witnessed by UL and FM.

Victaulic has application, installation and maintenance information which will be made available for development of the standard.

Victaulic will share an extensive number of internal fire test results with the group developing the standard. FM Global has published test criteria for hybrid systems which will be available.

Please send your request to:
NFPA
Codes and Standards Administration
1 Batterymarch Park
Quincy, MA 02169
Stds_admin@nfpa.org
Rev. 10/09

Signature: 

Name: William Reilly
(please print)

Affiliation: 

Page 2 of 5

July 22, 2013 
Supplemental Agenda July 29-August 1, 2013 
Page 1368 of 1861
• **Power Generation**
  - Base Load Plants
  - Co-Generation and Combined Cycle Plants
  - Power Parking Units
  - Coal Conversions
  - Coal Storage/Handling/Pulverizing
  - Gas Turbines
  - Machinery Spaces
  - Generator Rooms
• **Cement Plant/Blast Furnace**
  - Indirect Coal Firing Systems
• **Industrial Ovens**
  - Carbon Fiber Manufacturing Ovens
• **Metal Production and Processing**
  - Electrical Furnaces
  - Continuous Casters
  - Rolling Mills (steel and aluminum)
  - Coating Lines
  - Packaging Areas
  - Pickle and Annealing Lines
  - Pulpits
• **Automotive**
  - Assembly
    • Paint application
    • Mixing and storage
  - Parts
    • Machining
    • Heat Treating
• **Electronic Operations**
  - Computer Areas
  - Automated Information Storage Areas
• **Electronic/Computer Production**
  - Wet Benches
  - Wave Soldering Machines
• **Data Processing Rooms**
• **Underground Storage Vaults**
• **Research Facilities**
  - Test Facilities
  - Anechoic Chambers
• **Telecommunications Facilities**
• **Rare Book Libraries**
• **Museums**

Formerly SC Item 13-3-20
- Petrochemical and Medical Facilities
- Laboratories
- Printing
  - Newspaper Production
  - Periodical Printing
- Coating Lines
- Food Processing
The following is a list of contacts who have expressed an interest in hybrid systems. End users and AHJs represent companies or jurisdictions which desired to use hybrid systems for specific applications, but due to lack of a nationally recognized standard covering hybrid systems, were unable to approve the use of the hybrid technology for their application. The installers have had field experience with hybrid systems – both installing them in certain applications and being denied opportunity to install hybrid systems in other applications due to lack of a nationally recognized standard. The Fire Suppression System Association (FSSA) is the largest trade association of special hazards systems installers and manufacturers – the FSSA has indicated it wishes to see a standard developed for hybrid systems.

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Class</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Equipment, Inc.</td>
<td>Medham, MA</td>
<td>I</td>
<td>Scott Donehey</td>
</tr>
<tr>
<td>Nexus Alarm and Suppression</td>
<td>Tempe, AZ</td>
<td>I</td>
<td>John Henze</td>
</tr>
<tr>
<td>Eastman Chemical Co.</td>
<td>Kingsport, TN</td>
<td>E</td>
<td>Keith Boyd</td>
</tr>
<tr>
<td>Troy Co.</td>
<td>Ft. McMurray, AB</td>
<td>E</td>
<td>Don Dutton</td>
</tr>
<tr>
<td>New Brunswick Power</td>
<td>Pt. Lepreau Nuclear Power Plant (NB Canada)</td>
<td>E</td>
<td>Trevor Severin</td>
</tr>
<tr>
<td>Factory Mutual</td>
<td>FM Canada</td>
<td>AHJ</td>
<td>Francisco Garcia (Asst. VP)</td>
</tr>
<tr>
<td>Princeton University</td>
<td>Princeton, NJ</td>
<td>AHJ/E</td>
<td>John Glasson (FPE)</td>
</tr>
<tr>
<td>3S Incorporated</td>
<td>Cincinnati, OH</td>
<td>I</td>
<td>Tom Euson</td>
</tr>
<tr>
<td>Cold Storage Facility</td>
<td>Swiftwater, PA</td>
<td>AHJ</td>
<td>Steve McManus (Fire Marshall)</td>
</tr>
<tr>
<td>Fire Suppression Systems Association</td>
<td>Baltimore, MD</td>
<td>A</td>
<td>Crista LeGrand, Executive Director</td>
</tr>
</tbody>
</table>

Classes:

1. System Integrator/Installer
2. End user
3. Authority having Jurisdiction (Fire Marshall, Insurance Underwriter)
4. Trade Association
September 14, 2012

Amy Cronin  
Secretary of the Standards Council  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169-7471

RE: Request for New Committee Project – Standard for Hybrid Fire Extinguishing Systems

Ms. Cronin:

I am writing on behalf of the Fire Suppression Systems Association (FSSA). The FSSA is an association of manufacturers and installers of special hazards fire extinguishing systems.

The FSSA is requesting that the NFPA establish a new committee project to write a standard covering fire extinguishing systems that use a combination of inert gas and very fine water droplets, known as “hybrid systems.” A number of our member companies are involved in either manufacturing such systems or installing such systems. These systems utilize inert gas to reduce the oxygen concentration in the protected space below that required to sustain combustion and very fine water droplets which cool the protected space extracting considerable heat from the fire zone. The two fold attack of oxygen reduction and cooling is extremely effective for many types of fires.

Attempts have been made to include hybrid systems under NFPA 750, the standard on water mist systems. These attempts have been rejected by the NFPA 750 technical committee. 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 spray (mist) that absorbs heat, displaces oxygen, or blocks radiant heat” as required under NFPA 750.

NFPA 2001 on Clean Agent Fire Extinguishing Systems addresses systems which use inert gas to extinguish fire. FSSA, however, opines that hybrid systems are outside the scope of NFPA 2001 because the water component of the hybrid system generally leaves some residual water on surfaces within the protected space. Thus the system does not meet the intent of the definition of a “clean agent” in NFPA 2001.
Although Factory Mutual has approved hybrid systems for use in specific FM insured facilities, our member companies are experiencing difficulties in providing hybrid systems for facilities which are not insured by FM because there is no national standard covering such systems. Lack of a national standard covering hybrid systems hampers the use of such systems even when the hybrid system provides the best option for fire extinguishment in a given hazard area. Also lack of guidance for use of hybrid systems leaves the authorities, other than FM, who wish to utilize the hybrid technology without the type of definitive guidance provided by a national recognized consensus standard.

For the above reasons, the FSSA requests that the 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.

Best regards,

Crista LeGrand, CAE, CMP
Executive Director

cc: FSSA Board of Directors
January 31, 2013

Ms. Linda Fuller  
Manager, Codes and Standards Administration  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA  02169-7471

Re:  Hybrid Water Mist Systems – Support for New Standard

Dear Ms. Fuller:

It is my understanding that the Standards Council will soon consider a request to establish a new standard for hybrid water mist systems. This would have the effect of separating these systems from standard water mist systems in the NFPA standards.

We are submitting this letter in support this request for a separate standard.

Our primary reasons for supporting this request are as follows:

1. The existing Standard on Water Mist Fire Protection Systems, NFPA 750, does not adequately represent the differences between the “single fluid” systems and “twin-fluid” systems.
   a. Specifically, the existing standard does not recognize the use of nitrogen in the extinguishing mechanism for certain systems. Nitrogen is not even mentioned as far as we could find. Air is mentioned. The standard seems to assume the air (or nitrogen) is merely the “atomizing media”.
   b. For some systems, the nitrogen is an integral part of the extinguishing process and must be recognized as such.
   c. The standard does not address the O₂ depletion in an enclosed space when discharging some of the hybrid (nitrogen / water) systems. This is a critical safety concern. The discharge time must be balanced against the O₂ level in the protected space to achieve the desired O₂ concentration, typically 14 – 16% - safe to breathe, but inert to fire.
   d. The existing standard does not adequately represent the piping system needed for hybrid water mist systems that operate at only 1.7 bar (25 psi).

2. The wording of the existing standard specifies that the water mist systems must be listed for the intended application.
   a. This is an onerous requirement.
   b. The time and costs involved for specific application listing (FM has the only testing standard) has been a severe restraint on the use of water mist systems in North America. Insurance companies, AHJs and end-users look for “listed” systems in choosing and approving systems. This has severely limited the use and acceptance of water mist
systems, especially in a time when there is significant environmental pressure on some of the other agents.

c. Often, test standards don’t exist and need to be established before testing can even begin.

d. The test standards are established around the requirements in NFPA 750, few of which apply to hybrid (nitrogen / water) water mist systems. The result is listed hybrid water mist systems can rarely be used in accordance with the listing. For this reason, the use of water mist systems in general, and hybrid water mist systems in particular, have not gained the wide acceptance that they have in other parts of the world.

e. No other extinguishing or suppression agent in use has this requirement for individual application listing.

3. There are numerous design details in the existing standard that are either not pertinent to hybrid systems or ignore design details critical to them.

We support establishing a new standard on hybrid water mist systems. In our opinion, trying to modify the existing standard to suit the hybrid systems would not be practical and has not yielded results to date.

Please let me know if you have any questions with the above.

Thank you for your consideration.

Very truly yours,

3S Incorporated

Thomas G. Euson
Vice President

Chair, NFPA Committee on Finishing Processes

cc: Matt Euson, 3S
Report on Proposals F2009 — Copyright, NFPA

Committee Statement: A task group has been formed to review these issues and provide comments to address them.

Number Eligible to Vote: 27
Ballot Results: Affirmative: 22

750-33 Log #CPI18 Final Action: Accept
(8.1.1)

Submitter: Technical Committee on Water Mist Fire Suppression Systems
Recommendation: Revise paragraph as follows:
8.1.1 Listing. Water mist protection systems shall be designed and installed in accordance with their listing for the specific hazards and protection objectives specified in the listing.

Substantiation: Editorial revision removing redundant language.
Committee Meeting Action: Accept
Number Eligible to Vote: 27
Ballot Results: Affirmative: 22

750-34 Log #3 Final Action: Accept
(5.4.2.2)

Submitter: William J. Reilly, Victaulic Company
Recommendation: Revise text to read as follows:
4.2.2.2 Airflow at each nozzle shall be dependent on water pressure at the nozzle. The gas and water ratios and operating pressures for all nozzles in the system shall be within the manufacturer's listed limitations.

Substantiation: In some technologies the gas flow is not directly dependent on the water pressure at a nozzle. The real intent of this paragraph is that the gas and water ratios must be within the operating limits established in the listings/approvals of the systems. Those listings/approvals take into consideration both the fire performance and the methods to adequately predict the flow for both the water and gas components. The proposed revision more completely describes the outcome sought by this paragraph.
Committee Meeting Action: Accept
Number Eligible to Vote: 27
Ballot Results: Affirmative: 22

750-35 Log #7 Final Action: Reject
(10.3.1)

Submitter: William J. Reilly, Victaulic Company
Recommendation: Add new text to read as follows:
10.3.1
(4) For systems employing nitrogen or argon as the atomizing medium, the following requirements apply:
(4)(a) The discharge time shall be no less than 20% longer than that determined necessary for extinguishment in approval fire tests.
(4)(b) The quantity of water and the quantity of inert gas shall be no less than 20% more than the quantities of each determined necessary for extinguishment in approval fire tests.
(4)(c) The discharge time and agent quantity of inert gas shall not exceed that which will result in a residual oxygen level of 12% or less.

Substantiation: Fire testing has demonstrated the synergistic effect of employing water mist together with an inert gas in a twist fluid system. The performance is so convincing that agent quantities, flow rates and discharge times similar to those required for inert gas agents in NFPA 2001 seem more appropriate for these twist fluid systems than those traditionally used for water (alone) systems. While paragraph 10.3.1(3)(b) allows discharge times other than that required by paragraph 10.3.1(c), it does so without providing the users of the standard any useful guidance. The proposed additional text does provide measurable guidance that can be employed and enforced.
Committee Meeting Action: Reject
Committee Statement: This proposal represents a considerable departure from the present system design. It is premature for the committee to approve this proposal without reviewing the fire test record that supports it.
Number Eligible to Vote: 27
Ballot Results: Affirmative: 22

750-36 Log #8 Final Action: Accept in Part
(10.5.1)

Recommendation: Add new material to Section 10.5.1.
10.5.1 To prevent the growth of bacteria harmful to public health in reservoirs of stored water shall be employed whenever there is a possibility of persons being exposed to water mist.

A.10.5.1.4 The potential growth of legionella bacteria in stored water supplies is a significant concern where water mist systems are utilized in public spaces. Measures to prevent such growth include the use of ultra-violet light inserts in the reservoir that continuously circulate water. Stored water supplies should be tested for legionella bacteria at the semi-annual and annual maintenance intervals.

Substantiation: An article in a 2006 issue of Plumbing Engineer raised a concern that has implications for water mist fire protection systems. Legionella bacteria that may exist even in potable water can be spread through the air by fine water mists which, if inhaled into the lungs, can cause serious or fatal pneumonia. Although NFPA 750 requires that the water supply be from a potable water source, the article establishes that even potable water systems may contain the bacteria. Furthermore, there are types of water mist systems where potable water may be stored in a break tank or reservoir where the conditions discussed in the article could develop. A review of this potential hazard is in order. Measures in NFPA 750 to prevent or control bacterial growth in stored water should be reviewed and if necessary strengthened.
Note: Supporting material is available for review at NFPA Headquarters.
Committee Meeting Action: Accept in Part
Do not accept proposed 10.5.1.4.
Accept the proposed Annex language.
Committee Statement: Given the limited information regarding the effectiveness of mitigation efforts it is not appropriate to place this language as a recommendation but is appropriate to have information presented in the Annex.
Number Eligible to Vote: 27
Ballot Results: Affirmative: 21 Negative: 1

Explanation of Negative: OWEN, L.: 750-36, Log 8 recommends placing the following wording in the Appendix:

A.10.5.1.4 The potential growth of legionella bacteria in stored water supplies is a significant concern where water mist systems are utilized in public spaces. Measures to prevent such growth include the use of ultraviolet light inserts in the reservoir that continuously circulate water. Stored water supplies should be tested for legionella bacteria at the semiannual and annual maintenance intervals.
I vote negative on Proposal 750-36 for the following reasons:
1. There are no documented cases of legionella bacteria from water mist systems creating any type of health issues.
2. The stored water in water mist systems is changed out on an annual basis. If the water is changed out, there is no reason to test the water.
3. There is no defined level of legionella bacteria established by the recommendation as being safe or hazardous.
4. The recommended semianual testing time basis does not tie to the current requirement for changing out the water in a mist system annually and will result in additional maintenance cost to water mist system owners.
5. No other water based fire protection systems have a requirement for legionella bacteria testing.
6. The annual testing for legionella bacteria will result in additional maintenance cost on water mist systems and there is no apparent benefit for the cost.
Substantiation: See discussion above

750-37 Log #17 Final Action: Reject
(10.5.4.6 and 10.5.4.7)

Submitter: Matthew Dalhouisen, FM Global
Recommendation: Revise text to read as follows:
10.5.4.6 A reliable, supervised means shall be provided to indicate the pressure and level in all storage containers that will be pressurized.
10.5.4.7 A reliable, supervised means shall be provided to indicate the level in all storage containers that will not be pressurized.

Substantiation: These changes will address confusion regarding these sections and the previous section for water tanks and bring the requirements for both sections to be equal.
Committee Meeting Action: Reject
Committee Statement: This proposal is similar to Proposal 750-24 (Log #16). See Committee Action on Proposal 750-24 (Log #16).
Number Eligible to Vote: 27
Ballot Results: Affirmative: 21 Negative: 1

Explanation of Negative: KASISKI, R.: I am in agreement with the submitter of the Proposals as his intent is to increase the reliability of water mist systems which use high pressure cylinders by identifying a "Trouble" or abnormal condition. A "Trouble" or abnormal condition makes the system ineffective for fire extinguishment.

A water mist fire protection reliability study has been conducted by FM Global Research. More common failure contributors identified in the study are empty water tanks and low gas propellant pressures, which are typically associated with high pressure storage cylinders. These failure contributors are associated with human error in the maintenance of water mist systems. These finding are published in the Importance Analysis section of the Water Mist Fire Protection Reliability Study, presented by Shuqian Xu and David Fuller at the July 29-August 1, 2013
Report on Public Input – November 2013

NFPA 750

750 PI # 20
(1.1.1 and A.1.1.1 (New))

Submitter: Terry L. Victor, Tyco/SimplexGrinnell
Recommendation: Add new text as follows:
1.1.1 The water mist fire protection systems designed and installed in accordance with this standard are not equivalent in the level of fire protection to a sprinkler system designed and installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

Add new annex material as follows:
A.1.1.1 Sprinkler systems installed in accordance with NFPA 13 have been accepted in the building codes as providing a level of passive fire protection, in addition to the active fire protection they provide. As a result, building codes have reduced many of the passive fire protection requirements such as separation, construction materials, egross, etc., when the building is fully sprinklered in accordance with NFPA 13. Water mist fire protection systems have not been proven to have the equivalent level of passive fire protection and thus the building should be classified as non-sprinklered.

Substantiation: Almost every building code allows reduction in the passive fire protection requirements because of the history of reliability and fire protection from a properly designed, installed and maintained fire sprinkler system. This history of reliability and fire protection from a properly designed, installed and maintained fire sprinkler system. This standard needs to differentiate water mist fire protection systems from fire sprinkler systems so these "trade-offs" in the building codes will not be mistakenly applied when water mist systems are installed in lieu of a sprinkler system.

Public Input Response:
The suggested revision was not made in the First Draft because Water Mist systems can be designed to provide the same Fire Protection objectives as a sprinkler system. The proposed text could be interpreted in such a manner to not allow a Water Mist system to be allowed to be used as an alternative to a sprinkler system.

750 PI # 102
(3.2 Hybrid Extinguishing System (New))

Submitter: William J. Reilly, Victaulic Company of America
Recommendation: Add new text to read as follows:

Hybrid Extinguishing System, A system that introduces both inert gas and water as extinguishing media of a system is a hybrid extinguishing system if the O2 concentration is between 12.5 and 16% at extinguishment.

Substantiation: There are now multiple "hybrid" or "wet nitrogen" systems being marketed and installed under NFPA 750. While all systems are water mist, certain aspects of their dual extinguishing media are not adequately addressed in 750.

This is not original material; its reference/source is as follows:
FM 5580 Approval Standard.

Public Input Response:
The suggested revision was not made in the First Draft because a hybrid extinguishing system is not a water mist system & not addressed by the water mist standard. FM5580 has no relationship to water mist systems. TC recommends contacting NFPA to develop a new standard for this technology.
Not Returned: 4
Not Returned: Devlin, Froh, Reilly, Stilwell

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 occupancy classification rules for fire 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.

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 fire sprinkler systems. Also some of the 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. So to provide sprinkler systems would not be applicable to water mist systems. For instance, an area where there is significant shielding is occupancy. This is appropriate for a fire sprinkler system, but does not necessarily.

July 22, 2013

Supplemental Agenda July 29-August 1, 2013
Page 1378 of 1861
confinement), spray flux density, and spray velocity (momentum) are all involved in determining whether a fire will be extinguished. The "momentum" of an element of spray is the product of its velocity and the mass of dispersed water droplets (i.e., the mass flow rate). It must be stressed that the term velocity implies direction as well as speed. It is the momentum of a mist in a particular direction, relative to the direction of flow of the hot fire gases, that enhances cooling and suppression effectiveness. Opposing directional flows bring about turbulent mixing, hence improved cooling. Therefore, all three variables — drop size distribution, flux density, and velocity — are involved in determining the ability to extinguish a fire in a given scenario.

A.3.3.21.2 Hybrid Multi-functional A.3.23.2 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.

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. A.3.3.24.5 Pre-engineered Water Mist Systems. These systems have the specific pipe size, maximum and minimum pipe lengths, flexible hose specifications, number of fittings, and number and types of nozzles prescribed by a testing laboratory. Systems are provided with either a self-contained or an external water supply. Based on actual test fires, the hazards protected by these systems are specifically limited as to type and size by a testing laboratory. Limitations on hazards that are allowed to be protected by these systems are contained in the manufacturer's installation manual, which is referenced as part of the listing.

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, and 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 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.)

A.4.1.1.2 In special cases, where adequate safeguards have been provided, water mist systems for the protection of structures, equipment, or personnel in the presence of such materials as described in 4.1.1.2 can be permitted.

A.4.2 In the event of a fire, safeguards should be provided to ensure the following:

1. Prompt evacuation of trapped personnel

May 28, 2013

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169

Subject: New Installation Standard for Hybrid Systems

Dear NFPA Staff:

As a member of the Technical Committee on Water Mist Fire Suppression Systems, I have the following input to provide relative to the request for comments on a proposed new installation standard for hybrid (inert gas and fine water mist) systems as indicated in the April 2013 issue of NFPA News.

As I understand, one of the key areas of interest relative to the application of these systems is the use in occupied and unoccupied compartments or spaces. When used in this application, I understand that the primary fire protection objective is to quickly suppress/extinguish a fire by means of reducing the oxygen level within the enclosure via the introduction of an inert gas with some potential benefit of cooling from the water mist. Along with achieving this fire protection objective, there are critical safeguards that must be considered and implemented as a part of the system design/installation to ensure that these systems can be safely used in occupied spaces with low oxygen concentrations. The primary extinguishing mechanism of the hybrid system is similar to a gaseous system covered by NFPA 2001.

While it is the case that NFPA 750 includes some requirements for twin-fluid systems, these systems utilize air (rather than nitrogen) as the atomizing media. Water mist systems have the ability to cool the combustion process and dilute the oxygen concentration with the generation of water vapor near a fire, but water mist systems are not designed to reduce the oxygen within an entire compartment space.

The TC on Water Mist Fire Suppression Systems does not have expertise to address the potential hazards to personnel due to the reduced oxygen content within an occupied area. In regard to the safeguards to personnel within a protected area with a reduced oxygen concentration, it would appear that requirements similar to those described in NFPA 2001 would be needed for hybrid systems. Considering that unique characteristics of these systems, a separate standard may need to be developed to properly address the installation of these systems.
I trust this information will be helpful in your consideration of this matter.

Very truly yours;

George E. Laverick, FSFPE
Principal Engineer- Fire Extinguishers and Fire Suppression Products
Product Safety
From: "Kimball, Amanda" <AKimball@nfpa.org>
Date: June 26, 2013, 2:59:53 PM CDT
To: "robert.kasiski@fmglobal.com" <robert.kasiski@fmglobal.com>, "Stanek, Sandra" <SStanek@nfpa.org>, Peter Thomas <pthomasext@victaulic.com>, "Zachary.Magnone@tycofp.com" <Zachary.Magnone@tycofp.com>, Michael Gollner <mgollner@umd.edu>
Subject: Student Project on Hybrid Water Mist Systems

Panel Members,

In the 2012 Code Fund cycle, the attached information gathering project on hybrid water mist systems was submitted. We will be undertaking this project as a student project with the University of Maryland – Prof. Michael Gollner will be advising the project.

Thank you for agreeing to serve on the Project Technical Panel for this project. The Panel oversees the technical aspects of the project (review reports, etc). I would expect the workload to be review of a draft report and a few conference calls. I would like to schedule an initial teleconference for late July to discuss the scope of the project so when the student returns to school in the fall, they can hit the ground running on the project. I have set up a doodle scheduling poll at the following link: https://researchfoundation.doodle.com/wqdakd9f4gkmufxi. Please provide your availability by Friday, July 5th.

I would be happy to answer any questions that you have.

Thank you,
Amanda

Amanda Kimball, P.E.
Research Project Manager

Fire Protection Research Foundation
1 Batterymarch Park, Quincy, MA USA 02169-7471
617.984.7295
akimball@nfpa.org
www.nfpa.org/Foundation

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Hybrid Water Mist Fire Protection Systems

Background
There are now two commercially available fire extinguishing systems that FM has classified as "Hybrid" systems (in Approval Standard 5580), but are not addressed in the NFPA standards. These systems are unique because they use an inerting gas such as nitrogen as well as fine droplets of water typical of water mist system. FM has determined that the oxygen concentration is not depleted enough to classify this as a clean agent, but it also does not show all of the same characteristics as a standard water mist system. In some cases, manufacturers’ are “mixing and matching” requirements for water mist systems and inert gases to suit their needs.

Project Description
The objective of this research would be to provide background information on these systems so that it can be ultimately determined where these systems should best be addressed within NFPA documents. These systems may fit in NFPA 750, Standard on Water Mist Fire Protection Systems, NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems, or may be unique enough to require their own independent document.

This project would involve the following tasks:
- A literature review of available information on hybrid systems including technical background information and test data.
- Analysis of the extinguishing properties/capabilities of such systems and comparing them to traditional water mist systems and clean agent systems.
- Meeting with listing/approval bodies such as FM or UL to get their input on these systems and information on how they are testing them.
- Documentation of the study results in a report.

How this Information Will be Used
The information from this study may be used by the Technical Committees for NFPA 750 and 2001 to help determine where hybrid water mist system requirements should be included in the standards.
Item 13-8-29
April 23, 2013

National Fire Protection Association  
Standards Council  
1 Batterymarch Park  
Quincy, MA 02169

Dear Council Members:

Please find the attached New Project Initiation Form, which is for a new standard that addresses training props. This is a request for a new standard from the technical committee.

At our meeting held in February 2013 in San Diego, CA, the Task Group assigned to review the NFPA 1402 Guide their research and draft to the entire technical committee. After the presentation, it was clear to the majority of the committee members that a new standard for Training Structures and Props was needed. The committee voted to request for a new Standard and leave NFPA 1402 alone as a "Guide"

As always, we appreciate your time and efforts helping the committee to produce useful and up-to-date documents.

Respectfully,

Chief Kenneth W. Richards, Jr.  
Chairperson, Technical Committee on Fire Service Training
### New Project Initiation Form
(To be completed by proponent of new project/document)
*Additional pages may be attached if necessary.*

<table>
<thead>
<tr>
<th>a.</th>
<th>Explain the Scope of the new project/document:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard on Fire Training Structures, Props, and Equipment.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>b.</th>
<th>Provide an explanation and any evidence of the need for the new project/document:</th>
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<tbody>
<tr>
<td></td>
<td>The Fire Service Training TC currently is assigned responsibility for NFPA 1402, Guide to Building Fire Service Training Centers, which is a document that provides general information to architects, engineers, and fire service entities on possible components of fire training centers. The scope of the document is “food for thought” and ideas to consider when planning or designing a training center. The committee is aware that there is an increasing need to have a prescriptive standard available to provide minimum mandatory requirements for the manufacturing, installation, and maintenance of gas-fired props, and for the design and construction of live fire training structures (burn buildings) and other training props. This need has surfaced because of a growing awareness of fire fighter injuries that have occurred with gas-fired training props that have not been designed and constructed in a manner that provides a minimum required level of safety to all participants. The Fire Service Training TC has a growing concern that if a nationally recognized standard is not developed for gas-fire live fire training props we will see additional injuries and potentially fire fighter fatalities in the future.</td>
</tr>
<tr>
<td></td>
<td>The Committee has spent the past two years evaluating the possibility of converting 1402 from a guide to a standard. It has concluded that a new, separate standard for fire training structures, props, and equipment is needed and that the remainder of 1402 needs to remain as a guide for the following reasons:</td>
</tr>
<tr>
<td></td>
<td>1. The Training Committee has expanded the scope of the new, proposed standard from just live fire training structures, props, and equipment to also include non-live fire training structures, props, and equipment. This would move more of the exiting 1402 content into the new standard. Given this increased scope, the Training Committee believes it is important to separate these items into a new standard.</td>
</tr>
<tr>
<td></td>
<td>2. The current version of 1402 contains information intended to provoke thought for anyone planning to build a fire training center. Most of the current text does not need to be converted to a standard. If 1402 were converted to a standard, most of the existing content would move to the annex, in which case:</td>
</tr>
<tr>
<td></td>
<td>a. Readers might not know it is there.</td>
</tr>
<tr>
<td></td>
<td>b. Most of it would not relate directly to any content in the body of the standard.</td>
</tr>
<tr>
<td></td>
<td>c. By being in the annex of a standard instead of in a guide, the content might be interpreted as standard requirements, too. Legal entities already try to interpret the current 1402 guide as if it is a standard. Moving that content into the annex of a standard would strengthen the position of those legal entities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c.</th>
<th>Identify intended users of the new project/document:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Manufacturers of gas-fired and other live fire training props used to train fire fighters.</td>
</tr>
<tr>
<td></td>
<td>2. Architects and engineers that design fire training structures and props and specify fire training equipment.</td>
</tr>
<tr>
<td></td>
<td>3. Fire agencies that purchase gas-fired props and other fire training structures and props to train fire fighters.</td>
</tr>
<tr>
<td></td>
<td>4. Fire fighters that are potentially exposed to unacceptable risk from gas-fired and other fire training props and structures that have not been manufactured, designed, and constructed to a nationally accepted standard.</td>
</tr>
<tr>
<td></td>
<td>5. Operators of fire fighter training centers.</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>d.</th>
<th>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:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ISFSI; IFSTA; IAFC; NVFC; IAFF; NAFTD; Manufacturers; Technical Committee on Fire Service Training, Technical Committee on Special Effects.</td>
</tr>
</tbody>
</table>

| 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:

See item C above.

f. Identify other related documents and projects on the subject both within NFPA and external to NFPA:

NFPA 1402 is a related document but is an advisory document that cannot mandate minimum requirements.

NFPA 1403 is related in that it mandates minimum requirements and procedures for live fire training exercises.

DIN standard (Germany or whole EU?) addresses the subject in a limited capacity.

g. Identify the technical expertise and interest necessary to develop the project/document, and if the committee membership currently contains this expertise and interest:

See C above. In addition, the Fire Service Training TC currently has the necessary expertise, including two manufacturers of gas-fired training props, a special expert also in the gas-fired training prop manufacturing industry, engineers that specify gas-fired training props for fire fighter training centers and design fire training structures, builders of fire training structures, owners of fire training centers that use fire training structures and props, users of fire training structures and props, manufacturers of fire fighter training materials related to fire training structures and props, and representation from national research/testing laboratories. In addition, the Fire Service Training TC has organized a task group of outside experts, especially from the 160 Committee, to assist with the standard for gas-fired props.

h. Provide an estimate on the amount of time needed to develop the new project/document:

The proposed document could be developed in approximately three years.

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:

The Fire Service Training TC believes that there is adequate availability of data and information on the “best practices” design and construction of gas-fired fire fighter training props and fire training structures and props that are required to substantiate the technical requirements and other provisions of the proposed new project.

Please send your request to:

NFPA
Codes and Standards Administration
1 Batterymarch Park
Quincy, MA 02169
Stds_admin@nfpa.org
Rev. 10/09

Signature:

Name: Kenneth Richards, Chair
(please print)

Affiliation: NFPA Technical Committee on Fire Service Training
Item 13-8-30
Maynard, Mary

From: Fuller, Linda
Sent: Tuesday, May 07, 2013 11:50 AM
To: Maynard, Mary
Subject: FW: Scope for FAE-NSF

Brian Montgomery, Chair of the Technical Committee on Non-structural Fire Fighting SCBA and William Haskell, Chair of the Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment submits for Standards Council approval, a scope for the Non-structural Fire Fighting SCBA Committee:

**Proposed Committee Scope:** This Committee shall have primary responsibility for documents on respiratory equipment, including breathing air, for emergency response personnel other than those involved in structural fire fighting operations, during incidents involving hazardous or oxygen deficient atmospheres. These types of operations include tactical law enforcement, confined space, and hazardous materials response operations. This Committee shall also have primary responsibility for documents on the selection, care and maintenance of respiratory equipment and systems by emergency services organizations and personnel.

David G. Trebisacci, CIH, CSP
Public Fire Protection Division
NFPA
1 Batterymarch Park
Quincy, MA 02269
Phone: (617) 984-7420
Fax: (617) 984-7056
dtrebisacci@nfpa.org

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Check out NFPA on social media...
[www.nfpa.org/socialmedia](http://www.nfpa.org/socialmedia)

---

From: Fuller, Linda
Sent: Tuesday, May 07, 2013 11:06 AM
To: Trebisacci, Dave
Subject: FW: Scope for FAE-NSF
What about this?

Brian Montgomery, Chair of the Committee on Non-structural Fire Fighting SCBA and the William Haskell, Chair of the Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment submits for the Standards Council approval, a scope for the Non-structural Fire Fighting SCBA Committee:

**Proposed Committee Scope:** This Committee shall have primary responsibility for documents on respiratory equipment, including breathing air, for emergency response personnel other than those involved in structural fire fighting operations, during incidents involving hazardous or oxygen deficient atmospheres. These types of operations include tactical law enforcement, confined space, and hazardous materials response operations. This Committee shall also have primary responsibility for documents on the selection, care and maintenance of respiratory equipment and systems by emergency services organizations and personnel.

Linda Fuller
Manager, Codes & Standards Administration
National Fire Protection Association
1 Batterymarch Park, Quincy, MA 02169-7471
617.984.7248 phone
617.770.3500 fax

**From:** Trebisacci, Dave  
**Sent:** Tuesday, May 07, 2013 9:55 AM  
**To:** Fuller, Linda  
**Cc:** Baio, Debbie; Peterson, Cheryl; Montgomery, Brian; whaskell@cdc.gov  
**Subject:** RE: Scope for FAE-NSF

Linda, I discussed the Committee Scope with Chair Brian Montgomery and CC Chair Bill Haskell.

The following is proposed for the Council’s approval:

**Committee Scope:** This Committee shall have primary responsibility for documents on respiratory equipment, including breathing air, for emergency response personnel other than those involved in structural fire fighting operations, during incidents involving hazardous or oxygen deficient atmospheres. These types of operations include tactical law enforcement, confined space, and hazardous materials response operations. This Committee shall also have primary responsibility for documents on the selection, care and maintenance of respiratory equipment and systems by emergency services organizations and personnel.

Please let me know if you need anything additional.  
Thanks,  
Dave

David G. Trebisacci, CIH, CSP  
Public Fire Protection Division  
NFPA  
1 Batterymarch Park  
Quincy, MA 02269  
Phone: (617) 984-7420  
Fax: (617) 984-7056  
dtrebisacci@nfpa.org
From: Fuller, Linda
Sent: Wednesday, March 20, 2013 1:50 PM
To: Trebisacci, Dave
Cc: Baio, Debbie; Peterson, Cheryl
Subject: Scope for FAE-NSF

Dave

I have a proposed document scope for the new FAE-NSF, but not a committee scope. Could you, the CC/TC chairs work on a scope and bring it to the Council for approval. Here is a copy of the proposed document scope.

PROPOSED DOCUMENT SCOPE: This standard shall specify the minimum requirements for the design, performance, testing, and certification of new compressed breathing air open-circuit self-contained breathing apparatus (SCBA) and compressed breathing air combination open-circuit self-contained breathing apparatus and supplied air respirators (SCBA/SARs) and for replacement parts, components, and accessories. This standard shall not apply to SCBAs for structural fire fighting applications as addressed by NFPA 1981.

Linda Fuller
Manager, Codes & Standards Administration
National Fire Protection Association
1 Batterymarch Park, Quincy, MA 02169-7471
617.984.7248 phone
617.770.3500 fax
MEMORANDUM

TO:        Amy Cronin, Secretary, NFPA Standards Council
           Linda Fuller, Recording Secretary, NFPA Standards Council

FROM:     David Trebisacci, Staff Liaison

DATE:     July 16, 2013

SUBJECT:  FAE-NSF Technical Committee Name and Scope Change Request

Technical Committee Chair Brian Montgomery and Correlating Committee Chair William Haskell request that the Standards Council approve the following technical committee scope change, technical committee name change and acronym change.

1. Change (from version submitted 5/7/2013) the FAE-NSF Technical Committee Scope as follows:
   
   This Committee shall have primary responsibility for documents on respiratory equipment, including breathing air, for emergency response personnel other than those involved in structural fire fighting operations, during incidents involving hazardous or oxygen deficient atmospheres. These types of operations include tactical law enforcement, confined space, and hazardous materials response operations. This Committee shall also have primary responsibility for documents on the selection, care and maintenance of respiratory equipment and systems by emergency services organizations and personnel.

2. Change the name of the committee from Technical Committee on Non-Structural SCBA to Technical Committee on Tactical and Special Operations Respiratory Protection Equipment

Thank you for your consideration.

CC:        Brian Montgomery, FAE-NSF TC Chair
           Bill Haskell, CC Chair, FAE-AAC Correlating Committee on Fire and Emergency Services Protective Clothing
Item 13-8-31
Linda,

On behalf of Nat Addleman, Chair of the Technical Committee on Portable Fire Extinguishers (PFE-AAA), I am requesting a permanent cycle change for NFPA 10. The document is currently in a three-year cycle and is scheduled to enter the Fall 2015 cycle. We would like to move it to a four-year cycle, beginning with the Fall 2016.

We would like this to be considered at the July 30 – August 1 Council meeting. If you need anything further from me, please let me know.

Thank you.

Barry D. Chase  
Fire Protection Engineer  
NFPA  
1 Batterymarch Park  
Quincy, MA 02169-7471  
Office: (617) 984-7259  
bchase@nfpa.org

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Check out NFPA on social media...  
www.nfpa.org/socialmedia
MEMORANDUM

TO: Linda Fuller
FROM: R. P. Benedetti
DATE: June 4, 2013

SUBJECT: Request to Change Document Revision Cycle — NFPA 31

Linda:

The Technical Committee on Liquid Fuel Burning Equipment requests a change to their scheduled document revision cycle from the Fall 2014 cycle to the Fall 2015 cycle, to include a reopening of Call for Public Input.

The Technical Committee has been without a Chair for some time, during which no meetings were held. A new Chair, Roland Riegel, UL LLC has just been appointed.

Mr. Riegel and I have discussed the current workload and two proposed Task Group efforts that need to be done:

- Combustion Venting Tables. This will be a major effort, one that has been in the planning stages since the last document revision cycle.
- Fuel Oil Tank Anchoring. This is a new topic that has arisen because of the impact of Hurricane Sandy and the many cases of contamination there from, because of dislodged fuel oil tanks.

Initially in my earlier conversation with you, we discussed a rescheduling from Fall 2014 to Annual 2015. In discussion with Mr. Riegel, we concluded this was not realistic, given the estimated time needed to address the venting issue. (See Email from Mr. Riegel to me, dated 5/30/2013.)

Please add this request to the Agenda for the July/August Standards Council meeting.

If you have any questions, please call me at extension 7433.

rpb/

cr Riegel
DMatthews
LPI/CORR
Stds. Cncl. File
MEMORANDUM

TO: Linda Fuller
FROM: R. P. Benedetti
DATE: April 25, 2013
SUBJECT: Revision Cycle for NFPA 37

Linda:

The Technical Committee on Internal Combustion Engines (NFPA 37), at its March 5 & 6, 2013 meeting, voted unanimously to recommend to the NFPA Standards Council that its revision cycle be changed from a regular four-year interval to a three-year interval. They also voted to recommend that the next document revision cycle for this standard be the Fall 2016 cycle.

Please place this item on the Agenda for the next Standards Council meeting (July 2013).

rpb/

cc INT/CORR
    SC Folder
NFPA 96 (VEN-AAA)  TECHNICAL COMMITTEE COMMERCIAL COOKING HOODS

TO:   Linda Fuller
FROM: Sandra Stanek   Staff Liaison
DATE: April 23, 2013
SUBJECT: Request to Change Document Revision Cycle
          From Annual 2016 to Fall 2016

The Chairman for the Technical Committee on Commercial Cooking Hoods requests a change to

Sandra Stanek
Staff Liaison
a. Explain the Scope of the new project/document:

This document would provide a test method to evaluate fire/ignition resistance of upholstered furniture subject to a flaming ignition source.

b. Provide an explanation and any evidence of the need for the new project/document:

The State of California publishes Technical Bulletin 117, *Requirements, Test Procedure and Apparatus for Testing the Flame Retardance of Resilient Filling Materials Used in Upholstered Furniture*, which previously included a test method for evaluating fire resistance of upholstered furniture when exposed to an open flame ignition source. The California Bureau of Home Furnishings and Thermal Insulation has proposed the removal of the small open flame test requirement. Organizations have argued that requiring an open flame test will result in the continued use of fire retardant chemicals that can cause health problems.

NFPA currently publishes two upholstered furniture test methods, NFPA 260, *Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture* and NFPA 261, *Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes*. Both of these standards use cigarettes as an ignition source, representing smoldering ignition. NFPA’s research proves that smoldering ignition only represents 45% of the fire deaths associated with upholstered furniture. None of the leading U.S. SDOs for fire testing currently publish a test method to evaluate upholstered furniture subject to open flame ignition sources, leaving a gap in the industry.

NFPA conducted an analysis\(^1\) of national statistics regarding upholstered furniture related fire losses. The analysis found that upholstered furniture is the leading item involved in home fire deaths, accounting for 24% of all home fire deaths in recent years. Of those deaths, 45% is attributed to cigarette ignition, 10% is attributed to small open flame ignition and 21% can be attributed to flaming ignition from another burning item. The other 24% are ignitions that are an unknown mix of smoldering and flaming, such as arching or overheating from operating equipment.

\(^1\) William M. Pitts, *Summary and Conclusions of a Workshop on “Quantifying the Contribution of Flaming Residential Upholstered Furniture to Fire Losses in the United States,”* NIST Technical Note 1757, National Institute of Standards and Technology, Gaithersburg, MD, 2012.

c. Identify intended users of the new project/document:

Upholstered furniture manufacturers, testing laboratories

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:


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:

The NFPA 101/NFPA 5000 technical committees on Interior Finish and Residential Occupancies and the NFPA 1 technical committee could reference this new standard as a requirement for upholstered furniture in residential occupancies. Both the TCs on Interior Finish and Residential Occupancies have reviewed this proposal. Neither TC opposed the development of this document.

f. Identify other related documents and projects on the subject both within NFPA and external to NFPA:

NFPA 260, *Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of"
### Components of Upholstered Furniture

- **NFPA 261**, *Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes*
- **TB 117**, *Requirements, Test Procedure and Apparatus for Testing the Flame Retardance of Resilient Filling Materials Used in Upholstered Furniture*
- Consumer Product Safety Commission - Furniture Flammability Standards
- **ASTM Committee E-5, Fire Tests**
- **BS 5852**, *Methods of Test for Assessment of the Ignitability of Upholstered Seating by Smouldering and Flaming Ignition Sources*

### g. Identify the technical expertise and interest necessary to develop the project/document, and if the committee membership currently contains this expertise and interest:

The committee membership currently contains the expertise to develop this new standard. The technical committee informally voted during their last committee meeting (April 2013) to support this project.

### h. Provide an estimate on the amount of time needed to develop the new project/document:

Two to three years.

### 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:

The committee could build on the many years of test data gleaned under the California test program. Manufacturers of upholstered furniture would be asked to share their research or data on use of alternate methods to pass a flaming ignition test without the use of FR chemicals.

---

**Please send your request to:**

NFPA Codes and Standards Administration
1 Batterymarch Park
Quincy, MA 02169
Stds_admin@nfpa.org
Rev. 10/09

**Signature:**

Name: Barry Badders, Chair of the Fire Tests Committee
(please print)

Affiliation: ______________________________
To: Amy Cronin, Secretary to the NFPA Standards Council  
FROM: Nancy Pearce, Staff Liaison to CNS-AAA  
DATE: July 22, 2013  
SUBJECT: Release of Preliminary Draft for NFPA 350 and Requested Revision Cycle  
CC: Don English, Guy R. Colonna, Linda Fuller, Joanne Goyette

Dear Amy,

On behalf of the Technical Committee on Confined Space Safe Work Practices, I am submitting a request for the NFPA Standards Council to release the Preliminary Draft for NFPA 350, Guide for Safe Confined Space Entry and Work. The request is supported by the results of the committee ballot, attached. The technical committee requests that the proposed NFPA 350 be entered into the Fall 2015 revision cycle.

Please let me know if you need any further information.

Sincerely,

Nancy Pearce  
Staff Liaison
MEMORANDUM

TO: NFPA Technical Committee on Confined Space Safe Work Practices

FROM: Joanne Goyette, Administrator, Technical Projects

DATE: July 22, 2013

SUBJECT: NFPA 350 TC Final Results on Release of Draft

The Final Results of the NFPA 350 Release of Draft are as follows:

26 Members Eligible to Vote
1 Not Returned (R. Stamps)
23 Affirmatives (D. deVries and R. Kraus, w/Comment)
  2 Negatives (H. Cohen and J. Norris)
  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 Confined Space Safe Work Practices
Letter Ballot to Release NFPA 350
Best Practices Guide for Safe Confined Space Entry and Work

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

HAL COHEN

Name (Please Print)

7/15/13

Date

Please return your ballot no later than Tuesday, July 16, 2013.

RETURN TO:

Joanne Goyette, Administrator, Technical Projects
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
EMAIL: jgoyette@nfpa.org
FAX: 617-984-7110
The committee has worked very hard to get the document to its current state. I also recognize that any draft document needs to eventually be sent out for comment to help guide the committee in correcting the deficient and/or confusing sections. And, I believe the committee readily accepts that improvements to the draft document are needed and look forward to receiving input from the community.

At the same time, I believe there are some sections in this draft document that are woefully burdensome and are contradictory to the concept of a “recommended practice.” If enacted as adopted, incorporating some of the recommended practices would be prohibitively costly (i.e., eliminating the potential for one technician to respond to a service call because a supervisor is now recommended any time any worker has to inspect anything in an attic, crawl space, or above a suspended ceiling tile system) and does not greatly improve safety.

I believe most committee members agree that changing/modifying these types of requirements are needed. They prefer to make these needed changes as part of the comment process. I think these changes should be made before the comment process as incorporating these fatal flaws in the draft document weakens the entire document and reduces the credibility of the well written sections.

I vote negatively to release the draft document for public review and input. I see no other way to forewarn NFPA of the impending negative criticism I think this draft document will receive.

[Signature]

7/15/13
Technical Committee on Confined Space Safe Work Practices
Letter Ballot to Release NFPA 350
Best Practices Guide for Safe Confined Space Entry and Work

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 EXPLANATION ON ACCOMPANYING DOCUMENT

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)

7/16/2013

Date

Please return your ballot no later than Tuesday, July 16, 2013.

RETURN TO:

Joanne Goyette, Administrator, Technical Projects
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
EMAIL: jgoyette@nfpa.org
FAX: 617-984-7110

July 22, 2013

Supplemental Agenda July 29-August 1, 2013

Page 1749 of 1861
NFPA 350

EXPLANATION OF VOTE

Our general definition of a “confined space” is good, but in section 4.3 (1) it has been greatly expanded by the inclusion of or “any space that requires a ladder to access” and indicates that “Nonstandard staircases such as spiral stairs or ship ladders could also be considered to have limited access or restricted means of egress” is a problem. One could conclude from this definition that when moving from one level to another in a vessel you would have to post confined space signs (4.4), issue a permit, have an attendant etc. Likewise industry can have similar access methods including permanent ladders to areas that typically have no hazards during normal operation.

Requiring all precautions that are typically required for “permit required confined spaces” is overly restrictive and in some cases will create unnecessary requirements for compliance in confined spaces that have absolutely no hazard exposures during normal operations. This can result in less emphasis on safety for confined spaces currently designated as “permit required” and additionally exposure for users to expanded exposure from regulators and AHJs. Our guide should address all confined spaces and require hazard assessment of them all. If the hazard assessment identifies no exposure during normal operations, requirements typically applied to permit required confined spaces should not be required. This would also address some of the HVAC and plumbing residential concerns previously raised. If other than normal operations are to occur in confined spaces normally not considered permit required, then these spaces should require reassessment and application of precaution as needed. It could be possible to place signage on all confined spaces if a two-step system was used such as “Danger Permit Required Confined Space, Do Not Enter” and “Confined Space, if Entry is For Other Than Normal Operations, Contact Supervision to Determine if Permit Requirements Apply”.
Technical Committee on Confined Space Safe Work Practices
Letter Ballot to Release NFPA 350
Best Practices Guide for Safe Confined Space Entry and Work

Please record me as voting:

✓ AFFIRMATIVE      NEGATIVE*      ABSTAINING*  

TO ISSUING DRAFT NFPA 350 FOR PUBLIC INPUT.

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

Signature
DAVID DE VRIES

Name (Please Print)

Date
7-15-13

Please return your ballot no later than Tuesday, July 16, 2013.

RETURN TO:

Joanne Goyette, Administrator, Technical Projects
NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
EMAIL: jgoyette@nfpa.org
FAX: 617-984-7110

July 22, 2013
Technical Committee on Confined Space Safe Work Practices
Letter Ballot to Release NFPA 350
Best Practices Guide for Safe Confined Space Entry and Work

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.

THIS STILL NEEDS CONSIDERABLE WORK
I WILL SUBMIT A LOT OF COMMENTS

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

RICHARD S. KRAUS

Name (Please Print)

7/13/13

Date

Please return your ballot no later than Tuesday, July 16, 2013.

RETURN TO:
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Supplemental Attachment 13-8-37
Page 9 of 117 ADDITION

Best Practices Guide for Confined Space Entry and Work

Chapter 1 Administration

1.1 Scope.

1.1.1 This guide is intended to protect workers who enter into confined spaces for inspection or testing or to perform associated work from death and from life-threatening and other injuries or illnesses and to protect facilities, equipment, non–confined space personnel, and the public from injuries associated with confined space incidents.

1.1.2 This guide is not intended to replace existing regulations and standards but rather to supplement them by providing additional guidance for safe confined space entry and work. Existing regulations and standards are referenced throughout the guide, and the annexes direct the reader to regulations and standards that might be applicable.

1.1.3 This guide provides both prescriptive and performance-based guidance on how to identify, evaluate, assess, eliminate, and control hazards that occur during entry or work in and around confined spaces.

1.1.4 This guide addresses those fire, explosion, safety, and health hazards that are commonly associated with confined space entry.

1.1.5 This guide addresses training, qualifications, and competencies required for personnel responsible for confined space hazard identification, hazard evaluation, and hazard control as well as for those who are working in and around confined spaces.

1.1.6 This guide provides best practices for confined space rescue.

1.1.7 This guide addresses confined space hazards and safe practices that are common in all industries with confined spaces.

1.1.8 This guide addresses hazards adjacent to confined spaces that might affect the safe conditions necessary for entry and work in the space.

1.1.9 This guide provides criteria for controls that eliminate or minimize confined space hazards in the design phase.

1.2 Purpose.

1.2.1 The purpose of this guide is to provide the best safe work practices for those working in and around confined spaces. The guide goes beyond minimum requirements that have been established by regulations and standards and intends to provide those who strive to achieve a higher level of safety with the best practices for identifying, evaluating, and controlling hazards in order to manage the risk associated with confined space activities. This guide is also intended to address work practices and procedures not fully covered or explained in existing regulations and standards related to confined space entry and work.

1.2.2 This guide also serves to refer the reader to other applicable documents that relate to particular types of industries or type of work being done in a confined space.

1.3* Application. This guide is intended to provide guidance for entry into confined spaces regardless of location.

1.4 HEADING. This guide is not intended to supersede or replace any requirements in existing or future codes, standards, and regulations applicable to confined space activities.

Chapter 2 Referenced Publications (Reserved)
Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this guide. 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 Guide. A document that is advisory or informative in nature and that contains only nonmandatory provisions. A guide may contain mandatory statements such as when a guide can be used, but the document as a whole is not suitable for adoption into law. 3.3 General Definitions.

3.3.1 Accident. An unplanned occurrence, which results in a loss such as unintended injury, illness, death, property damage, or damage to the environment. [1521, 2015]

3.3.2 Accidents. Unplanned events that result in injuries or damage that interrupts routine operations. 3.3.3* Acceptable Entry Conditions. Conditions that have met all entry requirements specified in the confined space program and all entry conditions listed on the permit.

3.3.4 Adjacent space. Those spaces in all directions from subject space, including points of contact, internal and external, such as decks, sumps, floating roofs, secondary containment areas, interstitial spaces, under floors, supports, tank tops, and bulkheads. [326, 2015]

3.3.5 Competent Person. Someone who is designated in writing and who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. [1006, 2013]

3.3.6* Confined Space. A space that (1) is large enough and so configured that a person can bodily enter and perform assigned work; (2) has limited or restricted means for entry or exit; and (3) is not designed for continuous employee occupancy.

3.3.7 Confined Space Rescue Service. The confined space Rescue Team designated by the authority having jurisdiction (AHJ) to rescue victims from within confined spaces, including operational and technical levels of industrial, municipal, and private sector organizations.

3.3.8 Confined Space Rescue Team. A combination of individuals trained, equipped, and available to respond to confined space emergencies.

3.3.9* Explosion proof. Referring to apparatus enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that might occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby.

3.3.10 Hazard. Biological, chemical, mechanical, electrical, atmospheric, environmental, or physical agent that has or can have the potential to result in injury, illness, property damage, or interruption of a process or an activity in the absence of a control measure.

3.3.11 Hazard Evaluation. A two-step process of identifying hazards or potential hazards and then determining the risk of each hazard identified.

3.3.12 Hazard Identification. The determination of present and potential physical, chemical, atmospheric, mechanical, electrical, and biological hazards in and around a confined space.

3.3.13 Hot Work. Work involving burning, welding, or a similar operation that is capable of initiating fires or explosions. [51B, 2013]
3.3.14 Intrinsically Safe. Type of protection where any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under prescribed test conditions. [70, 2014]

3.3.15* Job Hazard Analysis (JHA). A safety management risk assessment (RA) technique that is used to define and control the hazards associated with a process, job, or procedure. Any job that has actual or potential hazards is a candidate for a JHA.

3.3.16 Maintenance. The routine recurring work required to keep a facility (plant, building, structure, ground facility, utility system, or other real property) or equipment in such condition that it can be continuously utilized, at its original or designed capacity and efficiency, for its intended purpose.

3.3.17 Periodic. Occurring or recurring at regular predetermined or specified intervals.

3.3.18* Permit Required Confined Space (Permit Space). A confined space that has one or more of the following characteristics:

(1) Contains or has the potential to contain a hazardous atmosphere
(2) Contains a material that has the potential for engulfing an entrant
(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section
(4) Contains any other recognized serious safety or health hazard

3.3.19 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, the work, or the project. [326, 2015]

3.3.20 Rescue Attendant. A person who is qualified to be stationed outside a confined space to monitor rescue entrants, summon assistance, and perform non-entry rescues.

3.3.21 Rescue Entrant. A person entering a confined space for the specific purpose of rescue.

3.3.22 Retrieval System. Combinations of rescue equipment used for non-entry (external) rescue of persons from confined spaces.

3.3.23 Risk. The probability that a substance or situation will produce harm under specified conditions. Risk is a combination of two factors: (1) the probability that an adverse event will occur and (2) the severity of the consequences of the adverse event.

3.3.24 Risk Assessment. A process for systematically evaluating risk that considers the severity of consequences and the likelihood that the adverse event will occur.

3.3.25 Ventilation. The changing of air within a compartment by natural or mechanical means. Ventilation can be achieved by introduction of fresh air to dilute contaminated air or by local exhaust of contaminated air. [302, 2015]


4.1 **HEADING.** The owner/operator or the on-site contractor/subcontractor performing work should evaluate the entire facility, including, but not limited to, detached buildings, structures, sewers and drainage, trenches; tanks, vessels and containers, tunnels, and property grounds to determine if there are confined spaces present that are configured so they could be entered by employees, contractors, the public, or visitors to the facility.

4.2 **HEADING.** All construction sites should be evaluated as indicated in the facility or contractor confined space program to determine if confined spaces could be present or created at any time during various construction phases.

4.3 **HEADING.** Spaces that should be evaluated to determine if they could be confined spaces include those that a person could enter bodily and that have both of the following characteristics:

1. Have limited or restricted means for entry and exit. Any space that requires a ladder to access or requires a worker to crawl or contort his/her body to enter could be a confined space. Nonstandard staircases such as spiral stairs or ships ladders could also be considered to have limited access or restricted means egress. Often these spaces are located below grade or require descent into a space. There are also confined spaces, such as water tanks, HVAC systems, and wind turbines that are typically located above ground.

2. Are not designed for continuous human occupancy. These are spaces where employees would not normally be assigned for work. They are spaces where a desk, computer, or phone would not be placed but that might need to be entered for non-routine inspection, maintenance, or repair work. Utility vaults, crawl spaces, tanks, and below grade structures are examples of spaces that typically are not designed for continuous human occupancy. There are also structures that might be confined spaces that need to be worked on internally during construction, such as a pipe or a tank that needs to be welded.

4.4 **HEADING.** All confined spaces should be posted with signs, tags, or labels denoting them as confined spaces and prohibiting entry to unauthorized entrants. In facilities with multiple, recognizable confined spaces, (such as storage tank facilities with multiple tanks or workplaces with multiple manholes), the owner can identify such spaces with facility signage and identify the spaces in their written confined space program in lieu of individual signs or labels. Signs should have the following (or similar) wording:

**DANGER — THIS IS A CONFINED SPACE.**

**DO NOT ENTER WITHOUT PERMIT**

FROM CONFINED SPACE ENTRY SUPERVISOR.

4.5 **HEADING.** All confined spaces should be locked, guarded, protected, or barricaded to prevent unauthorized entry when entry operations are not in progress.

4.6**HEADING.** All employees who work offsite in a facility or at a location where they could expect to work in or around confined spaces should be informed of the presence, location, and nature of such spaces and should be provided with confined space awareness training (TBD.
Chapter 5 General

5.1* HEADING. The terms confined space, non-permit required confined space, and permit required confined space can cause some confusion among employers and workers. To eliminate such confusion, this guide uses only the term confined space and makes provisions for evaluating the hazards of and issuing permits for all confined spaces entries regardless of whether the evaluation shows multiple hazards or no hazards at all.*

5.1.1 All confined spaces have the potential to become an OSHA-defined permit required confined space, depending on the work being performed and the inherent, potential, or introduced hazards in the space at the time of the entry. While procedures required to safely enter a confined space vary widely, the same basic evaluation of the hazards within those spaces should be done prior to and during entry. All confined spaces should be evaluated in accordance with the guidelines in Chapter 6 and Chapter 7, and all hazards should be eliminated or controlled to an acceptable level in accordance with the guidelines in Chapter 8 and Chapter 9.

5.1.2 Table 5.1.2 shows the terminology used in OSHA 29 CFR 1910.146, ANSI Z117.1, API 2015/2016, and this guide.

<table>
<thead>
<tr>
<th>Standard or Document</th>
<th>Term Used</th>
<th>Term Used in NFPA 350</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 CFR 1910.146</td>
<td>Confined space</td>
<td>Confined space</td>
<td>NFPA 350 uses the same definition as OSHA for a confined space.</td>
</tr>
<tr>
<td>29 CFR 1910.146</td>
<td>Permit required confined space</td>
<td>Confined space</td>
<td>NFPA 350 does not distinguish between permit required confined spaces and confined spaces. All confined spaces need permits for entry.</td>
</tr>
<tr>
<td>ANSI ASSE Z117</td>
<td>Non permit confined space</td>
<td>Confined space</td>
<td>All confined spaces need permits for entry. If no hazards are identified and no hazards will be introduced, then no restrictions will be listed on the permit for entry.</td>
</tr>
<tr>
<td>29 CFR 1910.146</td>
<td>Reclassification (downgraded) entry</td>
<td>Confined space entry</td>
<td>Not defined in NFPA 350. A confined space with hazards that have been completely eliminated will have no restrictions placed on the authorization/permit for entry.</td>
</tr>
</tbody>
</table>
| 29 CFR 1910.146      | Alternate procedures        | Confined space entry  | Not defined in NFPA 350. A
API 2015/2016

Non confined space (a confined space that is no longer a confined space due to reconfiguration)

None

If a space does not meet all the specifications for a confined space, then it is not a confined space and NFPA 350 does not apply.

NFPA 326

Nonconfined space (for purposes of tank entry, cleaning, or repair, a space that previously was a confined space but no longer meets any of the requirements for a confined space or a permit required confined space, such as a tank with a large door sheet cut into the side)

None

If a space does not meet all the specifications for a confined space, then it is not a confined space and NFPA 350 does not apply.

5.2 HEADING. A written confined space program that meets the guidelines of Chapter 12 should be developed for every facility that has one or more confined spaces.

5.3 HEADING. A permit should be issued by the designated entry supervisor for all confined spaces in accordance with Chapter 13. The permit can be basic, with limited guidelines and restrictions, or it can be a complex permit with multiple guidelines and restrictions established for entry and work. A “reclassified” (29 CFR 1910.146) confined space, in which all hazards have been eliminated and the work will not create new hazards, would have a permit issued without restrictions. An “alternate procedures” (29 CFR 1910.146) entry would be equivalent to a space in which the only hazard found is a hazardous or potentially hazardous atmosphere. In those cases, the permit would indicate that all other safety hazards have been evaluated or eliminated and that the only restriction is entry with continuous ventilation. (See Chapter 13.)

5.4 HEADING. Entry by employees should take place only after the competent entry supervisor has indicated that acceptable entry conditions as indicated in Section 5.5 and 8.2.1 have been met and after a permit has been issued.

5.5 HEADING. Prior to entry, the following criteria should be met:
1. All inherent, potential, introduced, and adjacent hazards of the confined space should be identified and evaluated in accordance with the written confined space entry program and guidance provided in Chapters 6 and 7.

2. All hazards should be eliminated or controlled in accordance with Chapters 8 and 9.

3. An authorized entry supervisor who is trained in accordance with Chapter 11 has been assigned to oversee the work.

4. An authorized entrant who is trained and qualified in accordance with Chapter 11 has been assigned to enter the space.

5. A competent attendant who is trained and qualified in accordance with Chapter 11 has been assigned.

6. If gas monitoring is necessary according to the permit, a qualified gas monitoring specialist who is trained in accordance with Chapter 11 has been assigned. This person can be the attendant, entry supervisor, or other person, such as a facility or contractor employee provided this individual is qualified in accordance with Chapter 11 guidelines.

7. If ventilation is required according to the permit, a qualified Ventilation Specialist who is trained in accordance with Chapter 11 should be assigned. This person can be the attendant, the entry supervisor, or other person such as a facility or contractor employee, provided the individual is qualified in accordance with Chapter 11 guidelines.

8. If energy or other sources exist that must be isolated or controlled according to the permit, a qualified isolation specialist trained in accordance with Chapter 11 should be assigned. This person can be the attendant, the entry supervisor, a standby worker, or entrant if qualified in accordance with Chapter 11 guidelines.

9. Rescue equipment and/or services should be available in accordance with the permit and the guidelines provided in Chapter 10.

10. Other required permits, such as hot work, are issued by the permit issuer.

11. A permit should be issued and signed by the Permit Issuer and entry supervisor in accordance with Chapter 13.

12. A pre-entry meeting should be held with all personnel who will be entering or working in or adjacent to the space to discuss the work to be performed, job requirements and assignments, actual and potential hazards, and methods of eliminating or controlling the hazards as listed in the conditions on the permit.

13. Communication between the entrant and the attendant should be established in accordance with Chapter 8.

14. Entry should not occur until all conditions for entry established on the permit are met.

5.6 Roles and Responsibilities. Every workplace that has one or more confined spaces as identified in Chapter 4 that will be entered should have personnel assigned to perform the responsibilities of following roles as applicable:

1. Owner/operator and/or contractor/subcontractor

2. Entrant

3. Attendant

4. Entry Supervisor

5. Permit Issuer

6. Gas Tester

7. Ventilation Specialist

8. Rescuer (could be attendant for non-entry rescue)

9. Rescue Team

10. Standby Worker

11. Isolation Specialist

5.7 Training Guidelines.
5.7.1 Employers (owners/operators) and contractors should ensure that all employees engaged in confined space activities have the necessary understanding, knowledge, and skills and are able to safely perform their assigned duties.

5.7.2 Employers (owners/operators) and contractors should ensure that all employees engaged in confined space activities who are assigned the duties of the roles listed in Section 5.6 have been trained as follows:

(1) Prior to beginning the initial assignment to their work or duties

(2) Before a change in assignment to a different type of work or duties

(3) Whenever there is a change in operations, procedures, or guidelines that has the potential to present a hazard for which the employee has not been previously trained or educated

(4) Whenever an employer (owner/operator) or contractor has reason to believe an employee requires retraining or additional education due to inadequacies in the employee’s performance or skill or because the employee deviates from the confined space program or established procedures

5.8 Training Verification. Employers (owners/operators) and contractors should verify, in writing, that employees have been trained, as required, and the verification should be available for inspection by employees and their designated representatives. The verification should contain the names of the employees trained; the means used to determine that the employees understanding the training; the signature, name, or initials of the trainer(s); the training subjects and content; and the date(s) the training was conducted, in accordance with Chapter 11.
Chapter 6 Identification of Hazards In and Around Confined Spaces

6.1 General.

6.1.1 Work in and around confined spaces in general is hazardous, and conditions can change significantly with little or no warning. Research and preplanning are necessary to ensure that confined spaces are recognized and that hazards are identified and evaluated. Additionally, the anticipation of potential hazards beyond those currently present should continue throughout the work evolution.

6.1.2 Workers can become quite familiar with the space(s) in which they operate. Likewise, work can be routine and repetitive, and complacency can ensue with continual uneventful entries. While knowledge of the space and equipment can be helpful when preplanning work, it does not lessen the vigilance needed to enter, work in, and exit a confined space safely. The space’s history and prior use should be considered in anticipation of hazards, but each entry should be considered an individual and unrelated event.

6.1.3 Identifying hazards in around a confined space is a three-stage process:

1. The anticipation or preplan stage starts with a sizing up of potential hazards and the identification of resources that might be needed to work in and around confined spaces.
2. The hazard identification stage confirms anticipated hazards and recognizes additional potential hazards.
3. The hazard evaluation stage determines the risk of each hazard identified.

6.1.4 After all hazards have been identified and risks have been assessed, controls should be implemented in accordance with Chapter 8.

6.2 Hazard Anticipation/Preplan. Many hazards can be anticipated before work begins by the preplanning process, which consists of a thorough analysis of the space, its purpose, the systems contained within it, and the scope of work necessitating the entry. Preplanning can identify potential hazards and resources that might be needed to work in and around confined spaces and to prevent adverse consequences related to the work. There are two main components to the preplanning stage: intelligence gathering and resource identification.

6.2.1 Hazard preplanning starts with the collection of information that could be useful prior to starting work. This intelligence gathering includes, but is not limited to, using previously prepared hazard surveys, preplans, schematics, blueprints, work orders, equipment guides, safety data sheets, manuals, control measures, and prior experience from previous entries and knowledge from workers familiar with the space. Likewise, its operations and the process area associated with the entry might be helpful in the anticipation and identification of hazards.

6.2.2 Once intelligence has been gathered, potentially required resources can be identified, including the following:

1. Instrumentation (e.g., air monitoring equipment, electrical testers)
2. Controls
   a. Engineering controls (e.g., ventilation hardware, lighting, line breaking/blanking)
   b. Administrative controls [e.g., additional permits, hot work, lockout tagout (LOTO), personnel needs]
3. Personal protective equipment (PPE) (e.g., hardhats, respirators, chemical protective clothing, safety boots)
4. Outside resources (e.g., technical specialists, rescue services, specialized equipment)

6.3 Hazard Identification.

6.3.1 Hazard identification, which is done at the site of the confined space, verifies anticipated hazards and identifies new ones. It is done by conducting a review of the space’s documentation (e.g., safety data sheets for cargo that the space held), a visual inspection, and atmospheric monitoring. The visual inspection should be conducted around the exterior of the space and then in all areas within the space. During the inspection, all posted warning signs and permits should be noted, as should any materials or conditions that could pose a hazard, such as chemical residue or the potential for a change in the atmospheric conditions. Atmospheric
monitoring (see Chapter 7) should be conducted to determine the atmospheric conditions inside the space and in its adjacent spaces.

6.3.2 There are three sources of hazards that can be directly or indirectly associated with working in and around confined spaces: hazards directly associated with confined spaces and inherently present in or around the space; the result of product(s) stored in or around the space; or the result of processes taking place within or near the space. Indirect hazards are hazards that are not integral to the space but can still affect it.

6.3.3 Hazards can be physical, mechanical, electrical, chemical, biological, or psychological. Equal consideration should be given to potential hazards directly and indirectly associated with the space.

6.3.4 Hazard Sources. Hazards that directly or indirectly affect the space can be inherent, introduced or adjacent.

6.3.4.1 Inherent Hazards.

6.3.4.1.1 Inherent hazards are those hazards that exist as a permanent, essential characteristic, or attribute of the space. The hazard identification stage should include whether the location and configuration (including restricted access, obstructions, or remoteness) could inhibit or interfere with movement, ventilation, escape, rescue, or fire fighting.

6.3.4.1.2 Inherent hazards to be identified include the following:

1. **Inaccessible or limited access into the space.** For example, space for which ladders or scaffolding is needed to reach the portal, to enter and exit the space, or to perform work therein. Elevated spaces require different considerations for entry and rescue than those that are at ground level, including fall protection.

2. **Size and shape of the portal.** For example, the restrictive nature of some portals makes access with certain types of PPE difficult or impossible or requires entrants to contort their bodies while entering or exiting. Likewise, an open, unprotected edge or portal can create a fall hazard.

3. **Size and shape of the space/vessel.** For example, inwardly converging walls or a funnel shaped discharge can entrap and suffocate an entrant; congested spaces can inhibit mobility or create slip, trip, and fall hazards.

4. **Products or processes in the space.** For example, chemicals, thermal stress, noise, steam, pressurization, mechanical equipment, and other activities associated with the use of the space can create hazards. Additionally, disturbing product residue during entry or work can release a contaminant that produces a hazard not detected during pre-entry testing.

5. **Fixed equipment within the space.** For example, piping systems, conduits, ducts, machinery or pressurized lines, and fire suppression systems should be evaluated for potential hazards and locked out/tagged out, tested, gas-freed, and/or inerted if needed to reduce the risk.

6.3.4.2 Introduced Hazards

6.3.4.2.1 Introduced hazards are hazards that are not normally associated with the space’s purpose or processes but are brought into the space or adjoining area(s) deliberately or inadvertently. As part of the hazard evaluation and risk assessment, the actions of entrants and the materials, products, and techniques used to gain access, enter, inspect, clean, and/or repair a confined space should be carefully considered to ensure they do not introduce hazards. This also includes an evaluation of work being performed in the area(s) immediately surrounding the space.

6.3.4.2.2 Examples of introduced hazards include the following:

1. **Atmospheric hazards.** Ventilating a space can introduce contaminants from an ill-placed supply air duct or draw contaminated air from engine exhaust or oxygen-deficient air from another space or source. Product off-gassing can be captured by forced ventilation and contaminate adjacent areas.

2. **Chemical hazards.** Products used in cleaning, abating, or coating need to be checked for reactivity with other chemicals that might be present. Chemicals can also produce hazardous vapors or gases and/or displace or consume oxygen due to the confined nature of the space.
6.3.4.3 Adjacent Hazards.

6.3.4.3.1 Adjacent hazards are hazards or other conditions that might exist in the area(s) surrounding the space. Adjacent hazards can also involve other spaces that are in proximity to the entry site and can pose significant hazards that need to be evaluated separately prior to entry.

6.3.4.3.2 Examples of adjacent hazards include the following:

1. **Adjacent spaces.** Spaces and vessels that share a common wall, contact each other in any way, or share a surrounding or cover need to be assessed for possible hazards or operation that could influence the subject space or vice versa (e.g., hot work, compressed gases, machinery). This includes evaluating areas in all directions from the subject space — those that share a common point/wall, contact, corners, diagonals, decks/floors, tank tops, and bulkheads/walls.

2. **Adjacent work activities.** Personnel activities or work that is being performed in nearby spaces should be analyzed for effects or dangers posed to the subject entry.

3. **External hazards.** Areas surrounding the subject space should be assessed for other possible dangers that can affect the entry. Pedestrian and vehicle traffic, equipment, smoke and exhaust, contaminate-producing activities, sparking, heating or cooling, or transfer of product can all produce hazards.

6.3.5 Types of Hazards. A pre-entry evaluation should be conducted for all confined spaces to determine if hazards are present. It should be assumed that a confined space is not safe for entry until the hazards (present or potential) are identified, evaluated, and eliminated or controlled. Hazards include, but are not limited, to mechanical hazards, electrical hazards, physical hazards, chemical hazards, biological hazards, and psychological hazards.

6.3.5.1 Mechanical Hazards. These hazards are created by equipment with stored energy (mechanical, electrical, pneumatic, or hydraulic) or equipment that is/was energized in and around the subject space. Mechanical hazards have the potential to crush, burn, cut, shear, stab, or otherwise strike or wound workers and include rotating or other moving equipment. This equipment can be associated with either mechanical processes that take place in the space or other machinery in the vicinity.

6.3.5.2 Electrical Hazards. These hazards are created by an electrical current, charge, or field capable of causing injury. All electrical sources should be treated as a potential hazard, including low-voltage sources. Low voltage does not mean low hazard. If electrical hazards are present, they should be evaluated by a qualified electrician as to the potential risk and controls in accordance with NFPA 70E. Voltage alone does not determine the severity of and electrical shock. The three factors that determine the severity of electrical shock are as follows:

1. The actual quantity of current (amperes) flowing through the body
2. The path of current through the body
6.3.5.2.1 As electricity travels from its source and returns to that source, either through another wire or through the ground, it makes a complete circuit. If anything, such as a human body, comes in contact with the current-carrying wires and has lower resistance than the wire, electricity will follow the path of least resistance. Note: Arc flash from energized conductors can produce intense blinding light capable of burning entrants and explosive high-pressure shock waves and molten metal projectiles.

6.3.5.3 Physical Hazards. These hazards include hazards other than mechanical or chemical that would cause harm to the body, including, but not limited to, noise, engulfment, falls, wet/slick surfaces, slip/trip hazards, lighting, radiation, vibration, and extremes of temperature and pressure. Physical hazards include explosion and fire hazards created by various chemical agents such as flammable liquids, paints, solvents, and methane, as well as combustible settled dust in excess of 1/32 in., and airborne concentrations that impair visibility to less than 5 ft are indicators of potential explosive conditions. Concentration of explosive/flammable vapors should be less than 10 percent of the lower flammable/explosive limit (LFL/LEL) for entry into a work area. Concentrations 10 percent or more of the LFL/LEL pose an explosion hazard. The LFL/LEL can be measured with an instrument configured to measure explosive gases. Note: LFL/LEL is the lowest concentration of gas or vapor in air in which burning will take place.

6.3.5.4 Chemical Hazards. These hazards can arise from exposure to concentrations of gases, vapors, mists, fumes, liquids, or dusts. Routes of exposure are through inhalation, absorption through skin or mucous membrane (nose, throat, eyes), or ingestion. All three routes of entry should be considered in the evaluation of confined space hazards:

(1) Inhalation is the most common way for a toxic chemical to enter the body. Inhaled materials are in the form of a fume, dust, gas, mist, or vapor.
(2) Skin absorption occurs when a chemical (such as a solvent) passes through the skin and enter the bloodstream. Some dusts and mists, like pesticides, can dissolve on moist skin and then be absorbed.
(3) Ingestion occurs when workers do not wash their hands before eating or when they drink beverages or smoke in an area where hazardous chemicals are used.

6.3.5.4.1 Chemical hazards and oxygen levels can be measured using atmospheric monitoring devices, such as multi-gas meters (configured for the compounds of concern), single gas monitors, and colorimetric tubes.

(1) Systemic poisons are materials that damage human organs or systems, such as the kidneys, liver, or central nervous system. Common poisons and toxic chemicals found in or around confined spaces include carbon monoxide from incomplete combustion (e.g., engines) or fires, hydrogen sulfide from decaying biological material (e.g., rotting fish, seaweed, grains), cleaning operations (e.g., toxic volatile organic compounds, solvents), and welding fumes (e.g., heavy metals).
(2) Corrosives are chemicals that cause visible destruction of living tissue at the site of contact. Some examples are muriatic acid, sulfuric acid, and lye.
(3) Irritants are chemicals that are not corrosive but can cause a reversible inflammatory effect on living tissues. Irritants are similar to corrosives, but they are weaker in their effects. Their sites of action are the skin, eyes, and lungs.
(4) Oxygen deficiency and enrichment atmospheres are also hazardous. The normal amount of oxygen is 20.8 percent to 20.9 percent in the air. When oxygen is lower than 20.8 percent, there might be a chemical or process consuming the oxygen; when it is higher, there might be a source of oxygen being introduced to the space. Oxygen deficiency can lead to atmospheres that cannot sustain life and that can become immediately dangerous to life and health. Oxygen-enriched atmospheres greater than 22 percent can create a fire or explosion hazard. Oxygen deficiency (less than 19.5 percent) can be caused by the following:
   (a) Displacement of oxygen by other gases and vapors such as inert gases or by evaporating liquids
   (b) Rusting metals, such as scrap iron or tank wall corrosion
   (c) Organic decay (rotting fruit, molasses, edible oils)
6.3.5.5 Biological Hazards. These hazards are created by viruses, bacteria, fungi, parasites, or other living organisms that can cause disease in humans. Common sources of biological hazards include bodily fluids and waste, insect bites or stings, rats, snakes, and microbial pathogens. Some biological materials, such as bacteria and molds, can be sampled and then analyzed at a microbial laboratory. Although the results can take time, the data can assist in determining and documenting potential exposures.

6.3.5.6 Psychological Hazards. Confined spaces, restricted movement, excessive noise, and PPE restriction can create psychological hazards. Some entrants can easily become claustrophobic or stressed, which can cause them to hyperventilate and alter their ability to reason and make sound decisions.

6.4 Hazard Evaluation.

6.4.1 Once hazards have been identified, their risks to entrants should be assessed. A risk assessment is a process in which the expected severity of illness, injury, or property damage that an identified hazard can cause is coupled with the probability of that level of hazard occurring. If the level of risk is greater than what is acceptable, control measures should be introduced to reduce the risk to an acceptable level. The risk assessment enables prioritization of controls and limited resources or can indicate that a hazard needs to be eliminated in order to establish acceptable entry parameters.

6.4.2 Acceptable entry parameter steps, in general, are as follows:

1. Identify hazards (through monitoring, visual inspections, documentation, etc.). Using the information in this chapter, conduct a thorough investigation of existing or potential hazards that could pose a danger to an entrant. Document findings and ensure that workers know what the hazards are and where they can be found.

2. Conduct a hazard evaluation to determine the risks. Develop hazard scenarios that describe the environment, possible exposures, actions or events that could precipitate the hazard, and the outcome that would occur should it happen. In other words, determine what can go wrong, how it could get that way, what the consequences would be, and how likely the event is to happen. Consideration should also be given to the entrants themselves, since their level of training, experience, and PPE can contribute to or create hazards in and around confined spaces (e.g., wearing an encapsulated suit to prevent skin contact can create a heat stress hazard over an extended period of use in a hot environment.)

3. *Assess and evaluate the —risks. Conduct a risk assessment of the hazards. This assessment can be quantitative, semi-quantitative, or qualitative based on the needs of the situation and the identified hazards. There are numerous methods for conducting risk assessments; one such method is outlined in ANSI/AIHA Z10-2012, Occupational Health and Safety Management Systems

4. Prioritize the risks. Note which of the hazards pose the highest risk and focus on controlling or eliminating those first.

5. Determine control measures. It is always best to eliminate hazards when possible regardless of the probability or severity of the hazard. If that is not feasible, the next best strategy is to use engineering controls to reduce entrants’ exposures. Engineering controls include such strategies as local exhaust ventilation to remove contaminants, general dilution ventilation to supply fresh air to the space, and substitution of materials so that chemicals are not introduced or produced during work in the space. Other types of control measures include administrative controls and PPE. Administrative controls include such measures as posting warning signs on confined spaces; ensuring that personnel are trained how to identify, evaluate, and control hazards; and instituting an organization-wide confined space safety program. PPE is used when engineering and administrative controls are not sufficient to reduce or eliminate the hazards — it is the last control measure in the hierarchy of controls because it does not reduce or remove the hazard. See Chapter 8 for hazard elimination and controls.

6. Verify control measures. Ensure that the control measures chosen do not introduce another hazard that has a higher level of risk. For example, if ventilation ducts block the exit for workers, it could be determined that the risk of not having the ventilation outweighs the risk posed by the blocked exit.
(7) Determine if the level of risk is acceptable. Determine if the risk has been reduced to an acceptable level (as determined by the organization or the supervisor) with the control measures chosen. For example, the risk assessment might conclude that a complicated, redundant ventilation system is required for entry. A facility in-house confined space entry team might conclude they are uncomfortable and unfamiliar with implementing such a system and determine that they will not complete the entry; instead, they conclude the risk is too great and opt to hire a professional contractor.

(8) Implement and train. After the controls are implemented, ensure that personnel involved in the entry operations are informed of the hazards, risk assessment determinations, and chosen control measures (and if those control measures might pose a hazard).

(9) Institute ongoing assessment. The identification and evaluation of hazards should be an on-going process as conditions often change in a confined space due to inherent, introduced and adjacent hazards. There should be regular visual and atmospheric monitoring of the space to ensure conditions do not change. Changing conditions may indicate the need to evacuate the space and re-evaluate it.

6.5 Communications. A vital, reiterative part of reducing hazards is communication. It starts after the identification of hazards and communicates them to all persons involved with the entry or working around a confined space.

6.5.1 Communications can be accomplished verbally, through the use of signs and placards, on a Job safety analysis form, or on the permit itself. All verbal notification of hazards should be documented in writing.

6.5.2 The authorization for entry procedures should outline how communication during the entry, work and exit stages will be conducted, ensuring that authorized entrants and attendants can maintain contact during entry and throughout the work shift. Because voice communications can be hampered by noise, PPE, distance, and so forth, two forms of communication should be.

6.5.3 The risks and potential exposures of the entry as well as the signs and symptoms of exposure need to be communicated to the entrant and the attendant. The supervisor should ensure that they are familiar with equipment, such as PPE, atmospheric testing equipment, alarm systems, and the rescue equipment available.

6.5.4 Entrants and attendants should have the ability to witness and review any testing results conducted; if that is not done, then the results need to be communicated to them.

6.5.5 The means of rescue or recovery as well as the means of egress should be communicated to all entrants and attendants.

6.5.6 The supervisor needs to ensure that the attendant(s) has the means to notify the designated Rescue Team.

6.5.7 All personnel involved need to be informed of other key information given the circumstances of the particular confined space to ensure employee safety. This information includes, but is not limited to, additional permits (e.g., hot work, electrical work, lockout/tag out); other work being performed in the vicinity of the confined space; forecasted atmospheric conditions; and past concerns or issues with the space.

6.6 Resources. The resources in 6.6.1 through 6.6.5 might be helpful in identification of hazards associated with confined spaces:

6.6.1 Safety Data Sheets (SDS). Safety Data Sheets should be available and reviewed for recent materials that previously have been stored or used in a confined space being entered, have been used to purge a confined space being entered, or are being brought into the space being entered.

6.6.1.1 Safety Data Sheets should be reviewed or evaluated to determine, at a minimum, the flammability, combustibility, toxicity, asphyxiation hazard, and reactivity of materials.

6.6.1.2 All hazards identified during the SDS evaluation should be recorded on the confined space permit in accordance with Chapter 13 and evaluated and controlled in accordance with Chapters 7, 8, and 9 (atmospheric monitoring, ventilation, and hazard control sections).
6.6.2 Blueprints and Schematics. Blueprints and schematics can provide information about the construction of the space, such as dimensions and distances. They can familiarize the entrant with equipment locations, size, power sources, and safety features.

6.6.3 Placards and Markings. Warning placards and markings can provide entrants with specific hazard warnings, such as “Electrocution Hazard.” They also provide warning of toxins and chemical hazards. The NFPA 704 marking system, which provides a warning of significant hazards, should be present at most facilities.

6.6.4 Department of Transportation Emergency Response Guide. This guide is available online at http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Hazmat/ERG2012.pdf

6.6.5 Documentation. See Chapter 13 Permits.
7.1 Procedures for Atmospheric Testing. Atmospheric testing should be done using the criteria described in Chapter 7 prior to any confined space entry to determine if the atmosphere is safe for entry. Further atmospheric monitoring might not be necessary after initial entry testing based on the permit requirements of Chapter 13. Atmospheric testing is performed for three distinct purposes:

1. Evaluation testing (initial hazard evaluation)
2. Verification testing (pre-entry testing)
3. Continuous monitoring of the atmosphere within the space (See Section 7.12.)

7.1.1 Evaluation Testing. (Note: Evaluation testing is performed for the purpose of initial hazard evaluation and hazard identification. See Chapter 6.) The atmosphere of a confined space should be tested using equipment of sufficient sensitivity and specificity to identify and evaluate any atmospheric hazards that could exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions can be stipulated for that space. Evaluation and interpretation of the data and development of the atmospheric monitoring procedures necessary for entry, should be done by or reviewed by a technically qualified professional such as but not limited to a Certified Industrial Hygienist, Certified Safety Professional, or Certified Marine Chemist based on evaluation of all hazards.

7.1.2 Verification Testing (Pre-Entry Testing). The atmosphere of a confined space should be tested for all hazardous contaminants identified by the evaluation testing above or by the permit issuer or entry supervisor using appropriate equipment to determine that the atmospheric concentrations at the time of entry are within the range of acceptable entry conditions as described in 8.2.1. Results of testing (actual gas concentrations, etc.) should be recorded along with the stipulated acceptable entry conditions according to the permit recommendations in Chapter 13. All detection equipment should be designed for the gases and vapors being tested and certified for use in the environment where it is being used. Refer to manufacturers’ specifications and hazardous location certifications.

7.1.3 All portable gas monitoring equipment used for confined space atmospheric testing should be turned on and zeroed according to Section 7.9.

7.1.4 All portable gas monitoring equipment used for confined space atmospheric testing should be bump tested and calibrated according to Sections 7.6 and 7.7.

7.1.5 If atmospheric testing is done from outside the space, initial testing should be performed with all ventilation controls turned off to ensure testing of a static atmosphere and to determine the background gas concentration levels in the event that ventilation fails during the entry. However, after the initial testing is completed, it is acceptable to test the atmosphere with the ventilation controls turned on if ventilation is necessary as a means to mitigate the hazard.

7.1.6 Tests for atmospheric hazards should be conducted simultaneously or in the following order:
1. Oxygen deficiency and/or oxygen enrichment. An oxygen-deficient atmosphere represents the most common atmospheric hazard in confined spaces. Most combustible gas sensors are oxygen dependent and might not provide reliable readings in oxygen-deficient atmospheres. Therefore, oxygen concentrations should be noted during testing first to ensure that sufficient oxygen is present for proper sensor operation according to the equipment manufacturer’s recommendations.
2. Combustible or flammable mixtures. Combustible gases and vapors present an immediate threat for fire and explosion and are a common atmospheric hazard found in confined spaces.
3. Toxic gases and vapors as necessary and determined by hazard identification (see Chapter 6):
   a. Carbon monoxide (CO) and hydrogen sulfide (H2S) are the two most common toxic gases found in confined spaces.
   b. Carbon monoxide is a by-product of combustion and should be a suspected hazard in and around any space where combustion processes occur.
7.1.7 The qualified gas tester performing atmospheric testing should be trained and knowledgeable with regard to the potential atmospheric hazards and the specific monitor being used to test the confined space according to Section 7.8 and Chapter 11.

7.1.7.1 The qualified gas tester performing atmospheric testing should verify that the monitor is functioning properly (see Sections 7.6 and 7.7), has the appropriate accessories (filters, tubing, probes, etc.) and is equipped with the proper sensors for the identified atmospheric hazards related to the confined space. In addition, the qualified gas tester should have an understanding of the equipment specifications, including, but not limited to, response time, measurement range, and operating temperature (see Section 7.2).

7.1.8 If the confined space has not been opened or the atmosphere is not immediately accessible for testing, the qualified Gas Tester should open the confined space just enough to allow insertion of the probe for testing. Any potential hazard including but not limited to pressure and electric shock should be eliminated prior to opening the space. Note: Many manhole covers have a small opening to allow the insertion of a sampling hose.

7.1.8.1 If the entrance to the confined space could be affected by wind or ambient air flow, the qualified gas tester should remain on the upwind side of the entrance.

7.1.8.2 The purpose of testing before completely opening the confined space is to prevent creation of an immediately hazardous atmosphere either inside or outside the confined space and to protect the personnel outside the space.

7.1.9 As much of the confined space’s horizontal or vertical area(s) should be tested by use of a pump and remote probe or sample hose from the outside before the space is entered for further testing.

7.1.10 Testing should include all irregular areas of the confined space where atmospheric hazards could be present or could accumulate. (See Section 7.11.)

7.1.11 If entry into the confined space is required to test the entire area, the confined space should be ventilated according to Chapter 9, and a second qualified gas tester, who can be the intended space entrant, equipped with all appropriate PPE (breathing air, harness, lifeline, etc.) can enter the space to complete the test, which would include irregular areas where pockets of gas could become trapped. An entry permit and an attendant are required for this operation. Note: It is not uncommon for each entrant to be equipped with a multi-gas monitor in this situation.

7.1.12 When testing for entries involving a vertical descent is performed, the atmosphere should be tested according to the procedures outlined in 7.11.2

7.1.13 If the confined space requires a horizontal entry, the atmospheric testing should be performed according to 7.11.3.

7.1.14 The qualified gas tester performing the atmospheric testing should document the initial results of the atmospheric monitoring, including all gas readings, along with but not limited to the tester’s signature and the date and time of the gas test, on the entry permit.

7.1.15 While the pre-entry test determines the initial air quality before the confined space is entered, it is important to monitor for changes in the atmosphere that could occur during work operations inside the space to ensure that a safe atmosphere is maintained. Therefore, continuous atmospheric monitoring according to 7.12 should be performed.

7.1.16 If hazardous atmospheric conditions as described in Section 7.14 are detected during pre-entry testing, entry should be prohibited until corrective actions are taken and retesting verifies acceptable atmospheric conditions.
7.1.17 Any change in atmospheric measurements should be reported to the entrant and the entry supervisor immediately. The test results should be recorded, documenting the change in concentration and time.

7.1.17.1 If any results from atmospheric testing while working within the confined space exceed the acceptable limits for entry described in Section 7.14, all work should cease and the space should be evacuated immediately.

7.2 Selection and Types of Monitors.

7.2.1 A gas monitor should be selected based on the initial hazard evaluation of the confined space. The atmospheric hazards that could be in the confined space prior to entry and during work in or around the space should be defined in accordance with Chapter 6. Once the atmospheric hazards are determined, the proper monitor can be selected.

7.2.2 Confined space monitors should be calibrated, direct reading, continuous monitoring instruments. The monitor should detect for oxygen (O2) content, flammable gasses and vapors (LFL), and for potential toxic gases. These are minimum requirements. The hazard evaluation will determine if it is necessary to monitor for specific gases, including, but not limited to, carbon monoxide (CO), hydrogen sulfide (H2S), ammonia (NH3), or volatile organic compounds (VOCs), like benzene. Each of these hazardous gases can require its own unique sensor technology in order to be detected properly. In addition, monitoring of other potential atmospheric hazards could be necessary according to the hazard identification and hazard evaluation.

7.2.3 Portable gas monitoring instruments should be used for confined space entry atmospheric testing. In confined spaces where fixed gas detectors are installed, portable instruments should be used for pre-entry testing and worn by the entrant in the space.

7.2.4 Monitor Accuracy.

7.2.4.1 Direct reading instruments used for the purpose of evaluating or verifying confined space atmospheres should provide reading accuracy of +/-20 percent of the actual gas concentration or better in all use conditions that are covered within the monitors’ operating specifications.

7.2.4.2 Instruments using correlation or response factors to determine the level of a particular gas or vapor concentration present that is different from that for which the sensor or instrument is calibrated should have accuracy of +/-30 percent or better with the correlation factor applied. For example, a monitor equipped with a PID-calibrated to isobutylene can be used to detect the level of trichloroethylene in a confined space. The monitor reading should be multiplied by a correlation or response factor, specified by the manufacturer, to determine the relative concentration of trichloroethylene in the space. The accuracy of the value after the reading has been multiplied by the correlation factor should be better than +/-30 percent.

7.2.4.3 In addition to the accuracy stated in 7.2.4.1 and 7.2.4.2, the user should be aware of the instrument’s capabilities in the areas discussed in 7.2.5 through 7.2.10.

7.2.5 Limits of Detection. The minimum detection limit (MDL) (the smallest level of a gas that can be detected within the specified accuracy or repeatability of the monitor) should be less than 2 percent for oxygen, 2 percent LFL for combustible gases, and at least one order of magnitude lower than the published PEL or TLV, whichever is lower, for toxic gases. The levels can be determined from manufacturers’ specifications. For example, the current OSHA PEL for chlorine (Cl2) is a ceiling limit of 1.0 ppm. The MDL for a chlorine monitor should be less than or equal to 10 percent of 1 ppm, or 0.1 ppm. Lower MDLs will provide for greater reading stability and confidence around gas concentration action points and reduce or eliminate false or nuisance alarms due to detector or sensor instability.

7.2.6 Measuring Range. The instrument measuring range for detection of each of the targeted gas hazards should be known and be verified to be adequate for proper evaluation of all potential hazards. Instrument and sensor measuring ranges should be greater than or equal to 25 percent for oxygen, 100 percent LFL for combustible gases, and greater than or equal to 50 percent of the IDLH level for toxic gas hazards. These levels can be determined from manufacturers’ specifications. Note: It is desirable to use instruments with
broader measuring ranges in order that atmospheres with contaminants that are outside normal limit values can be properly evaluated, proper mitigation procedures can be established and followed, and proper PPE can be issued and used.

7.2.7 Interferences.

7.2.7.1 Instrument users should be aware of gases other than the targeted sensor gas that can interfere with and cause erroneous sensor readings. For example, typical carbon monoxide sensors will produce an erroneous response when exposed to hydrogen. It is important that all known potential atmospheric contaminants are identified, whether or not they can be considered to present a hazard to the entrant of the space, and the effect on the particular contaminant on the instrument’s sensors be verified with the instrument or sensor manufacturer.

7.2.7.2 Certain compounds can produce positive interferences that enhance or make instrument or sensor readings appear greater than actual target gas concentrations. Unless the presence and concentration of a potential positive interfering gas can be positively identified and confirmed, the resulting reading should be accepted as the true representation of the targeted gas concentration and proper action steps taken accordingly.

7.2.7.3 Certain compounds can produce negative interferences that make instrument/sensor readings appear lower than actual target gas concentrations. In the event that a known negative sensor interfering gas is encountered, the resulting reading from the concentration of that interfering gas determined or believed to be present should be added to the instrument reading for the target gas and the sum of the two values accepted as the actual concentration of the target gas present with proper action procedures followed as a result.

7.2.7.4 Commonly known sensor interferences should be listed in the instrument user’s manual or otherwise provided by the instrument’s manufacturer.

7.2.7.5 RFI/EMI. Instrument/sensor readings can be affected by radio frequency interference (RFI) or other electromagnetic interference (EMI).

7.2.7.5.1 Instruments used for evaluation/verification of confined space atmospheres should be certified by the manufacturer to tested and verified to perform in accordance with relevant guidelines for RFI/EMI.

7.2.7.5.2 Care should be taken to keep instruments isolated from potential sources of RFI/EMI as much as possible during use. As a rule, portable electronic instruments should not be used within 18-in. of the antenna of a transmitting mobile or hand-held radio.

7.2.8 Environmental Factors (Temperature, Humidity, Pressure/Altitude). Portable gas monitoring instruments can be affected by environmental factors, including, but not limited to, temperature, relative humidity, and atmospheric pressure.

7.2.8.1 All instruments/sensors used for evaluation/verification should be compensated for the effects of temperature on the readings throughout the full measuring range of the sensor and the full operating temperature range of the instrument.

7.2.8.2 The absolute effects as well as the effects of changes in relative humidity and pressure/altitude on the monitor readings should be identified and understood in accordance with the manufacturer’s product recommendations.

7.2.9 Alarm Indications

7.2.9.1 Monitors should have simultaneous, multiple alarm indicators, including audible, visible, and vibrating alarms to indicate the conditions in 7.2.9.2 through 7.2.9.6.

7.2.9.2 Gas Alarm Set Points. Portable gas monitors should have preset alarm values but also should allow the user to set the alarms at particular levels. It is critical that a qualified health and safety professional be consulted to determine the level at which instrument/sensor alarms should be set for a specific application.
7.2.9.3 Portable gas monitors should have at least two levels of instantaneous alarms for all sensors (often LEL, and toxics).

7.2.9.4 Portable gas monitors should have alarms to indicate that the Short Term Exposure Limit (STEL) for toxic gases has been exceeded.

7.2.9.5 Portable gas monitors should have time weighted average (TWA) (typically 8 hours average) alarms for toxic gases.

7.2.9.6 Gas monitors should have alarms to alert the user to other conditions, including, but not limited to, the following:

1. Low battery
2. Low flow (on instruments that include remote sampling pumps)
3. Sensor failure
4. Calibration past due
5. Bump test past due

7.3 Other Monitor Types.

7.3.1 If the confined space potentially could have atmospheric hazards that current gas monitoring technology cannot detect, other types of detection equipment should be utilized to assess the atmosphere. Such potential air contaminants could include uncommon chemicals, particulates, and, in some cases, unknown air contaminants. Colorimetric detector tubes and industrial hygiene sampling are two methods that can be utilized.

7.3.2 Colorimetric detector tubes that are selected for particular chemicals can sometimes be used for screening purposes. These tubes, which are usually made of glass, change color in accordance with the concentration level of contaminant measured. Air is drawn through the tube with a bellows or manual aspiration pump.

7.3.3 Detector tubes should be used as according to the manufacturers’ specifications. Most detector tube manufacturers require that only their brand of pump be used.

7.3.3.1 Prior to use, detector tube pumps should be leak checked. This is typically done by compressing the bellows fully, inserting an unbroken tube and releasing the bellows to see if they expand. The bellows will remain fully compressed if no leaks in the pump exist.

7.3.3.2 If measurements are to be made inside a confined space, the detector tube should be attached to the end of the sampling hose and not near the pump. Otherwise, the air in the tubing will be measured rather than the air in the confined space, resulting in erroneous measurements.

7.3.3.3* Most colorimetric test methods are best used for screening purposes since they are typically only accurate to within +/-25 percent. To ensure safety, 25 percent should be added to the resulting reading to determine what the level of toxic gas might actually be in the confined space.

7.3.4* If direct reading instruments or colorimetric tubes are not available to assess the potential hazard, laboratory-based industrial hygiene monitoring with intrinsically safe battery-operated pumps and various air contaminant collection filters, tubes, impingers, or other devices, such as vacuum canisters, should be used. They might be the only means available to measure air contaminants.

7.4 Intrinsic Safety. All monitors used for the purpose of testing for atmospheric hazards within a confined space should be appropriately certified by a nationally recognized testing laboratory (NRTL) to be intrinsically safe for use in the space according to the classification of hazardous atmospheres under NFPA 70, National Electrical Code. (See Chapter 8.)

7.5 Personal Monitoring Versus Remote Sampling. Direct-reading gas monitors can be used in different configurations. Diffusion or passive (personal) monitors work on the basis of the gas sensors being exposed to the ambient environment, unassisted. The sensors sense the immediate ambient environment surrounding
the gas monitor. Remote sampling or sample draw mode utilizes either a manual or an automatic pump. The pump could be an attachment or internal to the gas monitor. In either configuration the pump draws air through a probe and tubing into the gas monitor and directly onto the sensors, which allows the gas monitor to sense the environment away from where the gas monitor is located.

7.5.1* In all cases, remote sampling should be done prior to entering a confined space. The instrument and its display should be in the direct sight of the qualified gas tester at all times during testing. A pump, defined length of tubing, and a probe will be connected to the gas monitor while the qualified gas tester remains outside the confined space with the gas monitor and inserts the probe and tubing into the confined space to the farthest possible point from the entry.

7.5.1.1* Tubing Length and Response Times. The qualified gas tester should ensure that adequate time is allowed to completely purge the sample tubing and ensure that a full reading is obtained during remote sampling operations. Most automatic pumps will draw at approximately 2 seconds per foot of sample tubing. Therefore, the qualified gas tester should allow 2 seconds for every foot of sample probe and tubing used plus the normal instrument response time for the air from the sampling area to be sensed by the sensors.

7.5.1.2 The instrument manufacturer should be consulted to determine the proper type of sample tubing or probe to be used to detect particular hazards because there are some gases that can be absorbed into specific types of tubing, producing erroneous readings.

7.5.2 Gas monitors for personal monitoring should be used in the diffusion mode.

7.5.2.1 Confined space entrants should wear a gas monitor at all times during the entry. It is critical that the monitor does not get covered by clothing or PPE or it will no longer be measuring the atmosphere.

7.5.2.2 Confined space attendants also should wear a direct-reading, diffusion mode gas monitor, or one should be placed in the area outside the space. This allows the attendant to monitor the environment just around the confined space to make sure the environment around the confined space is not changing. For example, if ventilation is exhausting toxic materials outside the space, it could affect the adjacent space and attendant even if the inside of the confined space is not showing elevated readings. If there is a toxic or combustible gas reading outside the confined space, it could affect the environment in the confined space. The sooner the attendant can be made aware of this, the more effective decision making can be.

7.6 Monitor Calibration

7.6.1 A calibrated, direct-reading instrument is required for entry into a confined space. A calibrated instrument is one that has completed a span calibration function before being put into service. Executing a span calibration is the best way to ensure the unit is reading concentrations as designed. Span calibration is the action of exposing a direct-reading instrument (or sensors) a defined concentration of calibration gas. Prior to completion of a span calibration, the direct-reading instrument should have a zero calibration performed in a clean air environment, preferably outdoors and upwind from any sources of air contaminants.

7.6.1.1 The gas monitor should be programmed to sense a set concentration of specific gases aligned to the configuration of the instrument for the purpose of calibration. For example, the instrument might be programmed to read 20.9 percent oxygen (O2), 32 percent methane (LFL), 25 ppm hydrogen sulfide (H2S), and 50 ppm carbon monoxide (CO) during the calibration process. The instrument will then be exposed to a blend of calibration gases of the identical defined concentrations of the same gases. The instrument will then “calibrate” what it is programmed to see to what it is being exposed to. This is a span calibration. Through this process, the instrument will either pass or fail the span calibration. If it fails, the unit should be removed from service and tagged for maintenance. If the instrument passes, it is acceptable to use for confined space monitoring.

7.6.1.2 The gas monitor instruction manual or the manufacturer should be consulted to determine the proper gases and concentrations to be used for monitor calibration. Calibration gas can vary depending on the manufacturer of the calibration gas. There are different types of combustible gases used in calibration gas blends (pentane, propane, methane, etc). Each gas monitor manufacturer has a rationale on which type of
combustible gas should be used to most accurately calibrate these combustible sensors. The manufacturer’s recommendations should always be followed. If the manufacturer of the gas monitor provides calibration gas, the calibration gas from the same manufacture as the gas monitor should be used. This ensures that the calibration gas cylinders have gone through a quality assurance program in alignment with the gas monitors.

7.6.2 Calibration results should be documented. Some direct-reading gas monitors have a data-logging feature that allows the calibration process to be documented and downloaded from the instrument, which allows electronic storage of the activity. Otherwise, the following data related to monitor calibration should be documented manually:

1. Date of test
2. Serial number of instrument and sensors tested
3. Serial number of any docking/calibration station used to perform the test or name of individual conducting a manual test
4. Type and concentration of each gas used to conduct the test
5. The result of the test for each sensor in the instrument tested.

7.6.3 The person performing calibration should ensure that the gas monitor is programmed to sense the gas concentrations listed on the cylinder label.

7.6.4 The person performing the calibration should ensure that the calibration gas cylinder has not expired. Gas cylinders typically have a shelf life of 2 years or less, depending on the type of gas in the cylinder. Calibrating with expired gas can result in inaccurate calibration and is not acceptable.

7.6.5 When a manual span calibration is conducted, the person performing the calibration should ensure that the regulator and tubing meet the gas monitor manufacturer’s recommendations for the gases that are being calibrated. Regulators can come in a variety of materials and flow rates. If the manufacturer specifies a 0.5 LPM flow rate, a regulator with that flow rate should be used. If the manufacturer of the gas monitor supplies regulators, a regulator from that manufacturer should be used. A manufacturer that owns the quality assurance program for all components will ensure a more accurate calibration process and less questions for troubleshooting if there are questions along the way.

7.6.6 Gas monitor span calibration can be performed utilizing an automated docking or calibration station. A docking station made by one manufacturer should be used to calibrate an instrument manufactured by another. Docking stations are designed specifically by a manufacturer to be used with its gas monitors. Docking stations should ensure that the calibration process is documented. When possible, a docking station should be utilized as part of the calibration process. Docking stations help eliminate potential errors in the manual process and also can be more efficient in the use of calibration gas.

7.7 Zeroing. Prior to any atmospheric testing, the gas monitor should be zeroed in a known clean air environment according to the manufacturer’s recommendations and instructions.

7.8 Bump Testing

7.8.1 Instruments used for the evaluation/verification of confined space atmospheres should be bump tested prior to each day’s use. A typical bump test will take 30 to 45 seconds and is a critical step to ensuring that the gas monitor is functioning since it was last used or calibrated.

7.8.1.1 The only way to ensure that a portable gas monitoring instrument will respond to the targeted gas is to test it with a known concentration of that gas or an acceptable surrogate gas.

7.8.1.2 A bump test is defined as a brief exposure of the instrument/sensors to specified target gas(es) for the purpose of verifying sensor and alarm functionality. It is not intended to be a measure of the accuracy of the instrument/sensors.

7.8.1.3 Any instrument that fails to respond properly during a functional bump test should undergo a successful full calibration prior to further use.
7.8.2 An instrument bump test should be performed prior to daily use using an automated docking or bump test/calibration station or by manual application of gas to the sensors.

7.8.3 The test should be performed by applying a known concentration of each of the target gases to the instrument/sensors individually or in combination and verifying that each sensor responds in a positive manner and that all instrument alarms are activated accordingly.

7.8.4 The concentration of gas used for the purposes of conducting a bump test should be greater than the lowest alarm set point for each sensor.

7.8.5 Surrogate gases (a gas different from the explicit target gas for the sensor) can be used for the purpose of conducting a bump test of the sensor provided that the concentration of gas used produces a response equivalent to or greater than the concentration of the target gas required to exceed the lowest alarm set point for each sensor. This should be done in accordance with manufacturer’s approval.

7.8.6 Bump test results should be documented and include the following data:

1. Date of test
2. Serial number of instrument and sensors tested
3. Serial number of the docking/bump station used to perform the test or the name of individual conducting a manual test
4. Type and concentration of each gas used to conduct the test
5. The result of the test (Pass/Fail) for each sensor in the instrument tested

7.9 Clearing Peak Values. Prior to any atmospheric testing, the gas monitor’s stored peak reading values should be reset according to the manufacturer’s recommendations and specifications.

7.10 Training and Competency. All personnel serving as qualified gas testers should be trained in the proper use of the gas monitor according to the manufacturer’s recommendations and in accordance with the requirements given in Chapter 11.

7.11 Continuous Air Monitoring.

7.11.1 It is imperative that the atmosphere in and around a confined space remain safe during ongoing entry operations. Conditions can change quickly or slowly over time; without continuous air monitoring, air contaminants can increase or oxygen percentage can decrease, creating dangerous confined space atmospheric conditions. Entrants, attendants, and other involved personnel especially might be unaware of changing conditions if the air quality was initially monitored and determined to be acceptable.

7.11.2 There are many reasons that air quality can deteriorate in and around confined spaces, including air contaminants being generated by entrant activities, increased temperatures causing additional chemical vaporization, and existing hazards that have not been adequately controlled.

7.11.3 Continuous air monitoring is the best method to ensure that air quality remains acceptable throughout entry operations. The OSHA Permit Required Confined Spaces regulation requires that “entry conditions should be continuously monitored in the areas where authorized entrants are working” [29 CFR 1910.146(d)(5)(i)].

7.11.4 Air quality meters for common confined space air contaminants and oxygen are designed to perform continuous air monitoring. In addition, many meters have features, such as “peak” and “STEL” (short term exposure limit) that allow for data review of the highest air contaminant concentration and lowest oxygen reading. Data typically can be downloaded and stored electronically.

7.11.5 It is advantageous for the confined space attendant to use and view the meter as long as the measurements are taken in the vicinity of the confined space entrants. Having an additional meter(s) worn by one or more entrants provides additional air monitoring evaluation.

7.12 Acceptable Limits for Entry. The atmosphere in the confined space should be considered within acceptable limits for entry whenever the following conditions are maintained (see Chapter 5):
(1) Oxygen concentration within the range of 19.5 percent to 22.0 percent
(2) Combustible gas concentration less than 10 percent of the LEL
(3) Toxic gas concentrations less than the recognized occupational exposure limits for the respective gases

7.13 Maintenance.

7.13.1 Confined space meters need to be maintained according to the manufacturers’ specifications to ensure that they operate properly, to maximize their longevity, and to maintain their warranties. Occasional inspection for damage, cleaning, proper battery charging, and periodic sensor replacement is all that is typically needed to be done by the user. Major repairs should be done by the manufacturer.

17.13.2 Sensors have limited service lives, even when the meters are used infrequently. The oxygen sensor typically has the shortest life, usually 2 to 3 years. The majority of confined space meters have rechargeable batteries that provide years of service as long as they are charged according to the manufacturers’ procedures.

7.14 Record Retention.

7.14.1 Records pertaining to gas monitoring instruments and confined space atmospheric testing should be retained according to all applicable regulations.

7.14.2 Records should be maintained with regard to calibration and bump testing, personnel exposure, and gas monitor maintenance.
8.1 General. Inherent, introduced and adjacent hazards identified in and around confined spaces should be completely eliminated or controlled to the extent possible prior to entry. The confined space Entry Supervisor and/or Permit Issuer should ensure that all hazards have been eliminated or controlled and should document the corrective actions taken on the confined space permit. Hazards that are unable to be adequately eliminated or controlled should be clearly noted on the permit and personal protection or other provisions should be made for safe entry.

8.2 Chemical and Atmospheric Hazards. Atmospheric hazards identified during gas monitoring should be eliminated or controlled prior to entry. Methods to remove hazardous materials include cleaning, displacement or purging using ventilation. Where this cannot be initially accomplished, inerting and purging, or other methods to provide a safe atmosphere for entry and work should be utilized. Suggested methods to remove hazardous atmospheres are given in 8.2.1- 8.2.3. Atmospheric monitoring should be performed in accordance with Chapter 7 to confirm the space is safe to enter prior to entry.

8.2.1 Acceptable Entry Conditions. When levels are outside the following parameters, entry is allowed only after control measures as indicated in Chapter 8 are applied.

(1) < LFL (LEL): 10 percent
(2) O2: 19.5 percent to 22.0 percent
(3) Toxic materials: any level

8.2.2 Removal of Hazardous Materials and Vapor Freeing. Residual materials in confined spaces should be removed from the space prior to entry. This can be done by cleaning, ventilating and/or purging with inert gas, water or steam.

8.2.2.1* Whenever possible, the confined space should be cleaned from the outside without the need for entry.

8.2.2.2* Remaining vapors and toxic gases should be exhausted to eliminate hazards when entry is required using ventilation blowers and controlled exhaust eductors in accordance with Chapter 9. Note that intrinsically safe blowers and eductors should be used for flammable or combustible vapor removal.

8.2.2.3 Methods such as purging with an inert gas, water or steam can be used to remove residual vapors. See 8.2.3 and 9.5.9.

8.2.4 Regulations and Standards for Tank Cleaning.

8.2.4.1 Confined space entries of petroleum storage tanks should be in accordance with API 2015, Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks, and API 2016, Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks. These standards provide detailed safety requirements for above ground petroleum storage tanks.

8.2.4.2 Cleaning and entry of tanks other than petroleum tanks should be in accordance with NFPA 326, Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair. This standard provides detailed safety requirements for tanks that are not above ground petroleum tanks.

8.2.4.3 Confined space entry in marine vessels should be in accordance with NFPA 306 Standard for the Control of Gas Hazards on Vessels. This standard provides advice for entry into confined spaces on marine vessels.

8.2.5 Chemical Residues. Even after cleaning has been completed, chemical residues might be present. A review of the SDS should be done to determine if the chemical residues could be corrosive or absorbed through the skin. Methods such as wipe testing, testing with pH paper should be done prior to entry. This will help determine if additional cleaning and the type of personal protective equipment required.

8.2.3 Combustible Dusts. Combustible dust residue should be removed using intrinsically safe vacuums or using manual cleaning. Compressed air should not be used to move or clean combustible dust.
8.2.4 Inerting. Entry into inert atmospheres should not be allowed except in very limited circumstances. If hot work is to be conducted in or adjacent to a confined space that contains flammable or combustible vapors or liquids, one method of controlling the ignition hazard is to displace the oxygen within the space by inerting. Inert gas can also be used to displace oxygen in situations where flammable materials or atmosphere cannot be removed prior to entry. Following the use of inert gas, the space should either be ventilated with air in accordance with chapter 9 until acceptable entry conditions are met in accordance with 8.2 prior to entry.

8.2.4.1 Containers adjacent to a confined space where and work is to be conducted should also be considered as potential sources of flammable material and should be made safe prior to the start of hot work.

8.2.4.2 Whenever inert gases are used to purge a space, consider the discharge point for the evacuated atmosphere from the space in relation to the workers outside the space and any related processes or work adjacent to the space. It might be necessary to perform atmospheric testing in the adjacent areas and to create barriers with approach distances to insure that levels of exhausted contaminants are within acceptable levels as defined in 8.2. Hot, warm, and cold zones can be used to delineate areas of hazard.

8.2.4.3 Whenever inerting is performed the atmosphere within 35 feet of the opening should be tested as needed, to assure that it is safe for breathing. In outside environments wind direction and speed should be taken into consideration and area of testing extended if necessary.

8.2.4.4 The confined space and the surrounding area should be posted to indicate that the space has been inerted.

?Check National Safety Council?

DANGER INERT GAS ENVIRONMENT
ATMOSPHERE UNSAFE FOR WORKERS
INSUFFICIENT OXYGEN FOR BREATHING
DO NOT ENTER

8.2.4.5 Entry into inert atmospheres should not occur except in well controlled situations where no other option for entry is available. If an inert atmosphere remains, a combination full face-piece pressure demand supplied air respirators (SAR) with auxiliary Self Contained Breathing Apparatus (SCBA) escape mechanism or a full face-piece pressure demand SCBA with a 30 minute tank should be provided to and used by entrants. A full respiratory protection program that includes fit testing and medical screening should be developed before providing an employee with a respirator.

8.2.4.6 Regulations and Standards for Inerting.

8.2.4.6.1 Inerting in the maritime industry should be in accordance with NFPA 306 Standard for the Control of Gas Hazards on Vessels. This standard includes a section on inerting procedures for marine vessels.

8.2.4.6.2 Inerting in above ground petroleum storage should be in accordance with API 2217A Guidelines for Safe Work in Inert Confined Spaces in the Petroleum and Petrochemical Industries.

8.2.4.6.3 Inerting in other storage tanks should be in accordance with NFPA 326 Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair

8.3 Hot Work.

8.3.1 General. Hot work is any work that may produce a source of ignition. Sources of ignition include, but are not limited to open flames, sparks or heat producing activity and is typically associated with cutting, welding, grinding, drilling, abrasive blasting, burning, heating and brazing operations as part of maintenance or construction work. It also includes the use of non-approved electrical equipment in flammable atmospheres, internal combustion powered equipment, and so forth. Hot work in areas containing flammable vapor/air mixtures has been the source of many confined space accidents including injuries and fatalities. Sometimes,
these fatal accidents occur in spaces adjacent to the confined spaces when these spaces had not been considered as a part of the confined space evaluation.

**8.3.2 Hot Work Permit.** When hot work is required in or adjacent to a confined space, a separate hot work permit should be issued by the qualified hot work Permit Issuer and should be attached to the confined space permit. The facility where hot work is to occur (or the contractor conducting the hot work) should have a hot work program and permit procedures. The hot work permit should contain information, including, but not limited to:

1. Conditions under which hot work permit authorization is to start and stop or be cancelled.
2. Requirements for ventilation, inerting or other atmospheric precautions
3. Requirements for continuous monitoring of the atmosphere within and outside of the confined space while hot work is being conducted.

**8.3.3 Cold Repair Options.** Whenever possible hot work should not be performed in or around confined spaces. Alternative means such as mechanical cutting, cold cutting, scraping, and hand grinding or filing with equipment that minimizes the potential for sparks and heat should be considered. For instance, cutting can be performed with hand saws, hydraulic shears, pneumatic chisels or pipe cutters. Mechanical joining methods such as nuts and bolts, screwed fittings, or couplings can be used. Hand filing is an option instead of mechanical grinding, and threaded pipe is an alternative to welded or soldered pipe. Note-sparks can still be generated using some of the techniques recommended but the risk is greatly reduced.

**8.3.4** Whenever hot work may be performed, the qualified person should evaluate all potential locations where flammable or combustible materials may have accumulated and take measures to remove and clean the materials from these locations and adjacent spaces prior to issuing the hot work permit. Hot work should not be done on or in the adjacent area of “live” tanks or lines containing flammable or combustible materials unless there is no other alternative and a hot work permit covering such activity gas been approved.

**8.3.5 Tanks containing flammable or combustible materials should be gas-free , cleaned or inerted prior to hot work being performed in or around confined spaces. Precautions should be taken to insure that there are no ignition sources in the area adjacent to the confined space being cleaned or inerted since the vapors exiting the space will be flammable or combustible as well.

**8.3.6** Hot work should never be performed above a tank, container or line containing flammable of combustible materials unless precautions have been taken to shield the area below from falling materials and assure that vapors from the space cannot reach the area of hot work. An example of this would be the use of a welding blanket to cover pipes that contain flammable or combustible liquids.

**8.3.7** Atmospheric monitoring should be conducted in adjacent spaces within 7.6 meters (35 feet) horizontally of the hot work being performed. No hot work should be performed unless atmospheric testing indicates that levels of 02 levels are less than 22% by volume and the LFL is less than 10 % unless appropriate precautions are taken and the work is specifically authorized by the hot work permit.

**8.3.8** Consideration should also be given for adjacent spaces that are above and below the work being conducted. Note that when welding takes place on an elevated surface, all surfaces below the elevated platform in the vicinity of the welding are potentially at risk.

**8.3.9** Fire protection indicated in the hot work permit such as appropriate portable fire extinguishers selected in accordance with NFPA 10 should be located within 10 feet of the hot work area. Hoses and foam producing equipment may also be used.

**8.3.10** Oxygen, flammable gas and inert gas tanks should remain outside a confined space whenever possible. Leaking oxygen lines can create and oxygen-enriched environment which can lead to increased fire and explosion hazards and leaking acetylene can create a flammable atmosphere.

**8.3.11** All hoses and torches associated with oxygen and gas cylinders should be disconnected and the gas and oxygen supply shut off during extended break periods of more than 1 hour.
8.3.12 All electrical welding equipment used in flammable and combustible atmospheres should be intrinsically safe, be inspected and approved by a qualified person and be properly grounded.

8.3.13 Combustible materials should not be located within the 35 feet of where hot work will be performed.

8.3.14 Regulations and Standards for Hot Work.

All welding and hot work should be in accordance with applicable regulations, codes and recommended standards applicable to the particular industry or type of operation being performed. The most current regulations, codes and recommended practices should be followed. A summary of those standards follows:


8.3.14.1.1 Those workplaces that are considered general industry according to OSHA should follow requirements given in OSHA 1910 Subpart Q - Welding, Cutting, and Brazing (1910.251-1910.255) as a minimum. These standards provide both general requirements and specific requirements for oxygen-fuel gas welding and cutting, arc welding and cutting and resistance welding. In addition to the minimum OSHA general industry requirements, several additional standards should be considered.

8.3.14.1.2 ANSI Z49.1, Safety in Welding, Cutting, and Allied Processes provides for the safe setup and use of welding equipment and the safe performance of welding and cutting operations. It has specific provisions for oxyfuel gas and arc welding and cutting, resistance welding, electron beam welding, laser beam cutting and welding as well as brazing and soldering. The standard is generally applicable to other welding processes such as submerged arc welding and allied processes.

8.3.14.1.3 NFPA 51B Standard for Fire Prevention During Welding and Other Hot Work provides guidance for persons, including outside contractors and property managers, who manage, supervise, and perform hot work.

8.3.14.1.4 NFPA 326 Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair provides minimum procedures that permit repair, hot work, or other operations that have the potential to create a fire, an explosion, or another hazard whenever hot work will be performed on tanks or containers containing flammable, combustible or other hazardous substance vapors, liquids, or solid residues.

The American Welding Society also has information regarding hot work operations.

8.3.14.2 Construction Industry.

8.3.14.2.1 In construction settings OSHA 1926 Subpart J-Welding and Cutting (1926.350-1926.354) provides information for gas welding and cutting, arc welding and cutting, fire prevention, ventilation in welding cutting and heating, and welding cutting and heating in way of preservative coatings.

8.3.14.2.2 NFPA 51B Standard for Fire Prevention During Welding and Other Hot Work provides guidance for persons, including outside contractors and property managers, who manage, supervise, and perform hot work in the construction industry.

8.3.14.2.3 NFPA 326 Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair provides minimum procedures that permit repair, hot work, or other operations that have the potential to create a fire, an explosion, or another hazard whenever hot work will be performed on tanks or containers containing flammable, combustible or other hazardous substance vapors, liquids, or solid residues.

8.3.14.3 Shipyard/Maritime. In shipyard/maritime settings OSHA regulations included in 1915 Subpart B (1915.11-1910.16) and 1915 Subpart D (1915.51-1915.57) and NFPA 306 (4.3.4), provide information covering hot work performed in the maritime industry.

8.3.14.4 Petroleum Industry. In addition to applicable OSHA, NFPA and ANSI regulations listed above in 8.3.3.1 and 8.3.3.2, appropriate API standards, including but not limited to the following, provide information related to hot work in the petroleum industry.
8.3.14.4.1 API 653 Tank Inspection, Repair, Alteration, and Reconstruction. This document covers the inspection, repair, alteration, and reconstruction of steel aboveground storage tanks used in the petroleum and chemical industries. It provides the minimum requirements for maintaining the integrity of welded or riveted, non-refrigerated, atmospheric pressure, aboveground storage tanks after they have been placed in service.

8.3.14.4.2 API RP 2009 Safe Welding and Cutting Practices in Refineries, Gasoline Plants, and Petrochemicals Plants. This document provides guidelines for safely conducting welding, cutting or other hot work activities in refineries, gas plants, petrochemical plants and other facilities in the petroleum and petrochemical industries. It provides specific guidance for evaluating procedures for certain types of work on equipment in services. It does not include guidance for compliance with regulations or codes: hot tapping; welding techniques, normal, "safe work" practices; or entry or work in inert environments.

8.3.14.4.3 API Std 2015 Safe Entry and Cleaning of Petroleum Storage Tanks, Planning and Managing Tank Entry From Decommissioning Through Recommissioning. This standard provides safety practices for preparing, emptying, isolating, ventilating, atmospheric testing, cleaning, entry, hotwork and recommissioning activities in, on and around atmospheric and low-pressure (up to and including 15 psig) above ground storage tank that have contained flammable, combustible or toxic materials. This standard directs the user from decommissioning (removal from service) through recommissioning (return to service). This standard applies to stationary tanks used in all sectors of the petroleum and petrochemical plants, and terminals.

8.3.14.4.4 API RP 2016 Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks. This Recommended Practice supplements the requirements of ANSI/API Standard 2015, Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks, Sixth Edition. This RP provides guidance and information on the specific aspects of tank cleaning, in order to assist employers (owners/operators and contractors) to conduct safe tank cleaning operations in accordance with the requirements of ANSI/API Standard 2015.

8.3.14.4.5 API RP 2027. Ignition Hazards Involved in Abrasive Blasting of Atmospheric Storage Tanks in Hydrocarbon Service. This document identifies the ignition hazards involved in abrasive blasting of the exteriors of hydrocarbon storage tanks containing a mixture that is flammable or that can become flammable when air is added. It provides operational guidelines for procedures that significantly reduce ignition risks during abrasive blasting of hydrocarbon tanks that may contain a flammable vapor space.

8.3.14.4.6 API 2202 Dismantling and Disposing of Steel from Aboveground Leaded Gasoline Storage Tanks. This document outlines precautions to prevent hazardous exposure of personnel to lead antiknock compounds when dismantling tanks that have contained leaded gasoline and when disposing of the steel.

8.3.14.4.7 API RP 2207 (R2012) Preparing Tank Bottoms for Hot Work, This publication addresses only the safety aspects of hot work on petroleum storage tank bottoms. It discusses safety precautions for preventing fires, explosions and associated injuries. The term hot work, is used in this publication, is defined as an operation that can produce a spark or flame hot enough to ignite flammable vapors.

8.4 Energy Sources. All sources of energy, mechanical, electrical, hydraulic, chemical or stored energy in confined spaces that could impact employee safety should be eliminated using a lockout tagout program. OSHA 1910.147 The Control of Hazardous Energy (Lockout/Tagout) applies to preventing the accidental startup of equipment and machinery (such as an agitator) or the release of stored energy. OSHA 1910.333 - Selection and use of work practices has specific requirements for de-energizing and locking out electrical equipment. The OSHA electrical safe work practices requirements were derived from NFPA 70E - Standard for Electrical Safety in the Workplace. This standard provides comprehensive electrical safety information to prevent shock, arc and other electrical safety hazards.

8.4.1 All workplaces with confined spaces that contain energy sources requiring lockout/tagout should have an energy control program.
8.4.2 The qualified Isolation Specialist should verify that the energy sources affecting employees in the confined spaces have been locked/tagged out or otherwise safeguarded prior to work being performed in a confined space. If there is a need to enter the space to verify that sources have de-energized, the entry should be done using the permit process defined in Chapter 13.

8.4.3 Pipes and lines containing materials that could enter into the confined space should be disconnected and/or blanked, bled, flushed, purged or otherwise isolated prior to entry.

8.4.4 Pipes and lines running through confined spaces that will be worked on from inside the space need to be disconnected and/or blanked, bled, flushed, purged, isolated prior to working on the lines.

8.4.5 Pipes and lines containing material that run through the space but do terminate within the space do not necessarily need to be disconnected or isolated as indicated in 8.4.3 so long as Entry Supervisor and/or Permit Issuer has determined that the materials in these lines are not impacted by the work being done in the space nor does the material create a hazard to employees working in the space.

8.4.6* Where equipment should be operational in order to perform the work in the space then the Entry Supervisor and/or Permit Issuer should insure that the work is performed using alternative measures which provide effective protection of employees in the space.

8.4.7 Hot Tapping in the petroleum industry should be in accordance with API 2201Safe Hot Tapping Practices in the Petroleum & Petrochemical Industries.

8.5 Portable Electrical and Mechanical Equipment Used in and Adjacent to Confined Spaces. Electrical and mechanical equipment used in confined spaces should be listed (and labeled) for its intended use. All approved equipment should be inspected by a qualified person prior to use. Equipment to be considered includes the following:

(1) Lighting
(2) Communication Equipment including cell phones, pagers and two way radios
(3) Cordless tools that utilize a battery.
(4) Ventilation tools
(5) Portable tools
(6) Welding equipment
(7) Mechanical equipment
(8) Extension cords

8.5.1 Wet and Damp Locations. All electrical equipment used in wet or damp locations should be equipped with ground fault circuit interrupters and inspected by a qualified person prior to use.

8.5.2 Hazardous Locations.

8.5.2.1 All electrical and mechanical equipment used in flammable or potentially flammable atmospheres should be approved for Class 1 Division 1 locations and inspected by a qualified person prior to use.

8.5.2.2 All electrical equipment used in areas where combustible dusts may be present should be approved for Class 2 Division 1 locations and inspected by a qualified person prior to use.

8.5.2.3 All electrical equipment used in areas where easily ignitable fibers or flyings may be present should be approved for Class 3 Division 1 locations and inspected by a qualified person prior to use.

8.5.2.4 Equipment brought into confined spaces should be guarded with no exposed electrical components or unguarded moving parts that could cause injury, entanglement or amputation.

8.5.3 Regulations and Standards.

8.5.3.1 NFPA 497: Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
8.6 Bonding and Grounding for Flammable and Combustible Materials. Static electricity may be generated in several ways, most typically whenever two dissimilar materials rub against each other. These materials may be solids, liquids, or gases. The accumulation of a charge creates a potential safety hazard in that the charge may be quickly discharged, creating a spark. If there are flammable or combustible gases, vapors or dusts present, a fire or explosion may occur. The purpose for grounding and bonding objects is to provide a safe path for static electricity that may have accumulated on one or more insulated objects to safely dissipate. The combination of grounding one object to the earth and then bonding other objects to it with a conductive material, such as copper wire, is referred to as grounding and bonding.

8.6.1 Bonding. Bonding is the joining of metal parts to form an electrically conductive path that ensures electrical continuity and the capacity to safely conduct any current likely to be generated. Entry Supervisors, attendants, entrants and all workers working in and adjacent to confined spaces should be informed that metallic parts of equipment, accessories and appurtenances used in confined space entry, ventilation and cleaning operations, are capable of generating an electrostatic charge unless they are electrically bonded to the space to avoid ignition from sparks.

8.6.1.1 Requirements. Before use, a qualified person, such as an electrician, should thoroughly inspect all tank cleaning equipment, nozzles, hoses, couplings and accessories to ensure that they are properly bonded, including, but not limited to, the following:

1) Vapor and gas freeing, degassing and ventilation equipment and appurtenances, such as blowers and eductors; inert gas piping and connections; water, fuel oil and steam piping, hoses, nozzles, and connections; flame and detonation arrestors; and flexible vapor intake and exhaust ducts.
2) Vacuum trucks used for removing materials, degassing and exhausting vapors from a confined space should be located such that the vapors are discharged downwind of the truck and away for the confined space and potential sources of ignition. (Note: Regulations may require the capture, removal and treatment of liquids, vapors and residue.) The vacuum truck suction and discharge hoses should be electrically bonded to both the truck and space and grounded. See 8.6.3.2.
3) Hoses and nozzles used to inject product, steam, chemicals, solvents or water into the tank to dislodge and flush residue and sludge or wet down pyrophoric deposits.
4) Abrasive blasting hoses, nozzles, and equipment.
5) Mechanized portable and robotic cleaning equipment.
6) Welding, cutting, grinding, and hot tapping equipment should be bonded to the work to avoid stray currents.

8.6.2 Grounding (Earthing). Grounding is the process of directing electrical current to earth in order to reduce the possibility of an electrical spark (ignition source). Care should be taken to ensure that equipment is properly grounded to the power source. With power from power lines, the electrical ground is tied in at the breaker box. For portable generator sets, the unit should be grounded locally to the frame. Portable generator sets can be staked to form an earth grounding system or grounded to a facility ground system.

Grounding should be consistent with the equipment manufacturer’s instructions and applicable national and local electrical wiring codes.

8.6.3 Regulations and Standards for Bonding and Grounding. The following publications are good resources to consult:

1) NFPA 77, Recommended Practice on Static Electricity, which provides detailed information on how to control static electricity
2) API 2219, Safe Operations of Vacuum Trucks in Petroleum Service, which provides requirements for safe use of vacuum trucks in petroleum facilities to remove flammable or combustible liquids and which can be used as a reference for other facilities where vacuum trucks are used
3) API RP 2003, Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents
8.7 Ignition Sources. Flammable or combustible liquids and vapors may be released both within the space and around the outside area of a confined space during the process of ventilation, inerting, gas freeing or when removing, agitating or cleaning residue. In addition to hot work, which is covered in 8.2 sources of ignition that should be eliminated or controlled include the following:

(1) Internal combustion engines
(2) Non explosion proof and equipment not rated for the location
(3) Non bonded electrostatic generating equipment such as welding machines, fans and eductors, vacuum trucks, portable generators, pumps, etc.
(4) Lighting equipment
(5) Smoking
(6) Blast cleaning
(7) Grinding and cutting
(8) Unprotected pyrophoric iron sulfide deposits
(9) Heating equipment
(10) Vacuum trucks
(11) Communication devices including cell phones, two-way radios, pagers

8.7.1 Ignition sources should be eliminated or removed from inside and adjacent to confined spaces.

8.7.2 Ignition sources should be evaluated regardless of whether or not there are flammable or combustible atmospheres. Ignition sources can also create a fire hazard if combustible materials are present in or adjacent to a confined space.

8.8 Fall Protection. Fall protection should be used for entries into confined spaces where falls greater than 4 ft could occur. Confined space fall hazards should be managed by the confined space fall protection hierarchy:

(1) Elimination: Removal of the hazard by covering all vertical entry points until entry is required
(2) Protection: Use of OSHA-approved guardrail systems that will provide a controlled access zone around all vertical entry points
(3) Restriction: Use of positioning or restraint devices that will eliminate the possibility of a fall to all personnel located outside of the immediate vertical entry point
(4) Fall arrest: Use of OSHA approved fall arrest/belay devices that will limit the maximum arresting forces to below 1800 lbs in the event of a fall from a height greater than 4 feet above the lower level of the vertical entry point for all personnel exposed to a fall hazard during confined space operations.

8.8.1 Guarded Openings. Falls into confined spaces can occur while preparing to enter a confined space or while working outside the confined space. Floor and wall openings leading into confined spaces should be protected to prevent falls from occurring. There are a number of ways to do this:

8.8.1.1 Controlled access zones can be used during confined space operations to limit exposure to any open spaces or leading edges into which persons can accidentally walk. This can include the attendant warning of the potential fall hazard or providing a barricade around the space.

8.8.1.2 Restraint systems can be used during confined space operations when a worker needs to work near the opening or leading edge. This would be accomplished by wearing a properly fitted full body harness attached a shortened lanyard which is secured to a suitable anchor point able to withstand 1000 pounds.

8.8.1.3 Fall arrest systems can be used during confined space operations when the risk of a fall cannot be eliminated though the use of controlled access or restraint systems. This would be accomplished by wearing a properly fitted full body harness with a self retracting device attached to a suitable anchor point able to withstand 5000 pounds or engineered with a 2:1 safety factor.
8.8.2 Access. All employees entering into confined spaces regardless of space configuration or size should wear a properly fitted full body harness.

8.8.2.1 When utilizing fixed ladders, three points of contact should be maintained at all times. When the ladder extends beyond 20 feet it should be equipped with ladder climbing system or a secondary form of protection such as self retracting device or a belay line attached to a suitable anchor point able to withstand 5000 pounds or engineered with a 2:1 safety factor.

8.8.2.2 When utilizing potable ladders, three points of contact should be maintained at all times. A secondary form of protection should be used such as self retracting device or a belay line attached to a suitable anchor point able to withstand 5000 pounds or engineered with a 2:1 safety factor.

8.8.2.3 When employee needs to be lowered vertically into the confined space a secondary form of protection should be used such as self retracting device or a belay line attached to a suitable anchor point able to withstand 5000 pounds or engineered with a 2:1 safety factor.

8.8.3 Fall protection for vertical descents for rescue should be in accordance with Chapter 10.

8.9 Slip, Trip, and Entanglement Hazards.

8.9.1 Floors should be dried to eliminate slip hazards. Floors and surfaces should be de-iced if necessary. Where this cannot be initially achieved, entrants should use non-slip footwear.

8.9.2 Cords, lines, and hoses that are brought into the space should be placed and secured in such a manner so as to minimize trip hazards in work areas and pathways of travel. Trip hazards should be clearly identified and/or flagged or marked.

8.9.3 Non-fixed entanglements not required for the entry operation and work may be removed from the space to minimize hazards. Fixed entanglements should be recognized and appropriate precautions.

8.9.4 In-space lighting should provide illumination so that all surfaces and obstructions are clearly visible to those working in the space. Note that portable lighting should be approved for the location in which it is used in accordance with 8.5.

8.9.5 Whenever surfaces remain slippery or wet consider the installation of portable floor mats, or duck boards to raise the worker above the level of the liquid.

8.10 Lighting. Approved, safe lighting should be used for the work being performed. The selection of lighting should include the presence of flammable or combustible hazards in accordance with 8.5. Additional options for lighting may include helmet lights, portable lighting, etc. Calumine lights (glow sticks) are portable and can be utilized for backup lighting should the primary lighting fail. They can also be used to provide markings as a visual trail to a means of egress in poorly lit confined spaces.

8.11 Critters. Confined spaces can be ideal hideouts for animal, snakes and insects. If the confined space to be entered has been visually inspected and found to contain a critter, measures should be taken to remove them from the space prior to entry. A trap could be lowered into the space for larger animals such as skunks or raccoons or a pest control company or local animal control agency could be consulted. Care should be taken if an extermination chemical is used to reassess the environment and hazards including the hazard of the pesticide that has now been introduced into the space. The space may need to be ventilated and protective clothing and gloves worn to prevent skin contact with the chemicals.

8.12 Personal Protective Equipment. Personal protective equipment should be worn in accordance with the requirements of the entry permit when engineering or administrative controls cannot fully eliminate the hazard to entrants and workers.

8.12.1 Personal protective equipment including, but not limited to, eye protection, head protection, foot protection, hand protection, protective clothing, respiratory protection and hearing protection should be worn whenever the potential exists for an injury that could be prevented by the use of such equipment as
8.12.2 The Entry Supervisor or Permit Issuer should list the required PPE on the permit in accordance with the facility and/or contractor confined space entry programs.

8.12.3 PPE should be selected and used in accordance with applicable regulations and employer requirements.

8.12.3.1 General PPE requirements including hazard assessments, maintenance, and training requirements should follow the requirements given in 29 CFR 1910.132. Although that standard covers general industry in the United States only, it provides a good basis for developing a solid personal protective equipment program.

8.12.3.2 Eye and face protection should be selected and used in accordance with 29 CFR 1919.133.

8.12.3.3 Respiratory protection requirements should be in accordance with 29 CFR 1910.134.

8.12.3.4 Head protection should be selected and used in accordance with 29 CFR 1910.135.

8.12.3.5 Foot protection should be selected and used in accordance with 29 CFR 1910.136.

8.12.3.6 Hand protection should be selected and used in accordance with 29 CFR 1910.138.

8.12.3.7 Electrical protective clothing should be selected and used in accordance with 29 CFR 1910.137 and NFPA 70E: Standard for Electrical Safety in the Workplace.

8.12.3.8 Whenever skin contact with chemicals is of concern, the appropriate protective clothing should be worn. There is no single source of information for chemical protective clothing. Manufacturers of chemical protective clothing can often provide information on the appropriate clothing for the particular chemical or chemicals of concern. In addition there are several NFPA standards including NFPA 1991: Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies and NFPA 1992: Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies.

8.12.3.9 Hearing protection should be selected and used in accordance with 29 CFR 1910.95.

8.12.3.10 Other PPE including cooling vests and flotation devices, etc should be selected and worn as determined by the hazard evaluation.
Chapter 9 Ventilation

9.1 General.

9.1.1 Ventilation is used for two reasons: first, to remove or control atmospheric contaminants and second, to control temperature for personal comfort. In most confined space applications, the primary concern will be controlling atmospheric contaminants. Ventilation will commonly be used to establish initial safe conditions (prior to initial entry) and may be required to maintain safe conditions during entry where factors exist that encourage changing conditions (e.g., presence of residues or during hot work).

9.1.2 The need for ventilation should be determined initially through the results of a hazard evaluation and risk assessment conducted in accordance with Chapter 6.

9.1.3 When considering use of ventilation, it is important to recognize the differences between ventilation and purging. These common practices are often described interchangeably, but actually apply to different atmospheric hazard control situations. Ventilation generally introduces fresh, uncontaminated air into a space and controls contaminants in that space through mixing and dilution. Purging uses air, steam, or inert gas to displace the air within the space. See 9.3 for guidance on selection of method.

9.2 Ventilation Types. There are two types of ventilation – natural and mechanical.

9.2.1* Natural Ventilation. Natural ventilation is achieved when the closure(s) on a space is (are) removed or opened so as to enable the natural air flow present outside the space to enter and circulate within the space.

9.2.1.1 Natural ventilation should only be used when a documented hazard evaluation and risk assessment demonstrates that its use will effectively achieve the removal or control of atmospheric contaminants within the space.

9.2.1.2 When natural ventilation is used, continuous monitoring should be performed to ensure the atmospheric conditions are maintained in accordance with the permit for the space.

9.2.2 Mechanical Ventilation. Mechanical ventilation uses an air-moving device (fan, blower, eductor) to either push or pull air into or within the space and circulate it to achieve the required mixing and dilution of air within the space. There are two types of mechanical ventilation – general (sometimes referred to as dilution) and local exhaust.

9.2.2.1 General (Dilution) Ventilation. General ventilation can be oriented as either supply or exhaust. It is referred to as dilution ventilation because it achieves control of contaminants through mixing and dilution of the contaminated air using fresh, uncontaminated supply and make-up air.

9.2.2.1.1 Supply ventilation uses an air-moving device oriented so that air is pushed into the space. Depending on the size of the space and capacity of the air-moving device, ducting can be used to direct the air a greater distance into the space.

9.2.2.1.2 The source of supply air to the air-moving device should be taken from a location known to be free of contaminants.

9.2.2.1.2 Supply ventilation is generally less effective for controlling highly-toxic contaminants as it tends to spread the contaminants before dilution becomes effective. Local exhaust ventilation should be used in these instances (see 9.2.2.2).

9.2.2.2 Exhaust ventilation uses an air-moving device oriented so that air is pulled from the space.

9.2.2.2.1 The area or location where exhaust ventilation is discharged from the space should be monitored to ensure contaminants are dissipated upon discharge to the atmosphere.
The area or location where exhaust ventilation is discharged from the space should be located to ensure contaminants do not reenter the confined space through the ventilation supply air source. (See Section 9.5.)

9.2.1.2.3 The source for the make-up or replacement air should also be free of contaminants.

9.2.1.3 Supply and exhaust ventilation can be used together where sufficient openings in the space enable this arrangement.

9.2.1.4* Ventilation serves as a source for the generation and accumulation of static electrical charges and all equipment used in the ventilation system should be properly bonded or grounded.

9.2.2 Local Exhaust Ventilation.

9.2.2.1* Local exhaust ventilation should be used to capture and collect point source (localized or locally created) contaminants generated from specific work activities in order to limit the release of the contaminants to the space and the potential for further contamination of the entire space.

9.2.2.2* For local exhaust to be effective, it should be located and maintained as close to the source of the contaminants as possible.

9.2.3 Comfort Ventilation. Where the hazard evaluation and risk assessment determines that either heat or cold stress conditions exist, ventilation that provides heating or cooling should be considered.

9.3 Selection and Design of Ventilation.

9.3.1 General.

9.3.1.1 The entry supervisor should consider the following as part of the evaluation on the selection of ventilation for controlling a hazardous atmosphere:

1) Whether to use purging or ventilation
2) Size and configuration of the confined space including the number and location of openings that can be used for ventilation and entrant access
3) Capacity of the ventilation equipment
4) Prior use of the confined space for the storage or containment of a hazardous material
5) Current use of the confined space that might contribute to the existence of hazards within the space
6) Whether assigned work processes in or adjacent to the space could introduce atmospheric hazards into a confined space
7) Type of ventilation equipment available

9.3.1.2* Based on the size of the confined space (volume) and the capacity of the air-moving device, the entry supervisor should determine the time for a single air change for the confined space. Common practices recommend from 3 to 5 air-changes per hour as typical ventilation rates within spaces once safe conditions have been established. Note that this number assumes that safe conditions were initially achieved at 3-5 ACH and conditions have not changed.

9.3.2 Contaminant characterization. The physical and chemical properties of gases, vapors, dusts, and any other contaminant form that might be present in a confined space should be considered when selecting and designing a ventilation system. Considerations should include, but not necessarily be limited to:

1) Characteristics of air, vapor, gas and dust movement
2) Vapor density (gases and vapors)
3) Specific gravity (liquids or residues)
4) Vapor pressure
5) Effect(s) of space temperature on air contaminants
6) Flammability characteristics (flammable range for gases and vapors or MEC for dusts)
9.3.3 Ventilation Design Considerations.

9.3.3.1 Supply ventilation should be used when ventilating to return atmospheric conditions to normal oxygen levels or to maintain safe atmospheric concentrations within the established acceptable range.

9.3.3.1.1 Supply ventilation should not be used when initially controlling highly toxic atmospheric contaminants.

9.3.3.1.2 Supply ventilation should be used only when a clean source of make-up or return air is available.

9.3.3.1.3* Supply ventilation should be evaluated to ensure that sufficient air flow reaches the most distant point within the space.

9.3.3.2* Exhaust ventilation should be used when ventilating atmospheric contaminants in locations where it is not permitted to release those contaminants to the atmosphere.

9.3.3.2.1* Exhaust ventilation should not use axial-flow air-moving devices when controlling flammable atmospheric contaminants.

9.3.3.2.2 Exhaust ventilation should be used only when a clean source of make-up or return air is available.

9.3.3.2.3 Exhaust ventilation should be evaluated to ensure that the air-moving device can be located so that there is effective capture of the contaminants.

9.3.4* Purging Applications and Design. The purging medium should be determined based on the contaminant in the space and the entry or work condition objective.

9.3.4.1* Where the purging objective is to gas-free a storage tank that previously contained a flammable liquid while reducing the potential for a fire or an explosion, then purging with an inert gas should be implemented.

9.3.4.1.1 When an inert gas purge is used to displace the flammable vapors from above or within the flammable range, the inert gas should be introduced into the space and maintained until the flammable vapor concentration has been reduced to approximately 1 percent by volume (which represents the LFL for typical petroleum products).

9.3.4.1.2 Once the flammable vapor concentration has been lowered to 1% by volume, then purging can now resume with fresh air to displace the remaining flammable vapors and to increase the oxygen content to ambient fresh air levels.

9.3.4.1.3* While monitoring for the atmospheric conditions during the inerting process, it should be noted that the flammable vapor concentrations in the inerte d atmosphere will not be detectable using a catalytic bead-type sensor without taking special steps.

9.3.4.2 Purging with fresh air should be used to displace toxic contaminants or to displace oxygen deficient air (previously inerte d) and return to fresh air levels.

9.3.4.3 Purging with an inert gas should be used whenever hot work is to be performed on or adjacent to a confined space that has not been thoroughly cleaned and gas-freed of flammable gases, vapors, and residues.

9.3.4.4 Precautions should be taken to alert all workers working near spaces that have been inerted as any venting of the inert gas might displace the oxygen in localized areas near the space and create unsafe levels of oxygen.
9.4 Ventilation Equipment.

9.4.1 Air-Moving Devices. This includes venturi-type devices that exhaust only (eductors) and fan systems.

9.4.1.1 Axial-Flow Fans. In an axial-flow fan, the air flow through the impeller is parallel to the shaft on which the impeller is mounted. Within this category of equipment there are three types – propeller, tube-axial, and vane-axial.

9.4.1.2 Centrifugal-Flow Fans. A centrifugal-flow fan includes a wheel or rotor mounted on a shaft that rotates within a scroll-shaped housing. Air enters the center of the rotor and moves with centrifugal force at right angles through the rotor blades and into the housing.

9.4.1.3 Venturi-Type (Eductors). These devices are also known as air ejectors, air eductors, or air horns. They operate on the venturi principle where air moving through the horn increases in velocity as it passes through the smaller cross-sectional area and exits the horn. They are commonly powered by air or steam. When using air, these devices work as supply or exhaust, but when using steam as the source of power, they should only be used for exhaust ventilation.

9.4.2 Duct Work. The evaluation conducted as part of the selection and ventilation design in accordance with 9.3.1.1 should include a determination on use of ventilation ductwork.

9.4.2.1 The size, shape, or configuration of some confined spaces might make it necessary to attach flexible ducting to the air-moving device that has been selected in order to deliver the air movement to the designed location within the space.

9.4.2.2 It is recommended that the flexible ducting include means for bonding or grounding of the ducting along with the air-moving device in order to control the generation and accumulation of static charge.

9.4.2.3* The hazard evaluation should establish conditions where collapsible, rolled, plastic tubing can be used as ventilation ductwork.

9.4.2.4 For entry into spaces with single entry access portals, the hazard evaluation should consider using the ductwork and blower adapter (saddle) to minimize the degree to which the space opening is restricted by the placement of the ductwork.

9.4.3* Thermal Oxidizers. For ventilation requirements in tanks and other spaces with flammable atmospheres, local environmental regulations often restrict emissions. Within the petroleum, aboveground storage tank industry common practice for gas-freeing or vapor-freeing tanks is to use exhaust ventilation with the discharge connected to a thermal oxidizer unit.

9.4.4* Bonding/Grounding. Static electricity is created whenever surfaces are separated, which occurs when movement occurs, such as air moving through a fan or blower or ducting. Since applications where ventilation is used involve flammable gas or vapor concentrations, control of ignition sources becomes essential. Regulations and best practices require that all air-moving devices be properly bonded or grounded. This includes the ducting when attached to the air-moving device.

9.4.5 Other Equipment. In addition to flexible ducting, the ventilation installation can include other equipment such as adapters (saddle) that attach through the opening of the space to the air-moving device and ducting so as not to completely obstruct the opening.

9.5 Installation of Ventilation.

9.5.1 Ventilation should be placed in such a way to reach the farthest point within the space, in order to maximize the turbulence in the space and to minimize the creation of dead air pockets.

9.5.1.1* When evaluating the space configuration a competent person should consider obstructions within the space that restrict or limit air movement.
Figure A.9.5.1.1 Typical Space Configurations.

9.5.1.2 The location, size and number of portals or openings that can be used for ventilation should be considered when designing and installing a ventilation system.

9.5.1.3 Location of openings can limit the ability to efficiently and effectively move air throughout the entire space.

9.5.1.4* In placing the ventilation equipment, openings for exhaust and supply air should be separated as much as possible to limit the potential for creating short circuiting conditions.

Figure A 9.5.1.4 [these diagrams are a start; should show supply, exhaust, local exhaust examples; should also show ventilation from top as well as from at grade (side entry) configuration]

9.5.2 Ventilation ductwork should be installed so as not to block access into or exit from the space.

9.5.3* Stratified atmospheres (see Chapter 7) should be considered as part of the selection and design evaluation to ensure that ventilation ductwork is positioned to achieve the removal or displacement of contaminants.

9.5.4 Precautions should be taken to control or remove all ignition sources from the area since gases and vapors might be present in the flammable range both inside the confined space and at the point of ventilation discharge.

9.5.5 All air-moving devices and related equipment should be bonded and grounded.

9.5.6 The discharge point from all exhaust ventilation processes, not connected to scrubbing systems or other contaminant control systems, should be located at a minimum of 3.7 m (12 ft) above grade. The selection of the discharge point should ensure that exhausted contaminants are directed away from areas that might contain sources of ignition and areas where personnel may be working, and directed to a location that will reduce the likelihood of re-entrainment of exhausted contaminants.

9.5.7 Displacement of the confined space atmosphere with air should be accomplished by one of the following methods:

1) A negative pressure or vacuum used to pull outside air into the confined space using an educator-type air-moving device or other similar equipment.

2) A positive pressure or diffused air blower used to push outside air into the confined space.

3) A combination of options (1) and (2)

9.5.7.1 When the method described in 9.5.7(1) is used, the following should apply:

1) The connection between the educator and the confined space should be airtight.

2) Air should be drawn through the confined space to allow cross ventilation and removal of vapors.

3) All equipment should be bonded or grounded.

9.5.7.2 When the method described in 9.5.7(2) is used, the following should apply:

1) If a fill opening that extends into the confined space is used as an air supply point, the portion of the fill pipe that extends into the confined space should be removed.

2) The air should be supplied from a compressor or blower that has been checked for delivery of clean air that is free of flammable or toxic vapors.

3) The air-diffusing pipe, if used, should be bonded to the confined space to control the accumulation and discharge of static electricity.

9.5.8 Ventilation for controlling hazards of extreme heat or cold.

9.5.8.1 When entry and work in confined spaces involves potential for exposure to temperature extremes, the hazard evaluation and risk assessment should include a determination of the need for comfort ventilation to be applied.
9.5.8.2* Based on the outcome from the hazard evaluation and risk assessment, air can be conditioned to be warmed or cooled as appropriate for the environment and work.

9.5.9* Purging. A hazard evaluation and risk assessment should be completed to determine that purging can be safely implemented.

9.5.10 Atmospheric Monitoring.

9.5.10.1 Atmospheric testing should be conducted by a competent person in accordance with Chapter 7.

9.5.10.2 If the hazard evaluation and risk assessment indicates that atmospheric conditions within the space can change adversely, continuous forced mechanical ventilation should be provided for the space during all entry and work.

9.5.10.3* If the hazard evaluation and risk assessment indicates that atmospheric conditions will not be maintained within acceptable levels at all times during the entry and work, flow monitoring, alarms, secondary power systems and similar backup systems should be utilized to ensure the safety of entrants and the integrity of the ventilation system and fresh air supply.

9.5.10.4 When ventilation cannot or does not completely eliminate a recognized atmospheric hazard, other protective measures or methods for controlling air contaminants and protecting entrants should be determined by a competent person prior to entry authorization.

9.6 Limitations of Ventilation. The following limitations should be considered during the hazard evaluation and risk assessment process, during design and selection, and during installation and use of ventilation systems for confined spaces:

(1) Source of supply and make-up air
(2) Use of approved equipment where required (electrical area classification for example)
(3) Bonding and grounding of all air-moving devices
(4) Noise levels associated with air-moving devices
(5) Maintaining access and egress needs while ventilating spaces
(6) Frequent atmospheric monitoring inside space and outside space
(7) Time required to achieve initial safe conditions
(8) Worker protection in addition to ventilation
Chapter 10. Rescue.

10.1 General.

10.1.1 Application. Prevention is recognized as the best method to avoid the need for rescue. If a hazard evaluation is properly performed and all hazards are controlled in a way that will eliminate the chance of harm to entrants, the likelihood of a need for rescue is greatly reduced.

Even in cases where hazards may exist, training entrants to understand these potential hazards so they may exit the space on their own power when they recognize the threat is far better than waiting until they are incapacitated by it. Other options include the ability to remove ill or injured entrants without entering the space (Non-entry rescue) or entering the space to properly treat, package and remove these ill or injured entrants (Entry-type rescue).

This guide applies to all organizations that are responsible for selection or provision of a response capability for rescue emergencies in or associated with confined spaces. The elements associated with rescue program needs should be identified in the hazard evaluation and risk assessment conducted by the AHJ (person, persons or organization having responsibility for acquiring a rescue provision for one or more confined spaces).

10.1.2 Non-entry Rescue — Attendant Capabilities. In a confined space emergency where hazards exist that may affect others who would enter the space to provide rescue, it is best practice to extract the incapacitated patient without entering the space. In most cases, non-entry rescue provisions (retrieval systems) should be in place to allow this option. However, it should be recognized that conditions may exist or arise that would prohibit the use of non-entry rescue. This section is intended to address non-entry rescue.

10.1.2.1 Attendants Should Be Responsible for Performing Certain Non-Entry Rescue (Retrieval) Operations. Attendants should be responsible for performing emergency notification and certain non-entry rescue (retrieval) operations. If properly qualified/trained an Attendant may perform in the capacity of a confined space rescuer once relieved of Attendant duties.

10.1.2.2 Concept and Purpose of Retrieval Systems for Non-Entry Rescue Retrieval lines are intended primarily to provide a means for removal of ill or injured persons from a space in order to limit the exposure to other persons tasked with providing rescue. This provides a means for removal without entering the space to do so. These systems should also be applied for rescue entrants whenever possible, although the configuration of these systems may differ significantly. If properly configured, these systems may also double as fall protection in spaces where fall hazards exist.

10.1.2.2.1 Composition of Retrieval Systems. Retrieval systems are usually comprised of rope or cable based systems which are attached to the entrant in such a way as to provide a profile, appropriate to the space’s configuration, that would allow successful removal from the space. The retrieval system itself should, in most cases, provide a means of lifting or otherwise moving the entrant so that they may be removed without significant stress to the operator and without danger of dropping the ill or injured entrant should the operator release the system during retrieval (progress capture). This is much more important in vertically-oriented spaces where an ill or injured patient could be dropped. In spaces with a vertical depth greater than 4 feet, a mechanical means of retrieval (one employing mechanical advantage to reduce the force required) with a progress capture mechanism (to prevent drop if the system is released) should be used. In horizontally oriented spaces, retrieval equipment may be as simple as a rope, webbing or cable system; attached to the entrant’s harness or other appropriate type of body rigging (wristlets, anklets, wheeled or low-friction drag devices, etc.) to allow removal without endangering the entrant. These systems may not have a need for progress capture or a mechanical means of retrieval if the entrant is on a perfectly horizontal, low-friction plane. In all cases, the retrieval system should be appropriately anchored outside of the space to prevent it from being accidentally pulled into the space during operations, rendering it ineffective.
10.1.2.2 Retrieval Systems for Entry and Fall Protection. As previously stated, the equipment utilized to create retrieval systems may sometimes serve other purposes as well. In the case of vertically configured spaces where no other means of self-assisted entry exists (i.e. ladders or stairs), retrieval systems having the capability of both lowering and raising personnel may be helpful as the principal means of lowering entrants into the space. This is a non-emergency application of this equipment and it is highly recommended that a redundantly anchored and operated backup system of some sort be in place during these operations in the event of any failure associated with the primary system. For instance, a tripod and winch being utilized to lower workers into a space in a purely vertical environment should also maintain some sort of backup device which may include; but are not limited to; fall protection blocks, self-retracting lifelines or delay systems. As mentioned, it is highly recommended that backup systems be redundantly anchored to be completely independent of the primary system so that any failure of the primary (including the anchor system) would be sufficiently backed up.

10.1.2.2.1 When fall hazards exist within a space, the retrieval system may, in some cases, also provide an adequate means of fall protection to keep the entrants safe from falls while working in the space. In order for this to be effective, entrants must be independently attached to retrieval lines which are anchored outside of the space and incorporate devices that will withstand the forces expected from a fall while providing appropriate energy absorption to make the fall tolerable to the entrant’s body. These systems should be capable of not only preventing and/or arresting a fall, but also capable of removal of the entrant in the event of a fall. Fall protection systems and recommended tolerances are addressed in detail within chapter 8. If possible, these systems should limit the ability of the entrants to approach unprotected edges, in effect, becoming fall restraint rather than fall arrest systems.

10.1.2.2.3 Retrieval System Configurations. As it applies to the entrant in a typical confined space entry, unless waived, retrieval systems should maintain independent lines on each worker entering the space so as to allow independent retrieval with any worker should an incident occur. These systems should also be immediately ready to provide removal of the ill or injured entrant. It is highly recommended that retrieval systems be capable of actuation within seconds of recognition of the emergency. As it applies to rescue entrants, configurations may vary from the typical in certain circumstances. In any case, retrieval systems, unless waived, should be attached prior to entry and maintained at all times until the entrant(s) have left the space. A retrieval line should NEVER be disconnected inside a space. This would render the system ineffective should an emergency occur requiring retrieval.

10.1.2.2.3.1 Retrieval System Configuration Considerations for Typical Entries. In entries where portable anchor devices and manufactured systems may be employed with only one entrant, retrieval system configurations may be very simplistic. When the need for multiple entrants occurs or specific structural restrictions in and around the space exist, configuring these systems may become complicated.

(A) While it is often thought that a simple tripod and winch system will solve most retrieval problems, this may not be the case. A tripod and winch may offer a good alternative to retrieval in most cases but, when overhead or working surfaces restrict the ability to erect a Tripod, other methods must be utilized. A winch device or other manufactured system may be an excellent choice in a single-entrant type of entry where an adequate overhead anchor exists, but when multiple entrants must enter the space or the device cannot be positioned above the portal, it may become slightly more complicated to configure all of the retrieval devices so that they may be easily monitored and effectively utilized in the event of an emergency.

(B) In some cases, retrieval systems may be required to lift ill or injured entrants up and directly over the edge of the portal. Significant knowledge of managing human bodies over such edges and the equipment and systems necessary to effect retrieval without further injury (to entrants and operators) is of paramount importance.

(C) Appropriate assessment and training is vital to assure proper configuration of these systems based on the circumstances surrounding the entry. It is important that the retrieval system utilized accomplish the rescue objective effectively and safely within an appropriate time frame.
10.1.2.3.2 Retrieval System Configuration Considerations for Rescue Entrants. As previously stated, entry for rescue still requires the need for retrieval. Unless waived, these systems may offer significant assistance to persons who are entering spaces during an emergency. Consider the following question: If it is important to maintain an immediate means of retrieval during normal entries when no emergency yet exists, how much more so in a situation where an emergency has already occurred. Even when retrieval is possible, it is recommended that rescue entrants have trained back-up rescuers immediately available (one for each rescue entrant inside the space) for entry rescue should a rescue entrant get in trouble. These represent significant differences in rescue entries vs. typical confined space entries.

(A) Other differences are associated with the need for rescuers to handle emergencies quickly and safely by managing risks and minimizing complication in their systems. While using independent retrieval might be typical for most entries, rescuers must take other issues into consideration. For instance, when no fall hazards exist within the space and breathing air systems are not required for rescue entrants, they may consider placing several rescuers on a single retrieval line, spacing them out so each may be independently retrieved, one at a time. This makes the rigging of the rescue systems necessary to lift and lower these rescuers more efficient on the outside of the space. Of course, while this may be more manageable on the outside of the space, there is additional rope between rescuers that must be managed inside the space.

(B) In the case of rescuers on breathing air systems, independent retrieval lines are recommended so that the first rescuer in may be the first rescuer out since fatigue or depletion of air supply typically affects the first rescuer earlier than the subsequent rescue entrants.

(C) In cases where fall hazards exist, rescuers should follow the same guidelines as typical entries by providing independent attachment to appropriate systems to act as fall protection.

(D) In general, rescuers need more versatility in their retrieval systems while providing the same degree effectiveness and safety associated with typical entry retrieval.

10.1.2.4 Ensuring Operational Readiness in Retrieval Systems. Retrieval systems should be ready at all times. To assure operational readiness, the following three questions may be helpful prior to entry:

(1) Does everyone involved know the plan for retrieval? Without communication of this plan of action, personnel around the scene of the emergency may attempt to try many different options, slowing or rendering retrieval ineffective. Know the plan!

(2) Does everyone involved know their part in the retrieval plan? While typically, these systems are operated by the Attendant, more advanced systems may be utilized which require more than one person’s efforts to effect retrieval. Again, it is very important that everyone involved knows “who does what.”

(3) Will the retrieval system work the way it is configured? This may seem like an unreasonable question, but retrieval equipment is frequently setup without regard for whether or not it will actually work. For instance, slightly off-setting a winch device from center of a portal in a vertically-oriented space may allow ill or injured workers to be trapped against the underside of the portal during extraction, creating the significant potential for severe injury. A friction reducing device or other edge management methods might have been effectively used at the portal to prevent this from happening. In any case, these systems should be tested prior to use to assure that everything works the way it was intended.

10.1.3 Limitations and Exceptions for Retrieval. It should be recognized that retrieval is not always prudent or even possible. In the case of spaces that contain internal configurations that could entangle or trap a person against structure, a line attached to the entrant might not function at all or, worse yet, may actually cause further harm to the entrant during the retrieval attempt.

10.1.2.3.1 The conditions within a space should be carefully evaluated to assure that such dangers are mitigated or eliminated entirely. In most cases where these types of internal hazards exist, the logical choice may be to forgo retrieval lines entirely to prevent further rescue complications. Consider the following questions when determining whether or not to use a retrieval system:
Would the retrieval equipment increase the overall risk of entry? (If the answer to this question is yes, then the use of retrieval equipment can be waived.)

Would the retrieval equipment contribute to the rescue of the entrant? (If the answer to this question is no, the retrieval equipment can be waived.)

(A) In these situations, it is important to assure that an entry-type rescue provision should be available to respond in a timely manner.

(B) It should be recognized that, regardless of the ability to rig and operate retrieval lines effectively, it may not be prudent to utilize them. For example, a worker who is positioned on built-up scaffolding within a space might fall and strike his head on an object. Simply operating the retrieval to extract this person, without regard for a potential spinal injury, could create permanent damage to the patient's spine with significant potential for paralysis. Retrieval operations should take into account the hazard vs. the risk to the patient to ensure safety.

10.1.2.4 Organizations should implement procedures for the following attendant operations:

1. Recognizing the need for confined space search and rescue
2. Initiating contact and establishing communications with victims where possible
3. *Recognizing and identifying the hazards associated with non-entry confined space emergencies
4. Advising the responding rescuers of the situation and potential hazards
5. Recognizing confined spaces
6. *Identifying the need for and performing a non-entry retrieval, based on the conditions present
7. *Implementing the emergency response system for confined space emergencies

10.1.3 Entry-Type Rescue. Government or jurisdictional regulations often delineate between those spaces that contain actual or potential threats (hazards) that may necessitate rescue vs. those that do not have that potential. Confined spaces that do not contain a threat (or in some cases where the threats have been mitigated, controlled or eliminated entirely) have no requirement for a rescue provision.

10.1.3.1 Existing NFPA standards relative to confined space rescue (1670 and 1006) consider all spaces to which they respond to possibly contain hazards. Therefore, NFPA technical rescue standards make no delineation between confined spaces and permit-required confined spaces since an emergency has already occurred, evoking a response. It assumes the worst; that a hazard may have caused this emergency; regardless of whether or not that is the case.

10.1.3.2 Many elements of a confined space rescue program, such as the need for a rescue provision and the mode of response should be addressed in the planning phase. The response phase addresses the approach to emergencies when they have occurred. All elements of the rescue operation should be carefully considered in the planning phase.

10.1.3.3 This guide contends that the requirement for a rescue provision should not be based solely on the hazards within and around a space that might create emergencies and make it difficult to self-rescue, but also the characteristics that might make it difficult for an ill or injured worker to be removed when not under his or her own power, even if there are no atmospheric, engulfment, entrapment or other chemical or physical hazards introduced to cause the emergency. Unless a space can be proven to have no potential for hazards and no potential difficulty associated with removal of ill or injured entrants, a rescue provision of some degree is required.

10.1.3.4 Rescue Response Mode. The degree and rapidity of response should be principally driven by the anticipated hazards. Those spaces that contain known hazards should receive greater scrutiny and perhaps more rapid or complex response based on these hazards. Considerations should also include those spaces where technical rescue may be required to move an ill or injured entrant to a stable environment once extracted from the space. Rescue capabilities should be evaluated to assure they are appropriate to the response. Many emergency response agencies may not have the training or equipment to respond to confined space emergencies. Consideration should be given to three basic modes of rescue response;
(1) Tier 1 – Those that have no recognized hazards but could require technical rescue for extraction should the worker become incapacitated.

(2) Tier 2 – Those with non-life-threatening hazards requiring rapid intervention.

(3) Tier 3 – Those with life-threatening hazards requiring immediate intervention.

10.1.3.4.1* Tier 1 Response Mode. If a hazard evaluation has been performed (in accordance with Chapter six of this guide) and the space contains no potential for hazards but, due to its configuration, would prohibit workers from being easily removed if they were to become incapacitated, either due to medical illness or injury, a Tier 1 response mode may be indicated. At the minimum, this should include any vertically-oriented space greater than five feet in vertical height whether or not retrieval equipment is in place. A Tier 1 capability suggests that a fully trained Rescue Team meeting NFPA 1670, Chapter 7, Technician level is available to respond within five minutes to the site and capable of setup and rescue entry within 12-15 minutes of arrival on site.

10.1.3.4.2* Tier 2 Response Mode. If a space contains no IDLH or other potentially immediate life-threatening hazards, but contains some other actual or potential hazard that could incapacitate a worker or prevent them from exiting the space without assistance (self rescue), a Tier 2 response mode should be indicated. A Tier 2 capability suggests that a fully trained Rescue Team meeting NFPA 1670, Chapter 7, Technician level is on site with appropriate capability to make safe entry for rescue. This team should be equipped and mobile, capable of setup and rescue entry within 12-15 minutes of incident occurrence.

10.1.3.4.3* Tier 3 Response Mode. If work is occurring inside a space that contains an IDLH or other potentially immediate life-threatening hazard, either actual or potential, a Tier 3 response mode should be indicated. A Tier 3 capability suggests that a fully trained Rescue Team meeting requirements stated in NFPA 1670, Chapter 7, Technician level is standing by in the immediate area with appropriate capability to make safe entry for rescue. This team should be completely set up and capable of rescue entry within two minutes of incident occurrence. The Rescue Team should be dedicated to this singular entry with no other responsibilities.
10.1.3.5* Protection of Personnel During Rescue. In general, if the cause of the incident cannot be proven to be unrelated to the atmosphere, regardless of the atmospheric monitor readings, appropriate protection in the form of atmosphere supplying respirators should be worn by rescuers and provided to breathing victims. If chemical protective clothing is indicated by conditions, appropriate protection should be provided for rescue entrants as well.
10.1.3.5.1* Rescue Vs. Recovery. It is recognized that not all rescues can be performed safely. Certain conditions may exist that would create an unreasonable risk (as opposed to calculated risks) to rescuers. In these cases, the decision should be made to downgrade the rescue effort which may result in a body recovery. The decision to change the approach to this incident is generally the responsibility of the person in charge of the rescue service and may be loosely based on the following guidelines:

1. Are there enough Rescue Team members to perform the rescue safely,
2. Do rescuers have the proper equipment to perform the rescue safely, and
3. Do rescuers have the proper training to perform the rescue safely.
4. If any one of these questions cannot be answered in the affirmative, the rescue should not be performed.

10.1.3.5.2 Communications. While communications equipment and methods are thoroughly outlined in Chapter 8, it is important to note that the need for communications in rescue operations should be based on the circumstances and rescue objective, which means the choices made by the Rescue Team are not only about the type of communications equipment, but the methods employed.

10.1.3.5.2.1 The principle operational concerns regarding communications for rescue operations involve not only communication from inside to the outside of the space, but the communication among rescuers inside and outside the space. For example, teams utilizing rope-based or other rescue systems for lowering or raising rescuers/patients must have definitive communications so that the systems may be operated safely. Systems remote from the portal or positioned in high-noise environments may require the use of hand signals in addition to verbal or radio communication methods. On the interior of the space, high noise environments or the use of breathing apparatus may inhibit the ability of rescuers to speak to one another, even in close proximity. It will be important to utilize equipment such as voice amplifiers or even methods such as hand signals to assure adequate communication and efficient operations.

10.1.3.5.2.2 Regarding communications between team efforts outside of the space to those inside the space and vice versa, methods utilized should be as patent as possible with provisions in the event of a communications system failure. For example, a Rescue Team utilizing portable radio systems as the primary means of communications between the inside and outside of the space should have a secondary method of communications readily in place in the event of a radio failure or interference. This may be as simple as the utilization of a pre-designated series of hand signals but, in any case, should provide an appropriate substitute. One of the most patent means of communications between the outside and inside of a space is hard-line communications. This type of system utilizes a communications cable that allows transmission of voice between its terminal points. While this may be a very good means of communications, circumstances such as entanglement hazards within the space may render it ineffective. In any case, the pre-incident rescue action plan and practice of that plan represent the best means of determining the effectiveness of the communications methods chosen by the Rescue Team.

10.2 Rescue Team Qualification

10.2.1* Responsibility. The AHJ (The person, persons, or organization(s) responsible for the spaces or spaces at the site) should assure that the rescue service, regardless of who provides it, is qualified to act in that capacity. On-site, contracted or contractor-supplied rescue services should all meet applicable requirements to assure their level of capability is commensurate with the task at hand. Assessment of the rescue service’s qualifications should consider their training, standard operating procedures, equipment, availability and ability to perform rescue. An evaluation of their capabilities should include the overall timeliness of response and a demonstration of their ability to perform safe and effective rescue in those types of spaces to which the team must respond.
10.2.2 Rescue Program Audits. Confined space rescue programs should be audited periodically. It is suggested that this occur at least once a year. It is also a good practice to review the rescue program following each rescue operation and make adjustments to the program if needed.

10.2.2.1 Content of Audit. Rescue program audits should be conducted to include a full evaluation of the rescue program, regardless of the source of the rescue services and their capability. The components of the Rescue Program Audit should include, but not be limited to:

(1) Evaluation of the rescue response plan.
(2) Review of the rescue service’s equipment including the system utilized for Inspection, Inventory, History of use and documentation.
(3) Review of the rescue service’s standard operating procedures to assure they coincide with the needs of the response area.
(4) Evaluation of the rescue service’s availability and timeliness of response to assure it is appropriate to the response required.
(5) Evaluation of the rescue service capability by means of a performance evaluation.
(6) Review of rescue service’s qualifications and training records relative to both rescue and medical provisions.
(7) Review of rescue service’s pre-incident emergency action plans for each space for which they are responsible.
(8) Evaluation of the communications methods used for both rescue service notification and operation at an emergency.
(9) Additions and corrections to the rescue plan based on audit results.

10.2.2.2* Auditor Qualifications. Confined space rescue program audits should be conducted by a designated person or group of persons trained in or familiar with rescue operations and medical provisions at a level commensurate with the recommendations of this guide for Rescue Team members.

10.2.3 Performance Evaluations. Performance evaluations are a principal means of deciding who is qualified among a group of perspective rescue service providers. Performance evaluations should be conducted prior to considering a rescue service and then periodically to assure their performance is still satisfactory. Performance should be evaluated by means of simulated rescue operations in which the rescue service removes dummies, mannequins, or persons from actual confined spaces or from representative confined spaces resembling all those to which the rescue service could be required to respond in an emergency within their jurisdiction. Representative confined spaces should; with respect to opening size, configuration, and accessibility; simulate the types of confined spaces from which rescue is to be performed.

10.2.3.1* Team Composition for Evaluations. Evaluation of rescue service performance should include all combinations of personnel expected to participate as a member of that team. This may require multiple evaluations to assure all team member compositions will provide the appropriate capability for confined space rescue. Ad hoc or one-time Rescue Teams may only need a qualifying pre-operation evaluation.

10.2.3.2 Frequency of Performance Evaluations. Performance evaluations should be repeated annually.

10.2.3.3 Components of Performance Evaluations. Performance evaluations should include a means of evaluating the team’s ability to address patient care (prior to transfer of the patient to the local EMS provider), rescue operations, and safety and confined space operations and safety.

10.2.3.3.1 Patient Care Components. Patient care components should include; but are not limited to, the following:

(1) Assessing and addressing critical immediate life-threatening conditions,
(2) Assessing and addressing conditions that are not immediately life threatening
(3) Stabilization and packaging of the patient with regard to injuries so as to prevent further harm if possible,

10.2.3.3.2 Rescue Operations and Safety Components. These components include the following:
10.2.3.3 Confined Space Operations and Safety Components. These components include the following:

1. Hazard identification
2. Entry assessment – Go or No go?
3. Hazard mitigation
4. Regulatory compliance

10.3 Hazard Evaluation and Risk Assessments. The AHJ should conduct a hazard evaluation and risk assessment of the response area and should determine the feasibility and type of incidents that may require confined space rescue operations.

10.3.1 Components. These assessments should include, but not be limited to, the following:

1. Evaluation of the environmental, physical, social, and cultural factors influencing the scope, frequency, and magnitude of a potential incident
2. The impact these factors may have on the ability of the AHJ to respond to and to operate while minimizing threats to rescuers at an incident site.
3. Identification and maintenance of a list of the type and availability of internal resources needed for technical search and rescue incidents.
4. Identification of the type and availability of external resources needed to augment existing capabilities in confined space rescue incidents.
5. A determination of the potential to respond to rescue incidents that might involve nuclear or biological weapons, chemical agents, or weapons of mass destruction, including those with the potential for secondary devices. If the AHJ determines that a hazard evaluation exists for rescue response into a nuclear, biological, explosive and/or chemical environment, appropriate training and equipment for response personnel should be provided.

10.3.2 Acquisition of Resources. Where an advanced level of search and rescue capability may be needed in a given confined space, organizations should have a system in place to utilize the most appropriate resource(s) available, through the use of local experts, agreements with specialized resources, and mutual aid. The AHJ should establish procedures for the acquisition of those external resources needed for specific emergencies in and associated with confined spaces. A list of these resources should be maintained and updated at least once a year, where necessary. At a minimum, the list should be reviewed and updated prior to a planned entry requiring advanced capability.

10.3.3 Documentation. The hazard evaluation and risk assessment should be documented.

10.3.4 Review Process. The hazard identification and risk assessment should be reviewed and updated on a scheduled basis and as operational or organizational changes occur.

10.3.5 Surveys. At intervals determined by the AHJ; depending on changes in equipment, operations or materials; the AHJ should conduct surveys in the organization’s response area for the purpose of identifying the types of rescue incidents that are most likely to occur in and around confined spaces.

10.4 Standard Operating Procedures. The AHJ should establish written standard operating procedures (SOPs) consistent with a level of capability to respond to confined space rescue incidents.

10.4.1* Rescue Procedures. Rescue procedures should include; but not be limited to; identification of hazards, use of equipment, and application of techniques necessary to coordinate, perform, and supervise confined space rescue incidents. The person, persons or organization(s) having responsibility for acquiring a rescue provision and for performing rescue for the confined space, should work together to establish operational procedures to ensure that confined space rescue operations are performed in a manner that minimizes threats to rescuers and others.
10.4.2 Evacuation Procedure. The AHJ should ensure that there is a standard operating procedure to evacuate Rescue Team members and other personnel from an area and to account for their safety when an imminent hazard condition is discovered. This procedure should include a method to notify all personnel in the affected area immediately by any effective means, including audible warning devices, visual signals, and/or radio signals.

10.5 Regulatory Compliance. The AHJ should comply with all applicable local, state, and federal laws and regulations.

10.6 Incident Response Planning. The AHJ should train responsible personnel in procedures for developing pre-incident emergency action plans in order to prepare the rescue service for safe practices associated with rescue from specific and generic confined spaces for which they provide rescue. This process should include determining, reviewing, accessing, and using relevant components of applicable national, state, industry and local response plans.

10.6.1 Documentation of Response Plan. The procedures for a rescue emergency response in and around confined spaces should be documented in the confined space rescue incident response plan.

10.6.1.1 The plan should be a formal, written document.

10.6.1.2 Where external resources are required to achieve a desired level of operational capability, mutual aid agreements should be developed with other organizations.

10.6.2 Response Plan Distribution. Where required, copies of the confined space rescue incident response plan should be distributed to agencies, departments, owners/contractors and employees having responsibilities designated in the plan. Copies may also be given or shown to the Entry Supervisor, entrants, attendants and others involved in the confined space entry.

10.6.2.1 A record should be kept of all holders of the confined space rescue incident response plan, and a system should be implemented for issuing all changes or revisions.

10.6.2.2 The confined space rescue incident response plan should be approved by the AHJ through a formal, documented approval process and, where required, should be coordinated with participating agencies and organizations.

10.6.3 Type of Response Plan. Confined space Response Plans are of two types:

10.6.3.1 Organizational response plan to manage confined space rescue incidents within a specific area or jurisdiction. This is the overall plan for managing generic emergencies of this type.

10.6.3.2 Rescue Team pre-incident emergency action plans to address specific or generic approaches to rescue from confined spaces for which they are responsible. This is the confined space-specific rescue plan that should fit into the organizational response plan.

10.6.4 Components of Organizational Response Plan. The organizational response plan should include, but not be limited to, the following components:

(1) Command Structure
(2) Communications
(3) Internal Resources
(4) External Resources
(5) Safety and Accountability
(6) Regulatory compliance (state, local and Federal)

10.6.5* Components of Pre-incident emergency action plan. The rescue pre-incident emergency action plan should include, but not be limited to, the following components (see Figure 10.6.5):

(1) Space identification and configuration (Adjacent areas)
(2) Notification
(3) Command and control
(4) Communications
(5) Work to be performed
(6) Hazard identification and mitigation (Include adjacent areas)
(7) Environmental concerns
(8) Resource identification (Haz-mat, Fire, EMS, etc.)
(9) Access and egress methods
(10) Retrieval systems
(11) Rescue systems
(12) Personal protective equipment (including atmosphere supplying respirators)
(13) Action planning
(14) Equipment required (medical and rescue)

Figure 10.6.5 Sample Pre-Incident Emergency Action Planning Form
10.7 Confined Space Rescue Equipment and Gear.

10.7.1 Operational Rescue Equipment. The AHJ should ensure that confined space rescue equipment is procured and utilized commensurate with recognized standards of reference and the respective operational needs for rescue operations. Confined space rescue equipment may include, but is not limited to, the following:

1. Rescue harnesses (Class II or III)
2. Rescue rope
3. Auxiliary equipment and rope hardware
(a) Carabiners and snap links
(b) Rope grap and ascending devices
(c) Descent controlled devices
(d) Portable anchors
   i. Beam straps and clamps
   ii. Anchor plates
(e) Pulleys
(f) Load straps (end-to-end and multiple configurations)
(4) Mechanical rescue/retrieval devices (vertical and horizontal)
   (a) Winches
   (b) Pulley systems (i.e., block and tackle, pre-built)
   (c) Tripods and davit arms
(5) Illumination
(6) Ventilation
(7) Energy Control Devices
(8) Communication and technology systems
   (a) Hardwire
   (b) Mobile communication devices
   (c) Laptops and tablets
(9) Patient packaging and care equipment (BLS and ALS)
   (a) Medical first response kits
   (b) Backboards
   (c) Basket and flexible litters
   (d) Stabilization devices
(10) Grain rescue tube

10.7.1.1 Confined Space Rescue Equipment Standards. The following publications should be consulted as appropriate:
(1) NFPA 1983, Standard on Life Safety Rope and Equipment for Emergency Services
(2) NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services
(3) NFPA 1951, Standard on Protective Ensembles for Technical Rescue Incidents
(4) NFPA 1855, Standard for Selection, Care, and Maintenance of Protective Ensembles for Technical Rescue Incidents

10.7.1.2 Inspection, Care, and Maintenance of Confined Space Rescue Equipment and Gear. In accordance with manufacturer’s requirements/recommendations and reference standards, confined space rescue equipment should be properly inspected and maintained to ensure it will operate as designed. All equipment should be inspected for damage or defect before and after each use as appropriate and removed from service if found defective. Inspections performed according to manufacturer’s requirements should be properly documented.

10.7.2* Personal Protective Equipment (PPE). Rescue teams should assess the need for, provide and train personnel in the utilization of appropriate PPE based on guidelines listed in Chapter 8. Since some PPE requirements may be satisfied in different ways, it is important that Rescue Teams not only choose PPE appropriate to the hazards, but choose equipment that will most efficiently allow them to meet the rescue objectives.

10.8 Incident Management System.

10.8.1 The AHJ should provide for and utilize training on the implementation of an incident management system that meets the requirements of NFPA 1561, Standard on Emergency Services Incident Management System, with written SOPs applying to all members involved in emergency operations. All members involved in emergency operations should be familiar with the system.
10.8.2 The AHJ should provide for training on the implementation of an incident accountability system that meets the requirements of NFPA 1561, Standard on Emergency Services Incident Management System.

10.8.3 The incident commander should ensure rotation of personnel to reduce stress and fatigue.

10.8.4 The incident commander should ensure that all personnel are aware of the potential impact of their operations on the safety and welfare of rescuers and others, as well as on other activities at the incident site.

10.8.5 At all rescue incidents, the organization should provide supervisors who possess skills and knowledge commensurate with the organizations rescue capability.

10.9 Rescue Team Composition

10.9.1* The size and composition of a confined space Rescue Team should be based on pre-incident planning and practice of those plans to assure effective operations. The role of a Confined Space Rescue Team is intended to include entry into the space to perform a rescue and, as a minimum, should be staffed to provide sufficient members with the following exclusive functions:

(1) *Entrant / Entry team of sufficient size and capability to perform the rescue
(2) *Back up team of sufficient size to provide immediate assistance to, or rescue of, entry team members who become ill or injured and are unable to perform self-rescue.
(3) Attendant whose function is deny unauthorized persons access, monitor the conditions in the space and the status of all entrants
(4) Supervisor who should maintain control of the entire operation and be knowledgeable in all team functions*

10.10 Entry Rescue – Rescue Service Capabilities.

10.10.1 The organization should be responsible for the development and training of a confined space Rescue Team who are trained, equipped, and available to respond to emergencies in and around confined spaces of a type and complexity that require anything other than non-entry type rescues from confined spaces.

10.10.2 The Rescue Service may perform both non-entry and entry type rescues from confined spaces.

10.10.3 Organizations should develop and implement procedures for the following:

(1) Determining and recognizing existing and potential conditions at rescue emergencies
(2) Protecting personnel from hazards in and around the confined space
(3) Ensuring that personnel are capable of managing the physical and psychological challenges that affect rescuers performing these rescues.
(4) Identifying the duties of the rescue entrant(s) and backup rescue entrant(s), rescue attendant, and Rescue Team leader as defined herein
(5) Monitoring continuously, or at frequent intervals, the atmosphere in all parts of the space to be entered for oxygen content, flammability [lower explosive limit/lower flammable limit (LFL/LFL)], and toxicity, in that order
(6) Performing entry-type rescues into confined spaces
(7) Using victim packaging devices that could be employed in confined space rescue
(8) Selecting, constructing, and using rope or cable based lowering and raising systems in the high-angle environment commensurate with the needs of the organization.
(9) Developing hazard isolation and control requirements
(10) Ensuring that Rescue Team members take part in a medical surveillance program
(11) Planning response for entry-type confined space rescues in hazardous environments
(12) Implementing the planned response

10.10.4 Where applicable, organizations should have a working understanding of the machinery-related hazards in and around the space as it relates to the rescue.
Chapter 11 Confined Space Personnel Duties, Responsibilities and Competencies

11.1 General. All persons engaged in confined space activities and operations should be competent and/or qualified. There are numerous entities that may be involved, individually or working together, in confined space entry and related activities. These include, but are not limited to owners, facility personnel, contractors, visitors, subcontractor personnel and as well as other persons and operations both within and outside of the confined space. This chapter covers the duties, responsibilities, qualifications and competencies of these individuals as related to confined space activities.

11.2 Entrants.

11.2.1 General.

11.2.1.1 Entrants should be competent, qualified and authorized to enter and work within confined spaces.

11.2.1.2* Entry occurs when any part of the entrant’s body breaks the plane of a confined space opening that provides for entry.

11.2.1.3 Entrants may also perform other activities and assigned duties if qualified in accordance with the applicable Confined Space Program including, but not limited to, self rescue, monitoring and performing non-entry tasks.

11.2.2 Entrant Duties and Responsibilities.

11.2.2.1 Entrants should enter the confined space only after issuance of the entry permit.

11.2.2.1.1 Entrants should verify that their name is listed on the entry permit.

11.2.2.1.2 Entrants should be able to verbally identify all confined space hazards and controls noted on the permit to the Entry Supervisor.

11.2.2.2 Entrants should conduct assigned work following approved procedures that minimize hazards.

11.2.2.3 Entrants should demonstrate the proper use of approved equipment, materials, tools, and personal protective equipment identified in the permit to the Entry Supervisor.

11.2.2.4 Entrants should remain aware of potential atmospheric and non-atmospheric hazards that might be encountered during confined space entry.

11.2.2.4.1 Entrants should exit the confined space when changing conditions result in hazards that cause unacceptable risks.

11.2.2.4.2 Entrants should immediately exit the space if the entry permit expires or is cancelled.

11.2.2.4.3 Entrants should immediately exit the space when directed by the attendant or Entry Supervisor, or during an emergency else when in the vicinity that requires evacuation.

11.2.2.5 Entrants should verbally identify the hazards inside and outside the confined space that may be faced during entry, including information on the mode, signs or symptoms and consequences of exposure and acts accordingly.

11.2.2.5.1 Entrants should notify the attendant of any symptoms of exposure, emergency or unacceptable condition.

11.2.2.5.2 Entrants should exit the confined space immediately if symptoms, warning signs, or unacceptable conditions occur.

11.2.2.6 Entrants should respond to emergencies as trained and directed including, but not limited to, self-rescue or evacuation of the confined space.
11.2.3 Entrant Qualifications.
11.2.3.1 An entrant should verbally identify the governmental regulations that pertain to the planned confined space work to the Permit Issuer.

11.2.3.2 An entrant should verbally identify the use, limitations and hazards of materials, substances, and equipment approved for use within the specific confined space (i.e., tools, personal protective equipment, energy isolation devices, Gas Testers and chemicals) to the Permit Issuer before entry.

11.2.3.3 An entrant should verbally identify the primary and secondary means of communication to be used during emergencies to the Permit Issuer before entry.

11.2.3.4 An entrant should verbally explain how to interpret air monitor displays and alarms to the Permit Issuer before entry.

11.2.3.5 An entrant should verbally explain all sections of the confined space entry permit that are applicable to the entrants’ duties to the Permit Issuer before entry.

11.2.3.6 An entrant should verbally explain personal warning signs and overexposure symptoms to the Permit Issuer before entry.

11.2.3.7 An entrant should verbally explain applicable emergency procedures within or around the confined space to the Permit Issuer before entry.

11.2.4 Entrant Demonstrated Competencies.

11.2.4.1 An entrant should be able to read and understand permit requirements.

11.2.4.2 An entrant should be able to properly demonstrate the proper use required assigned equipment including, but not limited to, PPE, respiratory protection (if needed), non-entry rescue devices; etc.

11.2.4.3 An entrant should be able to communicate when evacuation is desired.

11.2.4.4 An entrant should be able to complete assigned tasks in an approved manner.

11.3 Attendant.

11.3.1 General.

11.3.1.1 Attendants should be competent, qualified and authorized to oversee the entrants working inside the confined space and activities outside the confined space that might impact confined space operations.

11.3.1.2 Attendants should be stationed outside of confined spaces.

11.3.1.3 Attendants may also perform other assigned duties, if competent, in accordance with the applicable Confined Space Program including, but not limited to, summoning rescuers and performing non-entry rescue.

11.3.2 Attendant Duties and Responsibilities.

11.3.2.1 Attendants should verbally indentify the hazards inside and outside the specific confined space that might occur during entry, including information on the modes, signs or symptoms and consequences of exposure to entrants.

11.3.2.1.1 Attendants should verify name is listed on the entry permit.

11.3.2.1.2 Attendants should be constantly monitoring the conditions in and around the confined space to assure that requirements on the permit

11.3.2.1.3 Attendants should monitor adjacent areas outside the confined space for changing conditions that might impact safe entry work or activities.

11.3.2.2 Attendants should remain outside the confined space during entry operations until relieved by another assigned attendant.
11.3.2.2.1 Attendants should inform the new (replacement) attendant of current confined space and entrant status.

11.3.2.2.2 The replacement attendant's name should be listed on the entry permit.

11.3.2.3 Attendants should monitor entrant's status and direct entrant evacuation as needed.

11.3.2.4 Attendants should continuously maintain an accurate count of entrants in the permit space.

11.3.2.5 Attendants should take the following actions when unauthorized person(s) approach or enter a permit space while entry is underway:

11.3.2.5.1 Attendants should prevent entry of non-authorized personnel into the confined space.

11.3.2.5.2 Attendants should inform entrants and supervisors when non-authorized personnel enter or attempt to enter the confined space.

11.3.2.5.3 Attendants should prevent non-authorized personnel from interfering with attendant duties.

11.3.2.6 Attendants should summon rescue and other emergency services immediately upon recognizing an entrant's distress inside the confined space.

11.3.2.7* Attendants should perform non-entry rescue as trained and equipped.

11.3.2.8* Attendants may perform other approved assigned duties that do not interfere with the primary duty to monitor and protect the entrants.

11.3 Attendant Qualifications.

11.3.3.1 An attendant should competent, qualified and authorized the confined space program and governmental regulations that pertain to the planned confined space work.

11.3.3.2 An attendant should verbally identify the use, limitations and hazards of materials, substances, and equipment approved for use outside the specific confined space (i.e., tools, personal protective equipment, energy isolation devices, Gas Testers and chemicals).

11.3.3.3 An attendant should verbally explain the hazards inside and outside the specific confined space that might be faced during entry operations, including information on the modes, signs or symptoms and consequences of exposure to entrants.

11.3.4 Attendant Demonstrated Competencies.

11.3.4.1 An attendant should be able to read and verbally explain permit requirements.

11.3.4.2 An attendant should be able to properly use required assigned equipment including, but not limited to, PPE, respiratory protection, non-entry rescue devices

11.3.4.3 An attendant should be able to communicate with the entrant to evacuate when conditions arise that might endanger the entrant.

11.3.4.4 An attendant should be able to perform assigned tasks safely

11.3.4.5 An attendant should be able to recognize entrant signs and symptoms related to hazardous or toxic chemical exposures and oxygen deficiency.

11.4 Entry Supervisor.

11.4.1 General.

11.4.1.1 Entry Supervisors should be competent to oversee and direct confined space entry and associated operations in accordance with applicable regulations and this document.
11.4.1.2 Entry Supervisors may also be designated as attendants, Permit Issuers, Gas Testers, Ventilation Specialists, Isolation Specialists and entrants in accordance with the applicable confined space program if properly trained and/or qualified in accordance with the respective requirements provided in Chapter 11.

11.4.2 Entry Supervisor Duties and Responsibilities.

11.4.2.1 Entry Supervisors should verify that the appropriate information has been recorded on the confined space entry permit or other specified permit and all tests specified by the permit have been completed and that all requirements, procedures and equipment specified by the permit are in place before issuing the permit to authorize entry.

11.4.2.1.1 Entry Supervisor be able to identify, eliminate, control or mitigate hazards

11.4.2.1.2 Entry Supervisors should be identified and documented on all permits.

11.4.2.1.3 Assigned Entry Supervisors should remain at the confined space work site to control operations unless relieved by another competent, qualified and authorized Entry Supervisor.

11.4.2.1.4 Entry Supervisors should ensure that personnel involved with the confined space operations are informed when a different person assumes the Entry Supervisor role.

11.4.2.1.5 The Entry Supervisor should be trained as an entrant if duties require entry into confined spaces.

11.4.2.1.6 The Entry Supervisor should be trained and qualified as a Gas Tester if duties require maintaining, testing and operating Gas Testers.

11.4.2.1.7 The Entry Supervisor should be trained and qualified as a Ventilation Specialist if duties require ventilation of the space.

11.4.2.2 Entry Supervisors should conduct a pre-entry safety meeting with all persons involved prior to the start of confined space operations in accordance with the applicable Confined Space program. (see Section 5.5)

11.4.2.3 Entry Supervisors should coordinate activities where multiple employers (owner/operator, contractor and subcontractor) are working on the same job or on nearby jobs that might impact the confined space operations.

11.4.2.4* Entry Supervisors should terminate the entry and cancel the permit when permit requirements are no longer met.

11.4.2.4.1 Entry Supervisors should cancel the permit whenever unauthorized individuals or equipment enter the confined space.

11.4.2.4.2 Entry Supervisors should cancel the permit when conditions arise within or outside of the confined space that were not anticipated on the permit and have the potential to adversely affect operations.

11.4.2.4.3 Entry Supervisors should cancel and reissue the permit with the new entry and control requirements when the confined space is reclassified.

11.4.2.5 Entry Supervisors should identify methods of alerting rescuers and assure rescuers are available for a timely response as required by the confined space program.

11.4.2.6 Entry Supervisors should determine acceptable entry conditions are met and that they remain consistent with requirements of the entry permit including whenever changes occur within or outside the confined space.

11.4.2.7 Entry Supervisors should assure that all energy sources (including, but not limited to, electrical, steam, hydraulic and mechanical) and all tank equipment and appurtenances (including, but not limited to, tank mixers, heaters, sensors, and other instrumentation) have been controlled, disconnected or isolated before the permit is issued.
11.4.2.8 Entry Supervisors should assure that the Gas Tester, entrants, attendants and other confined space personnel properly wear and use approved personal protective equipment and appropriate respiratory protection as identified on the permit.

11.4.2.9 Entry Supervisors should verify that prohibition of access to confined spaces is secure when work is not in process or when appropriate timely emergency response is not available.

11.4.2.10 Entry Supervisors should assure that areas are barricaded/cordonned off to prevent exposure where toxic and flammable gases, vapors, or inert gas are vented, or where ignition sources exist.

11.4.2.11* Entry Supervisors should assure that all ignition sources in the area are eliminated or controlled before permitting work to be conducted that might involve the actual or potential release of flammable vapors into the atmosphere around or inside the confined space.

11.4.3.1* A supervisor should be certified as a Confined Space Entry (Safety) Supervisor where certification is available and required or applicable.

11.4.3.2 A supervisor should verbally explain the hazards that might be faced during entry, including information on the modes, signs or symptoms, and consequences of exposure.

11.4.3.3 A supervisor should verbally explain and should be able to apply the regulatory and applicable confined space program requirements.

11.4.3.4 A supervisor should verbally explain the proper use of monitors and should be able to interpret monitor readings.

11.5 Permit Issuer.

11.5.1 General.

11.5.1.1* Permit Issuers should determine and delineate the specific permit requirements applicable to the hot work, cold/safe work and/or confined space entry operations to be performed and issue the appropriate permits upon assuring that the requirements have been met and that all persons involved are aware of these requirements in accordance with Chapter 13. The Permit Issuer can be a facility employee, Entry Supervisor or other designated person.

11.5.2 Permit Issuer Duties and Responsibilities. Prior to the start of work, the Permit Issuer should perform a hazard analysis and assessment to establish the conditions and requirements for entry into confined spaces and for conducting hot and/or cold/safe work in and around confined spaces in accordance with chapter 6.

11.5.2.1 The Permit Issuer should assure the implementation of these requirements and document them on the permit prior to issuing a completed permit allowing entry or work within and around the confined space.

11.5.2.2 The Permit Issuer should determine the requirements and designate appropriate protective personal protective equipment and respiratory protection required for entry into confined spaces.
11.5.2.3 The Permit Issuer should determine that the risk assessment level (see chapter 6) is within the parameters of the applicable confined space program.

11.5.2.4 The Permit Issuer should issue a written entry permit for every entry into a confined space attesting that all required testing and safeguarding has been completed and that the entry requirements on the permit have been satisfied.

11.5.2.4.1 The Permit Issuer should assure that the duration of the permit does not exceed the time required to complete the assigned operations or tasks identified on the permit.

11.5.2.4.2 The Permit Issuer should determine prohibited entry and work limitations and document these on the entry and work permits.

11.5.2.4.3 The Permit Issuer should determine if continuous ventilation is required to assure atmospheric levels inside the space remain within permit limits. If ventilation is required the Permit Issuer should ensure that a Ventilation Specialist has determined what ventilation is required and list those requirements on the work permit.

11.5.2.4.4 The Permit Issuer should determine if periodic or continuous toxic exposure monitoring is required during entry. If monitoring is required the Permit Issuer should ensure that a Gas Tester has determined what ventilation is required and list those requirements on the permit.

11.5.2.4.5 The Permit Issuer should enter the names of all persons and their duties on every entry, safe (cold) work and hot work permit issued.

11.5.2.5 The Permit Issuer should assure that Entry Supervisors, entrants, attendants and other workers (or their authorized representatives) are capable to confirm that the pre-entry requirements have been met by posting the permit at the entry portal or by other effective means.

11.5.2.6 Where there are any physical conditions that might result in entrapment or engulfment, or affect the rapid evacuation of the space by entrants, the Permit Issuer should determine if supplementary rescue equipment and measures are required. The rescue equipment should be identified on the permit.

11.5.2.7* The Permit Issuer should be aware that there might be a need to cancel and reissue the permit if unforeseen conditions arise.

11.511.5.2.8 The Permit Issuer should ensure that all appropriate information has been recorded on the permit, that all tests specified by the permit have been completed and are acceptable, and that all procedures and equipment specified by the permit are in place before endorsing and posting the permit to allow entry and/or hot work or safe work to operations commence.

11.5.2.9 The Permit Issuer should verify that required rescue services are available, that the means for summoning them for timely response are operable, and that potential rescue procedures are planned to assure proper equipment needed for the specific job has been identified, inspected and staged so as to be available to or near the entry location prior to issuing the permit.

11.5.3 Permit Issuer Qualifications.

11.5.3.1 A Permit Issuer should be able to recognize hazards associated with the specific space and operations.

11.5.3.2 A Permit Issuer may be certified as a Confined Space Entry (Safety) Supervisor where certification is available and applicable.

11.5.3.3 A Permit Issuer should verbally indentify the hazards that are applicable to entry, hot work and cold work operations and the equipment, procedures and controls required to protect against such hazards.

11.5.3.4 A Permit Issuer should verbally explain and be able to apply the applicable regulatory and confined space program requirements.
11.5.3.5 A Permit Issuer should know and understand the proper use of monitors and be able to interpret monitor readings.

11.5.4 Permit Issuer Demonstrated Competencies.

11.5.4.1 A Permit Issuer is capable to prepare and issue permits

11.5.4.2 A Permit Issuer is able to identify and evaluate the hazards and the need for required equipment and controls.

11.5.4.3 A Permit Issuer is able to communicate with all personnel.

11.5.4.4 A Permit Issuer is able to perform assigned tasks in an approved manner.

11.6 Rescuer.

11.6.1 General. Rescuers should be competent, trained, equipped, designated and able to respond to emergencies requiring the rescue of entrants from outside of or from within confined spaces and should be familiar with all provisions of Chapter 10.

11.6.2 Rescuer Duties and Responsibilities.

11.6.2.1 Rescuers should evaluate the internal and external physical, atmospheric and other hazards (specific to the confined space) that might be encountered during a rescue situation.

11.6.2.2 Rescuers should assure all required rescue and personal protective equipment is inspected and in good working order prior to start of confined space operations.

11.6.2.3 Rescuers should determine if a non-entry rescue or an entry required rescue is needed.

11.6.2.3.1 The rescue may be conducted totally from outside the confined space and without the need for entry.

11.6.2.3.2 Should the rescue require entry into the space, the rescuers should be trained similar to entrants and should meet the same entry requirements applicable to entrants.

11.6.2.4 Rescuers should develop a pre-emergency action plan with the ability to respond in an organized manner that includes, but is not limited to, the following:

(1) Alarm or notification method specific to the facility or operation
(2) Assessing the incident and identifying potential related hazards
(3) Determining if rescue is to be external or internal
(4) Determining the appropriate PPE and respiratory protection required for entry
(5) Organizing equipment and personnel prior to start of rescue operations
(6) Determining signals or communication to be used during rescue
(7) Planning the specific step-by-step operations of the rescue
(8) Responding to the incident and performing rescue
(9) Conducting a post-incident evaluation and taking necessary action to correct pre-emergency rescue plans where needed.

11.6.2.5 Rescuers should consider the rescue requirements with respect to entrant’s self-rescue capability or physical and mental condition, hazards, equipment, communications, confined space configuration and other rescue related conditions prior to starting rescue operations.

11.6.3 Rescuer Qualifications.

11.6.3.1 A rescuer should be familiar with the confined space program and governmental regulations that pertain to the planned rescue work.
11.6.3.2 A rescuer should be familiar with the use, limitations and hazards of materials, substances, and equipment approved for use outside the specific confined space (i.e., tools, personal protective equipment, energy isolation devices, Gas Testers and chemicals).

11.6.3.3 A rescuer should verbally explain the hazards inside and outside the specific confined space that might be faced during rescue operations, including information on the modes, signs or symptoms and consequences of exposure to rescuers and entrants

11.6.3.4 A rescuer should be able to identify hazards and eliminate, control or mitigate exposures during rescue operations (in accordance with chapters 6, 7, 8)

11.6.4 Rescuer Demonstrated Competencies.

11.6.4.1 A rescuer should be able to pre-plan rescues specific to the confined space.

11.6.4.2 A rescuer should be able to properly use required assigned equipment including, but not limited to, rescue equipment, PPE and respiratory protection.

11.6.4.3 A rescuer should be able to communicate with the entrants, attendants, and supervisors.

11.6.4.4 A rescuer should be able to perform assigned tasks in an approved manner.

11.7 Gas Tester.

11.7.1 General. Gas Testers should be qualified in the appropriate selection, inspection, calibration, testing, adjustment and use of monitoring equipment and applicable monitoring and testing procedures associated with the assessment and evaluation of atmospheres in and around confined spaces in accordance with Chapter 7

11.7.2 Gas Tester Duties and Responsibilities.

11.7.2.1 Gas Tester should determine proper selection of monitoring equipment based on the hazards that are present or to be encountered during confined space operations.

11.7.2.2 Gas Tester should calibrate, test and adjust equipment prior to use.

11.7.2.3 Prior to entry, Gas Tester should first test, sample and monitor the atmosphere around the confined space

11.7.2.3.1 Gas Tester should verify their name is listed on the entry permit as tester

11.7.2.3.2 Gas Tester should be aware of all confined space hazards, entry requirements and controls noted on the permit prior to entry for testing.

11.7.2.4 Gas Tester should sample and monitor the atmosphere inside the confined space in the following order:

(1) Oxygen levels
(2) Flammable gases and vapors
(3) Toxic/hazardous atmospheric contaminants

11.7.2.5 Gas Tester should record test results on the permit and verify by signing the permit indicating the time(s) and the result(s) of the testing.

11.7.2.6 Gas Tester should allow Permit Issuers, Entry Supervisors, attendants, entrants, and workers (or their authorized representatives) to observe the monitoring process and results.

11.7.2.7 Gas Tester should re-evaluate conditions by testing, sampling and monitoring the atmosphere both around and inside the confined space as often as necessary as determined by the Permit Issuer and/or Entry Supervisor.
11.7.3 Gas Tester Qualifications.

11.7.3.1 A Gas Tester should be familiar with the confined space program and governmental regulations that pertain to the planned confined space work.

11.7.3.2 A Gas Tester should be trained and qualified in the appropriate selection, inspection, calibration, adjustment and use of monitoring equipment.

11.7.3.3 A Gas Tester should be able to verbally explain, assess, interpret and apply material safety data information and limitations pertinent to the hazards associated with the confined space and surrounding area and operations.

11.7.3.4 A Gas Tester should be able to verbally explain and apply the appropriate testing procedures associated with the monitoring of atmospheres in and around confined spaces.

11.7.3.5 A Gas Tester should meet the qualifications for an entrant

11.7.3.6 The Gas Tester should know how to determine, select and use required personal protective equipment and respiratory protection based on hazards associated with the confined space operations.

11.7.3.7 The Gas Tester should be able to verbally explain how to monitor and interpret atmospheric hazards.

11.7.4 Gas Tester Demonstrated Competencies.

11.7.4.1 A Gas Tester should be able to demonstrate the competencies required for an entrant and understand permit requirements for recording monitoring results.

11.7.4.2 A Gas Tester should be able to select, adjust, calibrate, bump test and properly use required equipment.

11.7.4.3 A Gas Tester should be able to conduct monitoring and testing in approved manner.

11.7.4.4 A Gas Tester should be able to compare results with recognized OSHA, NIOSH ACGIH and other applicable recommended exposure limits to determine if hazard exists.

11.8 Owner/Operator.

11.8.1 General. Owners/Operators should have control, ownership or authority over the confined space and should assure that confined space operations are conducted in accordance with regulatory and industry practices and the owner/operator’s and/or contractor’s confined space program and chapter 12

11.8.2 Owner/Operator Duties and Responsibilities.

11.8.2.1 The owner/operator should evaluate and re-evaluate confined spaces and identify and designate those that should be classified as permit required confined spaces in accordance with Chapter 4. This responsibility can be delegated by the owner when the space is under the control of a third party (such as when a building or portion thereof (a space) is leased or contracted to a third party) and owner/operator has no obligation to the building, space or operations therein.

11.8.2.2 The owner/operator should obtain required jurisdictional permits and authorizations.

11.8.2.3 The owner/operator should identify and designate those individuals (either facility personnel or contractors) who are educated, trained, competent and/or qualified to perform specific confined space related duties, including, but not limited to, supervising operations, issuing permits, entering into confined spaces, conducting gas testing, providing for rescue, performing attendant duties, overseeing ventilation, and conducting hot or cold work operations. The owner/operator should designate and identify the individuals and their duties in the written confined space program in accordance with chapter 12

11.8.2.4 The owner/operator should develop and implement a confined space program in accordance with chapter 12 which should be available for inspection by the employees and their authorized representatives.
The confined space program applicable to the operations may be that of the owner/operator or a contractor or both.

11.8.2.5 Owner/operators should conduct a pre-entry safety meeting in accordance with chapter 5 to assure that all Permit Issuers, Entry Supervisors, Gas Testers, entrants, attendants, etc. and contractors/subcontractors are apprised of the hazards associated with the confined space.

11.8.2.6 When an owner/operator arranges for a contractor to perform work that involves confined space entry, the owner/operator should assure that the contractor is aware that entry into a confined space requires compliance with an applicable confined space program.

11.8.2.7 Owners/operators should assure that contractors/subcontractors are aware of any precautions or procedures that the host employer has implemented for the protection of employees in or near the confined space where the contractor/subcontractor personnel will be working.

11.8.2.7.1 Owners/operators should coordinate entry operations with the contractor when both host employer personnel and contractor personnel will be working in or near permit spaces.

11.8.2.7.2 Owners/operators should debrief contractors at the conclusion of entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.

11.8.2.7.3 Owner/operators should coordinate activities where multiple employers (owner/operator, contractor and subcontractor) are working on the same job or other nearby jobs that may impact upon the confined space operations.

11.8.2.8 Owner/operators should implement effective measures to prevent unauthorized personnel from entering confined spaces.

11.8.2.9 If there are changes in the use or configuration of a confined space that affect the hazards, owner/operators should assure that the entry is cancelled and the confined space is reevaluated and, as necessary, reclassified, issuing new permits and establishing revised entry criteria.

11.8.2.10* Owners/operators should provide the required equipment and assure that it is properly inspected, tested, maintained, and used in accordance with the confined space program.

11.811.8.2.11 The owner/operator should evaluate, qualify and identify rescuer services and develop and implement procedures for summoning rescue and emergency services.

11.8.2.12 The owner/operator should develop and implement procedures to review entry operations when there is reason to believe that the measures taken under the confined space program might not protect employees. The owner/operator should revise the program to correct identified deficiencies before subsequent entries are authorized.

11.8.2.13* The owner/operator should review the confined space program annually utilizing cancelled permits and other information to ensure protection from hazards during entry operations.

11.811.8.2.14 The owner/operator should consult with employees and their authorized representatives on the development and implementation of all aspects of the confined space program and make information available to all affected employees and their authorized representatives.

11.8.2.15 The owner/operator should provide training regarding existing, new, and revised procedures and work practices so that all employees involved in confined space operations and activities acquire the understanding, knowledge and proficiency necessary for the safe performance of assigned duties. Training should be provided:

(1) Before the employee is first assigned confined space related duties
(2) Whenever there is a change in assigned duties
(3) Whenever there is a change in confined space related operations that presents a hazard
(4) Whenever the employer has reason to believe that there are deviations from the confined space entry procedures, operations or program requirements or that there are inadequacies in the employee’s knowledge of these procedures and requirements.

11.8.2.16 The owner/operator should certify that the training has been accomplished. The certification should contain the training provided, employee’s name, the signatures or initials of the trainers and the dates of training and should be available for inspection by employees or their authorized representatives.

11.8.3 Owner/Operator Qualifications.

11.8.3.1 The owner/operator should be able to identify and classify confined spaces within their facility

11.8.3.2 Where the owner/operator is an absent party this may be delegated to another responsible entity such as;

(1) Spaces within a Leased facility controlled by another entity
(2) Entire facility is controlled by another entity

11.8.3.3 The owner/operator should verbally identify and apply the regulatory requirements.

11.8.3.4 The owner/operator should be able to develop and implement an appropriate confined space program.

11.8.3.5 The owner/operator should be able to train, qualify and designate personnel for confined space operations.

11.8.3.6 The owner/operator should be able to evaluate and select contractors, subcontractors and rescuers.

11.8.4 Demonstrated Competencies

11.8.4.1 The owner/operator should be able to verbally explain and apply requirements and evaluate permits.

11.8.4.2 The owner/operator should be able to identify, evaluate need for and provide for required equipment.

11.8.4.3 The owner/operator should be able to communicate and coordinate activities associated with confined space operations.

11.8.4.4 The owner/operator should be able to assign tasks in accordance with the confined space program and operational requirements.

11.8.4.5 The owner/operator should be able to recognize, evaluate and classify confined spaces

11.9 Contractor/Subcontractor.

11.9.1 General. A contractor is an employer who performs work under contract to the owner/operator at the owner/operator’s confined space work site. Contractors may employ sub-contractors who perform work under contract to the primary contractor.

11.9.2 Contractors and Sub-Contractors Duties and Responsibilities.

11.9.2.1 The contractor should identify and designate those individuals (either contractor personnel or sub-contractors) who are educated, trained, competent and/or qualified to perform specific confined space related duties, including, but not limited to, supervising operations, issuing permits, entering into confined spaces, conducting gas testing, providing for rescue, performing attendant duties, overseeing ventilation, and conducting hot or cold work operations. The contractor should designate and identify the individuals and their duties in the written confined space program in accordance with chapter 12.

11.9.2.2 The contractor should attend a pre-job safety meeting with the owner/operator to establish assignments and responsibilities associated with the confined space entry. Subcontractors may attend this meeting or the contractor may conduct separate meetings for subcontractors.
11.9.2.3 The contractor should review the owner/operator's confined space programs and determine and establish the requirements needed to conduct operations. The confined space program applicable to the operations may be that of the owner/operator or the contractor or both.

11.9.2.4 If the contractor does not agree to use the owner/operators confined space program, the contractor should develop and implement its own confined space program in accordance with regulatory requirements, chapter 12 and contractor's procedures. This program should not conflict with the facility program and may be used in lieu of or to supplement the owner/operators program.

11.9.2.5 The confined space program to be used should be available for inspection by the employees and their authorized representatives.

11.9.2.6* The contractor should review and evaluate the confined space to be entered to pre-plan operations, identify hazards and determine necessary controls and measures to be taken.

11.911.9.2.7* When contractors/subcontractors perform work that involves confined space entry, they should be aware that entry into a confined space requires compliance with an applicable confined space program. *(Note: The same requirements apply between a contractor and a subcontractor)*

11.911.9.2.8 Contractors should assure that they are apprised of the hazards associated with the confined space and that they apprise subcontractors as necessary.

11.9.2.9 Contractors/subcontractors should be aware of any precautions or procedures that the host employer has implemented for the protection of employees in or near the confined space where the contractor/subcontractor personnel will be working.

11.9.2.10 Contractors and subcontractors should coordinate entry operations with each other and with the owner/operator when both host employer personnel and contractor personnel are working in or near permit spaces.

11.9.2.11 Contractors/subcontractors should implement effective measures to prevent personnel from entering confined spaces unless designated as entrants.

11.9.2.12 If there are changes in the use or configuration of a confined space that affect the hazards, contractors/subcontractors should assure that the entry is cancelled and the confined space is reevaluated and, as necessary, reclassified, issuing new permits and establishing revised entry criteria,

11.9.2.13* Contractors/subcontractors should provide the required equipment and assure that it is properly inspected, tested, and maintained and used in accordance with the confined space program.

11.9.2.14 If provided by the contractor/subcontractor, the contractor should evaluate, qualify and identify rescuer services and develop and implement procedures for summoning rescue and emergency services.

11.9.2.15 The contractor/subcontractor should develop and implement procedures to review entry operations when there is reason to believe that the measures taken under the confined space program might not protect employees. and revise the program to correct deficiencies found to exist before subsequent entries are authorized. The contractor/subcontractor should revise the program to correct identified deficiencies before subsequent entries are authorized.

11.9.2.16* The contractor should review the confined space program annually utilizing cancelled permits and other information to ensure protection form hazards during entry operations. Copies of permits should be provided to the owner/operator for their review and evaluation.

11.9.2.17* The contractor should consult with subcontractors, employees and their authorized representatives on the development and implementation of all aspects of the confined space program and make information available to all affected employees and their authorized representatives.
11.9.2.18 The contractor/subcontractor should provide training covering existing, new and revised procedures and work practices so that all employees involved in confined space operations and activities acquire the understanding, knowledge and proficiency necessary for the safe performance of assigned duties.

11.9.2.18.1 Training should be provided to each affected employee:

1. Before the employee is first assigned duties under this section.
2. Whenever there is a change in assigned duties.
3. Whenever there is a change in permit space operations that presents a hazard.
4. Whenever the employer has reason to believe that there are deviations from the confined space entry procedures, operations or program requirements or that there are inadequacies in the employee’s knowledge of these procedures and requirements.

11.9.2.18.2 The contractor/subcontractor should certify that the training has been accomplished. The certification should contain the training provided, employee’s name, the signatures or initials of the trainers and the dates of training and should be available for inspection by owner/operators, contractor/subcontractor employees or their authorized representatives.

11.9.2.19 After completion of the work, the contractor should meet with the subcontractors and with the Owner/operator to review safety issues that were involved on the job.

11.9.2.19.1 Contractors should debrief owners/operators at the conclusion of the entry operations regarding the permit space program followed and any hazards confronted or created in permit spaces during entry operations.

11.9.3 Contractor/Subcontractor Qualifications.

11.9.3.1 The contractor/subcontractor should be able to identify and understand confined space.

11.9.3.2 The contractor/subcontractor should know and understand the hazards that may be faced during entry into confined spaces and necessary controls and protective measures.

11.9.3.3 The contractor/subcontractor should know, understand and apply the regulatory requirements.

11.9.3.4 The contractor/subcontractor should be able to develop and implement an appropriate confined space program to comply with the owner/operator program.

11.9.3.5 The contractor/subcontractor should be able to train, qualify and designate personnel for confined space operations.

11.9.3.6 The contractor/subcontractor should be able to evaluate and select subcontractors and rescuers.

11.9.4 Contractor/Subcontractor Demonstrated Competencies.

11.9.4.1 The contractor/subcontractor should be able to understand requirements and evaluate permits.

11.9.4.2 The contractor/subcontractor should be able to identify, evaluate need for and provide for required equipment.

11.9.4.3 The contractor/subcontractor should be able to communicate and coordinate activities associated with confined space operations.

11.9.4.4 The contractor/subcontractor should be able to assign tasks in accordance with the confined space program and operational requirements.

11.9.4.5 The contractor/subcontractor should be able to recognize hazards associated with the specific space and operations.

11.9.4.6 The contractor/subcontractor should be able to qualify and select personnel and subcontractors.

11.10 Ventilation Specialist.
11.10.1* General. Ventilation Specialists should be familiar with, educated, trained and/or qualified in the various methods and requirements for removing hazardous and/or contaminated atmospheres from confined spaces. Ventilation Specialists may also perform other activities if competent or qualified and assigned in accordance with the applicable Confined Space Program and chapter 9

11.1011.10.2 Ventilation Specialist Duties and Responsibilities.

11.10.2.1 Ventilation Specialists should be familiar with acceptable ventilation methods and procedures and ensure that the specific procedures or methods to be used have been reviewed and approved in accordance with Chapter 9.

11.10.2.2 Ventilation Specialists should review the potential hazards associated with the use of ventilation, purging, etc. during the planned confined space work prior to permit issuance and entry.

11.10.2.3* Ventilation Specialists should be aware of the hazards associated with infrequently used procedures and the risks of using inert gas, chemicals or steam and that such use should be approved.

11.1011.10.2.4 Ventilation Specialists should ensure that if exhausted vapors, etc. are or may be flammable, ignition sources in and around confined spaces have been eliminated or controlled prior to ventilation.

11.10.2.5 Ventilation Specialists should ensure that adequately sized openings are provided for both clean air replacement and air exhaust and that the air supply and exhaust points are separated as far apart as possible.

11.10.2.6 Ventilation Specialists should never use pure oxygen (or oxygen above normal atmospheric levels) to ventilate a confined space

11.10.2.7 Ventilation Specialists should assure that air introduced into an area is from a “clean” (uncontaminated) source.

11.10.2.8* Ventilation Specialists should assure that hazardous atmosphere is properly exhausted in accordance with the confined space program and regulatory requirements and does not accumulate in unapproved areas.

11.1011.10.2.9 Ventilation Specialists should modify ventilation procedures or use appropriate alternatives as necessary to maintain acceptable exposures during entry, hot work or cold work.

11.10.2.10 Ventilation Specialists should direct ventilation flows toward occupied areas, as well as areas that may compromise air quality in occupied spaces.

11.10.2.11 Ventilation Specialists should be familiar with potential contaminant (liquid, sludge, or vapor) collection points within confined spaces, including less visible or accessible areas where contaminants are at risk of remaining following routine cleaning or other activities.

11.10.2.12* Ventilation Specialists should ensure that ventilation air streams do not compromise the accuracy of continuous or periodic air test results.

11.10.2.13 Ventilation Specialists should provide ventilation in accordance with the entry permit and for as long as deemed necessary by the Entry Supervisor, tester, or entrants.

11.10.2.14 Ventilation Specialist should be able to coordinate and communicate ventilation activities if the Gas Tester is a separate person when required

11.10.3 Ventilation Specialist Qualifications.

11.10.3.1 The Ventilation Specialist should be familiar with the confined space program and industry and governmental regulations that pertain to ventilations including, but not limited to oxygen levels, flammable and toxic atmospheric levels and required air changes per hour.

11.10.3.2 The Ventilation Specialist should be familiar with the use, limitations and hazards of materials, substances, and equipment approved for use outside the specific confined space -- including fans, eductors, hoses, personal protective equipment, Gas Testers and chemicals.
11.10.3.3 The Ventilation Specialist should know and understand the hazards inside and outside the specific confined space associated with ventilation operations.

11.10.3.4 The Ventilation Specialist should know ventilation techniques appropriate to the specific hazards and confined space, including accepted industry standards, regulatory requirements, etc.

11.10.4 Ventilation Specialist Demonstrated Competencies.

11.10.4.1 The Ventilation Specialist should be able to read and verbally explain permits.

11.10.4.2 The Ventilation Specialist should be able to appropriately inspect, maintain, test and use required equipment.

11.10.4.3 The Ventilation Specialist should be able to verbally indentify, assess, interpret and apply monitor readings.

11.10.4.4 The Ventilation Specialist should be able to communicate when evacuation is desired.

11.10.4.5 The Ventilation Specialist should be able to complete assigned tasks in an approved manner.

11.10.4.6 The Ventilation Specialist should be able to determine required ventilation flow rates.

11.11 Isolation Specialist.

11.11.1 General. Isolation is the process of removing a confined space from service and completely protecting the space from the unwanted release of energy, hazardous atmosphere and materials into the spaces. These operations are performed by the Isolation Specialist who should be qualified, competent and authorized. Isolation may be permanent or temporary.

11.11.1.11.2* Isolation Specialist Duties and Responsibilities.

11.11.1.11.2.1 Isolation Specialists should comply with applicable lockout tagout program and be authorized to work with the applicable energy control devices or other isolation equipment, materials and procedures.

11.11.2.2 Isolation Specialists should inspect and determine that equipment or devices to be used for isolation are approved, in acceptable condition and appropriate for the task prior to their use.

11.11.2.3 Isolation Specialists should notify authorized personnel when the energy control measures are either applied or removed.

11.11.2.4 Isolation Specialists should determine if stored energy is a potential issue, and if so, eliminate or control the hazard.

11.11.2.5 Isolation Specialists should properly sequence isolation and energy control procedures.

11.11.2.6 Isolation Specialists should verify that relevant energy sources have been isolated prior to the issuance of permits for work in or around areas impacted by equipment or spaces that need to be isolated and notify the Permit Issuer and/or Entry Supervisor.

11.11.2.7 Isolation Specialists should develop and make available to the owner/operator or contractor and Entry Supervisor, an isolation checklist relevant to the confined space.

11.11.2.8 Isolation Specialists, as well as other authorized individuals, should use methods and procedures approved by the applicable confined space or isolation program when temporarily removing lockout or tagout devices.

11.11.2.9 At the conclusion of the work, Isolation Specialists should take appropriate safeguards prior to releasing the space from lockout or tagout using the isolation checklist for verification purposes.

11.11.3 Isolation Specialist Qualifications.

11.11.3.1 An Isolation Specialist should comply with the confined space program and industry and governmental regulations that pertain to isolation.
11.11.3.2 An Isolation Specialist should verbally explain the use, limitations and hazards of materials, substances, and equipment approved for use for isolating the specific confined space.

11.11.3.3 An Isolation Specialist should verbally identify the hazards inside and outside the specific confined space associated with isolation operations.

11.11.3.4 An Isolation Specialist should verbally explain isolation techniques appropriate to the specific hazards and confined space including accepted industry standards, regulatory requirements, etc.

11.11.3.5 An Isolation Specialist should be able to comply with and be authorized to work with the applicable energy control devices or other isolation procedures.

11.11.4 Isolation Specialist Demonstrated Competencies.

11.11.4.1 An Isolation Specialist should understand all sections of the confined space entry permit.

11.11.4.2 An Isolation Specialist should be able to identify and evaluate need for required equipment.

11.11.4.3 An Isolation Specialist should be able to communicate with all personnel.

11.11.4.4 An Isolation Specialist should be able to perform assigned tasks in an approved manner.

11.11.4.5 An Isolation Specialist should be able to determine isolation devices, methods and requirements.

11.12 Standby Worker.

11.12.1* General. Standby Workers are individuals assigned to stay outside the confined space and conduct confined space related operations as assigned by the Entry Supervisor which do not involve duties assigned specifically to entrants, Gas Tester, rescuers, supervisors, Permit Issuers, attendants and isolation and ventilation persons.

11.1211.12.2 Standby Workers Duties and Responsibilities.

11.12.2.1 Standby Workers should have an understanding of the work required and the knowledge and skills to perform the work in a safe manner around the permit area.

11.12.2.2 Standby Workers should be familiar with the hazards in and around the confined space and use appropriate protective clothing and equipment as appropriate for assigned duties and exposures or as required by a work permit.

11.12.2.3 Standby Workers should receive direction from the confined space Entry Supervisor regarding tasks to be performed.

11.12.2.4 Standby Workers assigned to monitor supplied air systems should adhere to the following:

11.12.2.4.1 This should be the only task assigned to one person.

11.12.2.4.2 The Standby Workers should maintain air supply cylinders in a secured, upright position, properly switch cylinders as required to provide a constant air supply and ensure that the cylinders are protected against damage.

11.12.2.4.3 The Standby Workers should ensure that breathing air supply lines, hoses and couplings are maintained and are not used for supplying anything other than breathing air.

11.12.2.4.4 The Standby Workers person should assure that the intake air supply provided to compressors and/or air pumps (used in lieu of cylinders) is suitable for breathing and is free of contaminants.

11.12.2.4.5 The Standby Workers should immediately notify entrants to switch to emergency bottled air and leave the tank in the event of air supply failure, contamination or disruption.

11.12.2.5 Standby Workers should have an understanding of the emergency response plans established by the owner/operator or contractor and know what to do during an emergency.
11.12.2.6 Standby Workers conducting cleaning, disposal, hot work and/or cold work operations in and around the confined space should be able to perform these activities in accordance with the confined space program and issued permit requirements.

11.12.3 Standby Workers Qualifications (should they have the awareness level training too).

11.12.3.1 Standby Workers should comply with confined space program and industry and governmental regulations that pertain to work assignments.

11.12.3.2 Standby Workers should verbally explain the use, limitations and hazards of materials, substances, and equipment approved for use in assigned duties.

11.12.3.3 Standby Workers should verbally indentify the hazards inside and outside the specific confined space associated with assigned operations.

11.12.3.4 Standby Workers should verbally explain the safe work practices appropriate to the specific hazards and confined space.

11.12.4 Standby Workers Demonstrated Competencies.

11.12.4.1 Standby Worker should be able to read required permits if assigned to conduct hot or cold work.

11.12.4.2 Standby Worker should be able to properly use required equipment.

11.12.4.3 Standby Worker should be able to verbally communicate with all personnel.

11.12.4.4 Standby Worker should be able to perform assigned tasks.

11.13 Training.

11.13.1 General. All confined space personnel should be trained, educated and/or qualified as required by the applicable written confined space program and regulatory requirements to include, but not limited to, the following;

(1) General and specific duties and responsibilities for assigned work.
(2) Equipment, tools, PPE, respiratory protection and monitoring instruments to be used.
(3) Type of confined space to be entered, configuration and structure and materials or substances within, around or introduced into the space.
(4) Atmospheric, physical and chemical (toxic) hazard awareness including, but not limited to, the identification, elimination, protection and control measures applicable to the proposed entry and work.
(5) Certification, registration or licensing when required

11.13.1.1 Sources of Training/Education include, but are not limited to, the following:

11.13.1.1.1 On the Job (apprentice) training or experience

11.13.1.1.2 Company sponsored training/education – internal or external

11.13.1.1.3 Job required regulatory training/education, including, but not limited to, respiratory protection, hot work, lock-out tag-out, etc. as applicable to duties and assignment.

11.13.1.1.4 Government, regulatory, private and labor organization training/education programs such as NFPA Entry Supervisor Training Program, OSHA on-line courses or similar programs

11.13.1.2 Re-training.

11.13.1.2.1 All confined space personnel should be re-trained, educated and/or qualified as required by the confined space program or regulations.

11.13.1.2.2 All confined space personnel should be re-trained, educated and/or qualified when new duties and responsibilities are assigned.
11.13.1.2.3 All confined space personnel should be re-trained, educated and/or qualified when new equipment, types of space, or materials are introduced.

11.13.1.2.4 All confined space personnel should be re-trained, educated and/or qualified when work deficiencies are observed.

11.13.1.2.5 All confined space personnel should be re-trained, educated and/or qualified when certification requires renewal

11.13.1.2.6 All confined space personnel should be re-trained, educated and/or qualified when regulatory requirements change

11.13.1.2.7 All confined space personnel should be re-trained, educated and/or qualified in the proper use of tools and equipment, PPE, respiratory protection and monitoring instruments etc according to the manufacturer's recommendations for changes in existing or new tools or equipment

11.13.2 Rescue Training. The AHJ should provide for training in the responsibilities that are commensurate with the needs of the organization.

11.13.3 Roles and Responsibilities. The AHJ should determine distribution of roles and responsibilities in order to focus rescue training and resources to maintain proficiency.

11.13.4 Continuing Education. The AHJ should provide for the continuing education necessary to maintain all requirements of the organization's identified rescue needs.

11.13.5 Documentation of Training. The AHJ should be responsible for the documentation of all required rescue related training. This documentation should be maintained and available for inspection by individual team members or their authorized representatives and by the owner/contractor who has arranged for the rescue service.

11.13.6 Fitness. The AHJ should ensure that Rescue Team members are psychologically, physically, and medically capable to perform assigned duties and functions at technical search and rescue incidents and to perform training exercises in accordance with Chapter 10 of NFPA 1500, Standard on Fire Department Occupational Safety and Health Program.

11.13.7 Individual Team Member Requirements. Each member of the rescue service should meet the requirements defined in NFPA 1006, Chapter 7 Confined Space Rescue, Level 2.

11.13.7.1 Each member of the rescue service should be provided with, and trained to use properly, the PPE and rescue equipment necessary for making rescues from in and around confined spaces according to his or her designated level of competency.

11.13.7.2 Each member of the rescue service should be trained to perform the assigned rescue duties.

11.13.7.3 Each member of the rescue service should be equipped, trained, and capable of functioning to perform confined space rescues within the area for which they are responsible.

11.13.7.4 Each member of the rescue service should also receive the training required of authorized rescue entrants.

11.13.7.5 Each member of the rescue service should practice making confined space rescues once every 12 months.

11.13.7.6 Each member of the rescue service should be certified to the level of first responder or equivalent according to U.S. Department of Transportation (DOT) First Responder Guidelines.

11.13.7.7 Each member of the rescue service should successfully complete a course in cardiopulmonary resuscitation (CPR) taught through the American Heart Association (AHA) to the level of a “Health Care Provider,” through the American Red Cross (ARC) to the “CPR for the Professional Rescuer” level, or through the National Safety Council’s equivalent course of study.
11.13.7.8 Each member of the rescue service should be aware of the hazards he or she could confront when called on to perform rescue in areas and within confined spaces for which the service is responsible.

11.13.8 Rescue Team Requirements.

11.13.8.1 All confined space rescue services should meet the requirements defined in NFPA 1670, Chapter 7 Confined Space Rescue to the Technician level.

11.13.8.2 The rescue service should be capable of responding in a timely manner to rescue summons. This should take into account possible barriers, traffic, logistics or other factors that may create delays in response.

11.13.8.3 The AHJ should provide the rescue service with appropriate information on the hazards to which they may be exposed while performing rescue from specific or generic spaces for which they are responsible.

11.13.8.4 The AHJ should provide the rescue service with access to all confined spaces for which they are responsible so that they can develop rescue plans and practice rescue operations.

Chapter 12 Written Confined Space Program

12.1 General. Before confined space operations begin and before workers enter confined spaces for any reason, employers whose employees will be entering confined spaces should develop and implement written confined space programs that include, but are not limited to, the following elements:

(1) Program Responsibilities
(2) Identification of Confined Spaces
(3) Identification of Personnel who will be involved in confined space entry
(4) Standard Operating Procedures such as atmospheric monitoring and ventilation
(5) Entry Permits
(6) Other Facility Safety Permits and Procedures
(7) Rescue Procedures
(8) Training
(9) Resources
(10) Program Auditing
(11) Medical Qualifications
(12) Regulatory and Best Practices
(13) Employers that will only have qualified contractors enter their confined spaces need to have a written confined space policy that explains the following:
(14) How the employer determines if contractors are qualified
(15) How Confined Space Hazards are communicated to contractors
(16) How relevant facility safety information is communicated to contractors
(17) How the contractor is debriefed after entry is completed

12.2 Responsible Person and Responsibilities. There should be one person assigned to be the “Responsible Person” for the company or facility’s confined space entry program. This person can be the owner/operator or another competent individual assigned by the company owner/operator. This individual should be clearly identified in the written program. The confined space program should clearly establish the roles and responsibilities of all individuals involved in confined space entries. As a minimum, the name of the responsible person should be listed along with the list of “authorized” entrants, attendants and Entry Supervisors. Other roles such as the Gas Tester, Ventilation Specialist, Isolation Specialist, standby person, Hot/Cold work Permit Issuer, etc. should be assigned to other individuals if needed or can be assigned to the attendant or Entry Supervisor if appropriate. Chapter 11 of this guide provides a list of roles and required training.

12.2.1 A written confined space entry program should be developed by the responsible person for every workplace in which confined pace entries will be performed by employees. The program should meet, at a minimum, applicable regulatory requirements, and ideally, best practices as well.
12.2.2 Employee Involvement. Employees who will be involved in confined space entry operations should be involved in the development and institution of the written program.

12.2.3 All employees and contractors should receive a copy of, or know how to have easy access to, the facility’s written confined space entry program.

12.2.4 Roles and Responsibilities. The confined space program should clearly establish the roles and responsibilities of all individuals involved in confined space entries. As a minimum, the name of the responsible person should be listed along with the list of “authorized” entrants, attendants and Entry Supervisors. Other roles such as the Gas Tester, Ventilation Specialist, Isolation Specialist, standby person, Hot/Cold work Permit Issuer, etc. should be assigned to other individuals if needed or can be assigned to the attendant or Entry Supervisor if appropriate. Chapter 11 of this guide provides a list of roles and required training.

12.3 The written program should state that all employees and management are required to follow all confined space program elements and related safety procedures. The program and policy should also require that if anyone involved in confined space entry operations feels an unsafe condition exists they must immediately report that condition to the attendant or Entry Supervisor and entrants should not enter the space, or if entry has already been performed, leave the space until the concern is addressed by the responsible person or Entry Supervisor.

12.4 Periodic Review. The written program and other program elements should be reviewed by the employer and employees involved in confined space operations at least annually to determine if the program is effective in providing safe operations for confined space entries.

12.4.1 If a confined space related near miss, accident or equipment failure occurs the confined space program should be audited and modified as necessary to address any deficiencies before any additional entries are made.

12.4.2 The confined space written program should be dated and signed by the owner/operator, and approved by senior management.

12.5 Identification of Confined Spaces. An audit of the facility should be done and all confined spaces should be identified in accordance with Chapter 4 of this document. The recognized inherent and adjacent hazards that exist should be documented. In addition, the most probable introduced hazards based on the work likely to be performed in the spaces should be documented. NOTE- This does not eliminate the need for a full hazard evaluation risk assessment of the space at the time of the entry. Rather, it is to provide a general understanding of the hazards likely to be encountered so that proper equipment can be purchased and maintained, personnel trained on them, and roles can be assigned as needed. (See Figure A.12.5.)

12.6 HEADING. The written program should describe the procedures used to evaluate confined space hazards. Entry Supervisors should use the criteria listed in chapters 6 and 7 to identify and evaluate the hazards, and the procedures listed in chapters 7 and 8 to control or eliminate the hazards.

12.7 HEADING. Gas monitoring. The program should specify the gas monitor(s) and other atmospheric testing instrumentation and procedures to be used for confined space entry, including information about maintenance and repair, calibration, calibration frequency, bump testing and limitations.

12.7.1* The program should also specify the atmospheric conditions that prohibit entry. The program should indicate that if acceptable atmospheric quality criteria are not met, or if a hazardous atmosphere develops during occupancy, all entrants must exit immediately. For example, no entry should be allowed if any of the following conditions exists:

1. Oxygen is lower than 19.5 percent or higher than 22.0 percent.
2. Hydrogen sulfide is greater than 10 ppm.
3. LEL is greater than 10 percent.
4. Carbon monoxide greater than 35 ppm.
12.7.2 The program should specify when and how gas monitoring is conducted. For example, the program should specify if workers are to wear monitoring devices during the entire entry, or if the attendant will be performing gas monitoring, or both.

12.7.3 The program should specify who is responsible for maintaining and calibrating monitoring equipment.

12.7.4 The program should specify where gas monitor instructions and manuals are maintained and where calibration records are maintained.

12.8 HEADING. The written program should provide information about the types of mechanical ventilation systems available for confined space entry including where they are located and who is responsible for maintaining these systems.

12.8.1 The program should specify when and how mechanical ventilation will be used in confined spaces. For example, some confined spaces may require continuous ventilation during confined space entry operations.

12.8.2 The program should specify if additional or special types of mechanical ventilation may be required for particular tasks such as welding or using flammable solvents.

12.9 Rescue. The program should explain how rescue will be performed. It should state that whenever possible all permit required confined space entries will be done with entrants wearing full body harnesses that are either attached to a mechanical retrieval device or to a fixed object outside the space. Personal fall arrest may be necessary depending on the configuration of the confined space relative to entry operations. If attached non-entry rescue is not possible due to the configuration of the space, then a comprehensive emergency rescue contingency plan should be developed.

12.9.1 The program should designate who is responsible for maintaining and inspecting all mechanical retrieval, personal fall arrest, and rescue equipment. The program should state that all equipment will be inspected prior to use regardless of how frequently it is otherwise inspected.

12.9.2 The program should indicate the type of personal fall arrest equipment that will be used for entries.

12.10 Personal Protective Equipment (PPE). The program should indicate who is responsible for obtaining and maintaining personal protective equipment and should cross reference other PPE programs such as the respiratory protection program and the facility’s PPE written policies or procedures.

12.11 Energy Control Program (Lockout/Tagout). If there is any energy source(s) that can create a hazard in or around the confined space during entry operations then the program should cross reference lockout/tagout or other energy control programs in the facility.

12.12 Hot/Cold Work. The program should cross reference facility hot/cold work written policies and procedures. If hot/cold work is performed in or around confined spaces a hot/cold work Permit Issuer should be assigned in accordance with chapter 11.

12.13 Permits. The written program should include the facility’s confined space entry permit. See chapter 13 for permits.

12.14 Training. The written program should include information about the types of training required and who will be responsible for ensuring that all employees are trained to the level of competency required by their job assignment.

12.14.1 The program may indicate that generic training materials may be used for initial training, however the program should also indicate that all employees MUST BE TRAINED on the facility’s specific confined space hazards, procedures and equipment before being authorized to perform any confined space program function.

12.14.2 The program should indicate who is responsible for maintaining records of training.

12.14.3* The program should indicate how often retraining will occur.
12.15 Recordkeeping. The program should indicate who will maintain confined space program records, including cancelled permits. All permits should be maintained for a period of at least one year.

12.16 Contractors. The program should indicate that contractors will be expected to follow the procedures established by the written program. It should indicate that all contractors will be informed of the hazards and potential hazards in the confined spaces they will be entering. If joint entries are performed, the program should explain how these entries are managed. For example, will there be one or two attendants, whose permit(s) will be used, and how air monitoring is conducted. At the conclusion of a contractor entry, the program should explain how the contractor is debriefed concerning the entry, and how the debriefing is documented. The program should also indicate that if procedures are not being followed, the contractor may be disciplined, including removal from the facility.

12.17 Reporting of Accidents or Near Misses. The program should indicate that all accidents or near misses, including failures of retrieval systems, ventilation systems, gas monitor alarms sounding, etc. are to be reported to the responsible person. The facility’s incident investigation procedure should be cross referenced and followed.

12.18* General Fitness for Duty Evaluation. The written program should include procedures to be used to evaluate the physical and mental capabilities of personnel working in or adjacent to confined spaces. The program should consider the hazards and the work assignment and may cross reference other program medical evaluation procedures, such as for respiratory protection and hazardous material response. Additional medical evaluations may be necessary to address physiological and psychological stresses that may be present during confined space entries, such as climbing ladders, heat stress and claustrophobia.*

CHAPTER 13 PERMITS

13.1 General.

13.1.1 Permit Use. Permit should be used for all entries into Confined Spaces, reclassification, or alternate procedure. Permit shall be conspicuously visible at the Confined Space location. Permits should be marked as cancelled when work has been completed or conditions have changed requiring a new permit. Canceled Permits shall be maintained for duration not less than 2 years and shall be made available to Entry Supervisors or Permit Issuer for review prior to entering Confined Space. Permit are to be limited to 1 shift, if work activity exceeds 1 shift the permit should be reissued. Additionally, permit should be considered cancelled if personnel change.

13.2 Permit Elements. A Permit should be developed or adopted that meets the needs of the work activities of the owner/operator. The elements below describe in detail the expectation of the elements, how they should be used and why they are important. Each element may be expanded or minimized on the permit to meet the job task requirement and/or the responsible parties’ program management requirements. Each element of the permit identified has an in-depth section within this standard that the Program Manager, Entrant Supervisor, Attendant, and Entrant should be familiar with and addressed as mandatory requirements under the training program. At a minimum, 12 of the 14 elements listed below should be addressed on any owner/operator’s permit. Two of the elements are discretionary; “4. Alternate Procedure” and “5. Reclassification” should only be used if owner/operator’s written program allows them. It should be noted that these 2 discretionary sections have a history of misuse in industry. This guideline cautions the use of these sections, programs that have clear written procedures including management of change these sections may utilize these sections. Figure 13.2 is an example of a typical permit.

***INSERT FIGURE 13.2 HERE***

13.2.1 Confined Space Identification. The confined space should be clearly identified on the permit. This may be done by using its name, location and description.
13.2.2 Work Activities.

(1) Time: The permit should outline the period of time the permit is valid and, if possible, the times when workers are expected to be present in the space. Permits become void once the time / date of the permit has expired.

(2) Work: The permit should outline what work is scheduled to be done in the space. Permits are issued for specific work and if there is a change in the scope of work or its location, a new permit may need to be issued. Work that is not identified on the permit may not be done without the approval of the Entry Supervisor.

13.2.3 Initial Confined Space SAFE WORK Evaluation. All Confined Spaces shall have an Initial SAFE WORK evaluation. The intent of this evaluation is to ensure the review of confined spaces before any work activity begins, to ensure hazardous conditions do not exist inherently, are introduced, or are adjacent to confined space. Evaluation needs to be signed off by Entry Supervisor or issuer. If no hazardous conditions exist work may proceed. If any hazards exist the Entry Supervisor or Permit Issuer needs to complete the permit appropriately to ensure safe entry.

13.2.4 Alternate procedure. (DISCREIONARY SECTION)

Caution: Alternate procedure needs to be managed under extreme control. History of confined space entry incidents indicate misuse of this procedure and has resulted in death. Many owner/ operators have chosen not to allow the use of this procedure.

13.2.4.1 When alternate procedure is used, it may only be used if there is no potential for any other hazard besides atmosphere. A written procedure is needed for the confined space, including hazard evaluation, hazard identification, and risk assessment. The use of this procedure only provides relief from the requirement of a confined space attendant, and stand-by rescue.

13.2.4.2 All hazards must be eliminated before entry, except hazardous atmosphere potential. The Entry Supervisor needs to sign off on permit if alternate procedure is to be used and review with entrant what conditions would cancel said permit approval.

13.2.4.3 When this procedure is being used positive pressure ventilation and continuous air monitoring are required. Hazardous atmosphere may not exist prior to ventilation.

13.2.4.4, Note: Emergency Services Rescue notification should still be arranged, and incident action plan documented.

13.2.5 Reclassification. (DISCREIONARY SECTION).

Caution: Reclassification procedures need to be managed under extreme control. History of confined space entry incidents indicate misuse of this procedure has resulted in death. Many owner/ operators have chosen not to allow the use of this procedure.

When Reclassification procedure is used it may only be used if there is no potential for hazard before entry. A written procedure is needed for the confined space including hazard evaluation, hazard identification and risk assessment. Including written detailed description on how each hazard has been eliminated. The use of this procedure only provides relief from the requirement of a confined space attendant, and stand-by rescue.
The Entry Supervisor needs to sign off on permit if reclassification procedure confirming reclassification was conducted properly, and review with entrant what conditions would cancel said permit approval.

Reclassification is only allowed by formal risk assessment and identification of proper hazard elimination procedures by independent competent person.

Note: Emergency Services Rescue notification should still be arranged, and incident action plan documented.

13.2.6 Hazard Identification. All recognized and potential hazards should be outlined on the permit or on the permit’s documentation. These hazards should then be eliminated or controlled to reduce the risk to the workers to an acceptable level. Giving workers information about the hazards will assist them in their own hazard recognition and will help to alert them to changes in the space’s condition. Types of hazards include inherent hazards, introduced hazards, and adjacent hazards. 13.2.6.1 Inherent Hazards. As described in Chapter 6, there may be hazards inherent to the confined space. These hazards exist as a permanent or characteristic attribute such as the space’s design, configuration, size, or fixed equipment within the space. These hazards may not be able to be eliminated or controlled, but measures can be taken to assess their risks and take precautions. An example of this is a steep ladder into a fuel tank. The ladder’s configuration is not changeable, but the way in which supplies are brought into the space can be altered. The worker does not have to carry them down; instead, they can be lowered to him/her.

13.2.6.2 Introduced Hazards. These types of hazards are typically brought into the space by workers or work processes. The introduction of materials, personnel and work processes should be evaluated carefully to ensure that they do not create a hazardous condition for personnel. These are hazards that can be controlled or eliminated, making them a key element in a risk assessment. An example of introduced hazards includes the materials brought into a space to clean it. If the materials, such as solvents used to clean a fuel tank, create hazardous levels of vapors, the condition of the space may be altered by the process. Another example of introduced hazards is when workers disturb settled materials, such as fish processing or other biological waste. The disruption of the materials may allow trapped levels of hydrogen sulfide gas to be released creating a hazardous atmosphere.

13.2.6.3 Adjacent Hazards. Adjacent hazards are those hazards that are not in the space but are in close proximity. These hazards may impact a confined space through an opening or hatch (e.g., smoke from a nearby fire or hot work), common wall or conduit (e.g., leak from an adjacent tank), or through physical changes (e.g., heating of an adjacent wall during hot work). When conducting an inspection to develop a confined space permit, adjacent hazards that exist or can potentially exist should be considered and taken into account.

13.2.7 Hazard Control. (See also Chapter 8.) Identified hazards should be eliminated or controlled. When the hazards are inherent, they should be recognized and measures should be developed to reduce the risk to the workers. Controls should be clearly outlined on the permit, and include such measures as:

13.2.7.1 Air Monitoring. Air monitoring is often required to monitor the conditions intermittently or continuously. The frequency of monitoring depends on the work being performed and other potential introduced or adjacent hazards that could alter the atmospheric conditions of the space. These can include Oxygen Deficient, Oxygen Enriched, Flammable or Explosive, Toxics, Irritant/Corrosives or Asphyxiating atmospheres. The permit should detail what air monitoring should be done, by whom, and at what levels personnel are required to exit the space.

13.2.7.2 Ventilation. If possible, ventilating a space with fresh air before and during confined space work may reduce or remove atmospheric contaminants. Ventilation, especially during the warmer months, may also provide relief for thermal stress. The permit should outline what ventilation is required prior to entry and during entry. If the ventilation will block access in or out of the space, the permit should outline what the procedures will be needed to ensure worker safety during operations.

13.2.7.3 Personal Protective Equipment. The permit should address entrant and attendant PPE requirements. Likewise, if personnel need to carry escape devices or additional PPE for specific work, such as cleaning or painting, that should also be included.
13.2.7.4 **Other Permits.** All other permits that are needed for the space should be delineated on the permit (e.g., Hot Work, Line break, Electrical work, etc.).

13.2.7.5 **Grounding and Bonding.** If the space or the ventilation/equipment brought into the space need to be grounded or bonded, that information should be on the permit.

13.2.8 **Communications.** Communications should be documented as to how they will be maintained, as follows:

1. Verbal: Acceptable if line of sight is maintained
2. Radio: Permit to indicate test intervals
3. Rescue request: Permit to indicate how Rescue Team will be notified

13.2.9 **Rescue.** When preparing for entry into a Confined Space Rescue needs to be understood. There are 2 types of rescue both need to be understood as to when they are used and the limitations of each. Regardless of whether a confined space has hazards or not, the owner/operator shall ensure rescue is available and appropriate. All Confined Spaces should have a rescue incident action plan, which describes how rescue will be achieved. This incident action plan needs to be available to Entry Supervisors, Attendants, and Entrants. The incident action plan should be attached to the permit being issued. Emergency Response Team should be notified when all confined spaces are entered.

1. Self Rescue, permit shall indicate what equipment will be used and who will assist. Individuals should be trained on when and how to use the equipment and the limitations of said equipment.
2. Emergency Response Rescue- should be notified of the location of entry, hazards, and duration.

13.2.10 **Entrants.** [Introductory text]:

1. Name shall be printed
2. Entrant shall sign permit, indicating that they have been trained in Confined Space entry and have fully reviewed all the hazards associated with the specific entry they are about to make including which condition changes require their immediate evacuation.

13.2.11 **Attendant.** [Introductory text]:

1. Name shall be printed on the permit
2. Attendant shall sign permit, indicating that they have been trained in Confined Space entry and have fully reviewed all the hazards associated with the specific entry. The Attendant must be aware of the potential hazards in the confined space. This would include possible behavioral effects related to exposure to these hazards. An Attendant must remain in constant contact with the entrant, unless relieved by another attendant. Maintains communication with entrant, monitors activities and orders evacuations, when needed. Performs NON- ENTRY RESCUE or summons Rescue Team if needed. May not perform any other duty that may interfere with the primary duties of attending to the safety of the entrant.

13.2.12 **Entry Supervisor.** The Entry Supervisor has total responsibility for the entry. The Entry Supervisor shall sign permit, indicating that they have been trained in Confined Space entry and have fully reviewed all the hazards associated with the specific entry. They must be aware of the potential hazards in each space and standard operating procedures and equipment required for each entry. Ensures that the work remains consistent with the permit if the work or hazards change, the space is re-evaluated and a new permit is issued.

13.2.13 **Cancel Permit.** Each permit shall have a location on the permit to be identified as canceled. A permit can be canceled at the end of the work activity by attendant or entrant or at anytime by attendant, entrant, supervisor, or safety professional because of hazards.

13.2.14 **Rescue and Emergency Contact.** Permit should conspicuously indicate who and how emergency rescue and contact are contacted.
**CONFINED SPACE ENTRY PERMIT**

**COMPLETE BOTH SIDES OF PERMIT AND POST AT JOB SITE.**

<table>
<thead>
<tr>
<th>LOCATION OF CONFINED SPACE</th>
<th>ADDITIONAL DESCRIPTOR (Ex: LOCATION #, Risk Assessment #, etc...)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DESCRIPTION OF CONFINED SPACE (TANK #, MANHOLE, ETC.)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>DATE ISSUED</strong></td>
<td><strong>TIME OF ENTRY/ ISSUED</strong></td>
</tr>
<tr>
<td><strong>DESCRIPTION OF WORK TO BE DONE</strong></td>
<td></td>
</tr>
</tbody>
</table>

Initial Confined Space Safe Work evaluation. If “YES”, is indicted for any of the questions.

ENTRY NOT PERMITTED UNTIL hazards are indentified and mitigated by use of the permit and authorized Entry Supervisor.

If “NO” is indicated for every question work may proceed. Entry Supervisor Signature________________________________________

If any conditions change work shall stop and supervisor contacted

<table>
<thead>
<tr>
<th>HAZARD IDENTIFICATION</th>
<th>HAZARDS PRESENT OR POTENTIALLY PRESENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(indicate “YES” or “NO” in every box)</td>
</tr>
<tr>
<td></td>
<td><strong>INHERENT HAZARDS</strong></td>
</tr>
<tr>
<td>MECHANICAL / ELECTRICAL</td>
<td>(springs, elevated parts, electric over 50volts.)</td>
</tr>
<tr>
<td>Physical</td>
<td></td>
</tr>
<tr>
<td>Engulfment by material</td>
<td></td>
</tr>
<tr>
<td>PNEUMATIC / HYDRAULIC/ FLUIDS/GASES</td>
<td>(lifts, agitators, etc.)</td>
</tr>
<tr>
<td>CHEMICAL/ BIOLOGICAL/ ATMOSHERIC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternate Procedure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are Alternate Procedures allowed</td>
</tr>
<tr>
<td>If alternate procedure is allowed there shall be a formal hazard assessment by qualified person including written formal procedure.</td>
</tr>
<tr>
<td>If YES and being used, Entry Supervisor must sign and date ________________________________</td>
</tr>
</tbody>
</table>
Reclassification Procedure:
Are Reclassification Procedures allowed  yes  no 
If reclassification procedures are allowed there shall be a formal hazard assessment by qualified person including written formal procedure.
If YES and being used, Entry Supervisor must sign and date ____________________

<table>
<thead>
<tr>
<th>ENERGY SOURCES (examples)</th>
<th>HAZARDS PRESENT OR POTENTIALLY (CHECK ALL THAT APPLY)</th>
<th>HAZARD CONTROLLED BY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INHERENT HAZARDS</td>
<td>INTRODUCED HAZARDS</td>
</tr>
<tr>
<td>MECHANICAL</td>
<td>(springs, elevated parts, etc.)</td>
<td></td>
</tr>
<tr>
<td>ELECTRICAL</td>
<td>(motors, agitators, etc.)</td>
<td></td>
</tr>
<tr>
<td>PNEUMATIC / HYDRAULIC</td>
<td>(lifts, agitators, etc.)</td>
<td></td>
</tr>
<tr>
<td>FLUID / GASES</td>
<td>(CIP lines, nitrogen, steam, etc.)</td>
<td></td>
</tr>
<tr>
<td>OTHER HAZARDS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNAUTHORIZED ENTRY OF PERSONNEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOISE &gt;85 dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXCESSIVE HEAT OR COLD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FALLING OBJECTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Permits: Hot Work, Line Break, LOTO, Live Elect Work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATMOSPHERIC HAZARDS: (record pre-entry and document continuous at least every two hours until exit) Bump Test required and completed yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas Tester: Type Model ______________ Serial # ______________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRE-ENTRY REQUIRED AM / PM: Time AM / PM: Time AM / PM: Time AM / PM: Time AM / PM:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONTINUOUS MONITORING REQUIRED</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>PERCENT OF OXYGEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.5% to 22.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOWER EXPLOSIVE LIMIT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10% of LFL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBON MONOXIDE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;35 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYDROGEN SULFIDE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHER</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TESTER INITIALS:**

**PERSONAL PROTECTIVE EQUIPMENT REQUIRED:** *(FOR ALL, EITHER CHECK THE BOX OR CIRCLE “N/A”)*

<table>
<thead>
<tr>
<th>N/A</th>
<th>Respirator N/A</th>
<th>Safety Glasses w/ Side Shields N/A</th>
<th>Hard Hat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type: ___________________________</td>
<td>N/A</td>
<td>Goggles N/A</td>
<td>Face Shield</td>
</tr>
<tr>
<td>Model: __________________________</td>
<td>N/A</td>
<td>Ear Plugs/Muffs N/A</td>
<td>Boots</td>
</tr>
<tr>
<td>Cartridge/Filter: __________________</td>
<td>N/A</td>
<td>Gloves (Type: ____________) N/A</td>
<td>Disposal Coveralls</td>
</tr>
<tr>
<td>Other (specify: __________________</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMMUNICATIONS:**

8 **ENTRANT** VERBAL (ONLY ALLOWED FOR LINE OF SIGHT) RADIO

**EMERGENCY RESCUE WILL BE REQUESTED BY:**

9 **RESCUE:** *(FOR ALL, EITHER CHECK THE BOX OR CIRCLE “N/A”)*

<table>
<thead>
<tr>
<th>N/A</th>
<th>Full Body Harness w/ “D” Ring N/A</th>
<th>Tripod/Retrieval System N/A</th>
<th>Fall Arresting Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>Lifelines and Safety or Wrist Harness N/A</td>
<td>Emergency Escape Retrieval Equipment</td>
<td></td>
</tr>
</tbody>
</table>

Emergency Response Team has been notified of entry, hazards, and duration (Still use for alternate procedure, or reclassification)

Incident Action Plan has been completed and available

**ENTRANT(S):** I am aware of the hazards and their effects, and will take the precautions required.

__________________________________________  __________________________________________
__________________________________________  __________________________________________
### Chapter 14 Recordkeeping

14.1 **General.** All records for a confined space program should be maintained by the owner/operator for a minimum of one calendar year to allow for an annual review of the program.

14.2 **Employer Site Records.**

14.2.1 Documented evaluation and classification for each confined space present should be maintained for the duration of occupancy or until permanently eliminated.

14.2.2 Records of all reclassification and permits, including all supporting air monitoring results, should be maintained for a period of two years from the date of entry.

14.2.3 Documentation of annual reviews to determine continued program effectiveness should be maintained for a period of two years from the date of the review.

14.2.4 Documentation of confined space monitoring, personal protection equipment, rescue equipment monthly inspections and maintenance should be maintained for a minimum of two years.

14.2.5 Documentation of confined space monitoring, personal protection equipment, and rescue equipment inspections for and during entry should be maintained for a minimum of two years.

14.3 **Employee Records.**

14.3.1 Employee training records, certifications, competencies, should be maintained for the duration of employment if required for entry.

14.3.2 A roster of employees trained, educated, qualified and authorized to participate in confined space entries.

14.3.3 Any medical evaluation program documents should be maintained for thirty years past the last employment date of any employee.

---

**Figure 13.2** Example of a typical confined space entry permit.

<table>
<thead>
<tr>
<th>ATTENDANT(S):</th>
<th>I am aware of the hazards and their effects. I will arrange for rescue from outside the space, if required.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTRY SUPERVISOR:</td>
<td>I authorize entry into this confined space and verify that the hazards have been evaluated, control measures have been instituted, and the conditions are as indicated on this permit.</td>
</tr>
<tr>
<td>CANCEL PERMIT</td>
<td>This permit shall be cancelled at the completion of the entry or if hazards change by placing a large “X” across both sides of the permit.</td>
</tr>
<tr>
<td>RESCUE &amp; EMERGENCY CONTACT</td>
<td></td>
</tr>
</tbody>
</table>
14.4 Contractor. Contractor permits, supporting air monitoring results and qualifications should be retained for a minimum of one year.

Chapter 15 Management of Change (MOC)

15.1 Purpose. To establish the procedures to manage changes to equipment, work Scope and Application – Owners of confined spaces should complete a MOC review for any temporary or permanent change affecting confined space design, equipment, or work practices. Change is defined as all modifications to confined space configuration, equipment, work processes, materials, procedures, and contents/chemicals.

15.2 Responsibilities and Communication. For a MOC system to function effectively, confined space owners, entrants, attendants, supervisors, and rescuers should know how to recognize which deviations and changes are significant enough to trigger a MOC review. Once a deviation or change affecting a confined space is identified that triggers the MOC system, facility owners assign qualified personnel and provide the resources to conduct an MOC process to determine what changes, if any, are needed in the confined space program and hazard control measures.

15.3 MOC Process and Activation. A MOC process should be formally developed, implemented, communicated, and documented to ensure the changes and deviations affecting confined spaces have been reviewed and authorized. The steps for executing a MOC process include, but are not limited to processes, procedures, or the facility for designated confined spaces. The purpose of the Management of Change (MOC) procedure is to ensure that workplace changes to equipment, processes, personnel, procedures, or materials affecting confined spaces are properly reviewed against original confined space hazard assessment data. MOC is a concept that if well implemented could likely prevent confined space accidents associated with changes or modifications with confined spaces.

15.3.1 An MOC form should be originated, submitted, and authorized prior to implementing a change affecting a confined space. The person originating the change or deviation should complete Part I of the MOC form.

15.3.2 The MOC Form should then be submitted for review and approval by qualified personnel familiar with the process who should thoroughly identify potential issues, develop protective measures, and propose a course of action for proceeding safely with the confined space program changes or deviations.

15.3.3 After the confined space program changes have been implemented but prior to entry into confined spaces, the MOC form should be reviewed and authorized to ensure all confined space program requirements and documentation have been fully addressed or updated and that the change was implemented and consistent with original or updated confined space classification and hazard assessment documentation prior to providing authorization for confined space entry.

15.4 MOC Warranted Confined Space Changes:

15.4.1 Equipment Changes Affecting Confined Space. The addition, modification, or removal of equipment such that new processes, procedures, documentation or training for confined space work is required. Examples of changes in confined spaces include, but are not limited to the following:

(1) Physical configuration (e.g., external or internal dimensions of space, materials of construction, physical condition) of the space
(2) Entry or internal access portals and paths (e.g., number, size, configuration that will modify or affect egress routes, etc.)
(3) Internal equipment (e.g., agitators, dampers, piping, obstructions, safety critical equipment, system parts, etc.)
(4) Instrumentation and monitoring (e.g., monitors, electrical controls, program/control logic or set/alarm points, etc.)
(5) Electrical, hydraulic, pneumatic or mechanical equipment, or change of electrical classification
(6) Reclassification of the space so as to no longer be a confined space

84
15.4.2 Confined Space Process Changes. Any changes to confined space or adjacent processes, work practices, or procedures which could impact previously established confined space programs, classification and hazard assessment data including:

1. Planned confined space or adjacent work activities (welding, cleaning, maintenance, repairs, testing, monitoring, etc.)
2. Hazardous atmospheric conditions (oxygen, combustible gases, toxic gases, etc.) inside or outside the space
3. Physical factors (temperature, humidity, noise, radiation, etc.)
4. Safe upper and lower operating limits (temperature, pressure, flow, composition, etc.)
5. Changes in ventilation that could affect displacement, dilution, or removal of air contaminants within the space
6. Preventative Maintenance, isolation or Lockout Tagout Procedures (additions or changes in these procedures or processes)

15.4.3 Confined Space Content/Chemical Changes. Any changes in contents and/or chemicals used in confined spaces which could impact previously established confined space classification and hazard assessment data including:

1. The type, amount, or composition of contents/chemicals stored in confined spaces that may affect electrical hazardous area classifications, hazardous atmosphere considerations, air monitoring provisions, ventilation requirements, PPE requirements for entrants, rescue preparedness, etc.)
2. Introduction or use of new or changed hazardous chemicals or other materials inside confined spaces that may present or produce potential chemical or physical hazard exposure concerns to entrants.
3. The use of new or different materials or chemicals outside of the confined space whose release could affect the confined space.

15.5 MOC Completion and Verification. A MOC verification process should be followed to affirm that the potential safety impacts and consequences from the proposed changes or deviation have been properly addressed. The MOC Form should verify all required MOC action items are complete, the confined space classification/hazard assessment have been updated, the confined space program, entry procedure and rescue plan have been revised accordingly, and the confined space is safe to enter. A MOC completion and verification process should confirm, but not be limited to the following items:

1. Construction and equipment in accordance with design specifications
2. Confined space safety, operating, maintenance, and emergency procedures are in place and are appropriate for the planned activity
3. An updated confined space classification and hazard assessment has been performed and recommendations have been implemented before startup
4. Requirements and authorizations in MOC have been met
5. Training of each affected employee on changes has been completed

Chapter 16 Prevention through Design (PtD)

16.1 Purpose. A Prevention through Design (PtD) concept seeks to initiate a design process to reduce or eliminate inherent risks and hazards associated with the design of facilities, equipment, and products. PtD can minimize the cost of retrofitting and use of labor intensive administrative hazard control measures. The goal of PtD is to eliminate hazards and reduce risks by studying the safety impacts during the initial stages of design rather than relying on reactive hazard isolation and control approaches.

16.2 Scope and Application. The root PtD concepts and approach have a very strong and direct relationship and benefit to hazard and risk reduction efforts associated with confined space entry and rescue operations. Specifically, the application of PtD concepts to confined spaces targets two types of interactions; construction and/or installation of new confined spaces, and redesigning and renovation of confined spaces to eliminate or minimize hazards.
16.3 Responsibilities. PtD is facilitated when HSE professionals and engineers effectively collaborate during the early stages of a capital project process. For a PtD process to function effectively, confined space owners must understand the hierarchy of hazard controls and recognize which confined space hazards and risks can be reduced through improved design or redesign. Once an opportunity for reduced risks through an employment of a PtD process is identified, facility owners should gather the appropriate qualified people and resources to perform a PtD review.

16.4 PtD Process and Activation. PtD is widely recognized and even formalized by OSHA, NIOSH, other consensus safety organizations and several non-mandatory PtD standards and guidelines have been developed, published, and disseminated to the public. There is not a current regulatory standard, consensus standard, or guideline that specifically addresses a formal process for activating a PtD concept specifically for confined spaces. Confined space owners should consider the following tools and processes to move a PtD concept forward towards reduction and elimination of confined space risks and hazards:

1) Integrate PtD concepts into your Management of Change (MOC) process when evaluating potential hazards, risks, and control measures for new confined spaces or when making changes or renovations with existing confined spaces;
2) Use risk assessment and coinciding hierarchy of controls to achieve a tolerable level of risk when performing confined space risk assessments, and during development of confined space entry procedures/permits, and rescue plans;
3) Investigate confined space incidents and near misses that evaluate the benefit of PtD concepts into the root cause analysis and corrective action process; and
4) Train and communicate PtD concepts, practices, and benefits to facility managers, supervisors, engineers, and EHS professionals.

16.5 PtD Warranted Confined Space Changes. The following provides examples of how PtD concepts can be utilized to reduce or eliminate the hazards and risks associated with confined space entry and rescue operations.

16.5.1 PtD to Eliminate Confined Space by Definition. [Introductory text]:

1) Eliminate the ability or need to enter and perform work (e.g., remotely operated tools, fixed monitoring devices, viewing windows or cameras, remote grease joints, redesign of work or maintenance tasks, relocate critical valves/equipment outside space, etc.);
2) Eliminate restricted means of entry and exit (e.g., replace ladders with steps/stairs, enlarge openings/access paths, use standard doorway openings, add access points, etc.);
3) Design space for continuous employee occupancy (e.g., improves ventilation, illuminate space, alter space configuration, etc.);

16.5.2 PtD to Eliminate PRCS Definition Classification. [Introductory text]:

1) Substitute or eliminate hazardous chemicals that present potential hazardous atmospheres (e.g., use combustible liquids with reduced flash points, use corrosives and toxics which present a lessened worker exposure concern, etc.)
2) Protect from exposure to serious safety hazards (e.g., install fixed guards/covers on mechanical and electrical equipment hazards, install railings and/or fall protection points into space, install energy isolation lockout points outside of space, eliminate or guard exposure to sharp/heatheated/slippy surfaces)
3) Prevent from exposure to engulfment or entrapment hazards (e.g., design pipes, valves, and line breaks to allow blocking and bleeding of lines outside of space, design space opening to allow for easy emptying of contents, alter configuration of space to prevent entrapment, etc.)

16.5.3 PtD to Facilitate Rescue of Entrants. [Introductory text]:

1) Design or redesign space to allow for two openings for rescue
2) Design or redesign space to allow unobstructed access of rescue/retrieval equipment
3) Permanently mount davit arm, receiver, or other fixed anchor points at space access opening
(4) Work towards the goal the being able to perform external rescue of entrants when designing spaces.

16.5.4 PtD Reference Standards and Guidelines. Several agencies have developed standards and guidelines in reference to discussion and implementation of a PtD process. The following is a summarized list of PtD references, sites, and standards for further reference:

(2) NIOSH “Prevention through Design: Plan for the National Initiative”
(3) ANSI/AIHA/ASSE Z10-2012, Occupational Health and Safety Management System (provides specific reference to use of PtD process)
(4) ASSE Tech Brief on PtD Standard

Annex A

A.1.3 For confined space activities within the United States, this guide is intended to incorporate the requirements included in OSHA standards for general industry, construction, agriculture, and maritime.

A. 3.3.3 Acceptable Entry Conditions. See Section 8.2.

A. 3.3.6 Confined Space. For example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that often have limited means of entry.

A.3.3.9 Explosion Proof. See NFPA 70.

A. 3.3.15 Job Hazard Analysis (JHA). For a JHA, the job first is broken into a sequence of steps. Each step should accompany some major task, which will consist of a series of movements. The analyst then looks at each series of movements within that basic task.

Next, all the hazards or potential hazards associated with each step are identified. It is important that the entire environment be considered in order to determine every conceivable hazard that might exist.

Finally, based on the basic job steps and the potential hazards, it can be determined what actions are necessary to eliminate, control, or minimize hazards that could lead to accidents, injuries, damage to the environment, or possible occupational illness. Each safe job procedure or action must correspond to the job steps and identified hazards.

A.3.3.18 Permit Required Confined Space (Permit Space). The definition in 3.3.18 is based on 29 CFR 1910.146.

A.4.6. An example of this type of job would be a contractor who is sent to various sites to do contract repair work in confined spaces or a pest control applicator who might enter crawl spaces to apply pesticides.

A.5.1 Although a permit should be issued for all confined space entries according to this guide, this is not to imply that all confined spaces are permit-required confined spaces (PRCSs) as defined by OSHA. There is a difference between a PRCS under OSHA and a confined space that has been issued a permit.

This guide uses the terms confined space and confined space entry for all spaces that meet the definition of confined space, regardless of hazard. The purpose is not to supplant other definitions or regulatory requirements but to clarify and simplify the terminology so that the recommendations contained within this guide can be more easily applied to all industries and situations it is intended to reach.

A.6.4.2(3) Training, competencies, and PPE are addressed in Chapters 11 and 12; the guidance given there should be used to analyze the hazards and assess the risk.

A.7.3.3.3 Colorimetric detector tubes visibly change color when chemical reactions occur between the air contaminant and the substance in the detector tube. Because the amount of color change is proportional to
the concentration of the air contaminant, a quantitative measurement can be obtained. There are approximately 500 different air contaminants that can be measured with detector tubes. Although gas monitors have replaced detector tubes for common air contaminants, detector tubes fill a void for specific chemicals in which alternative direct reading monitoring do not exist. Examples are chemicals such as hydrogen chloride, ozone, and phosgene.

A.7.3.4 The obvious shortcoming to this method is that laboratory analysis of the collected sample needs to be done, which even under the most ideal conditions (i.e., having a qualified laboratory onsite or nearby) can take several hours before the results are known. This type of Industrial hygiene monitoring is of value for determining air contaminant concentrations for entries that do not need to take place immediately or to assist in determining the exposure levels that would be expected for a particular type of task.

For example, stainless steel welding in a confined space creates various safety and health hazards, one of which is generating hexavalent chromium, a known carcinogen and a chemical with an OSHA expanded health standard. Industrial hygiene air monitoring can determine if the controls utilized, such as local exhaust ventilation, are effective in reducing hexavalent chromium concentrations to below the OSHA Action Level and Permissible Exposure Limit, or if the appropriate respiratory protection continues to be needed for future entries.

A.7.5.1 For example if the confined space is 12 ft deep and is 4 ft by 4 ft square and the entry is in the center of the space, the probe should be lowered to within 3-6 in. from the bottom of the space to monitor the air at that location for 2 to 3 minutes, and the readings documented. Then the space at approximately 10 ft deep should be monitored for approximately 2 to 3 minutes. This routine in continued until all levels of the space have been monitored before the confined space is entered.

A.7.5.1.1 For example, if a 12 ft probe and tube configuration is used, a minimum of 24 seconds should be allowed plus the normal response time of the instrument, typically 2-minutes, before the reading from the sensors is accepted. A best practice would be to monitor that environment at 12 ft for 2 minutes and 30 seconds before moving to the next sampling point.

Most remote sampling pumps will have a limit from how far they can sample. Diaphragm or rotary vane pumps used in portable gas detection typically have a limit of up to 100 ft probe and tube length before they are no longer effective.

A.8.2.2.1 Depending on the material to be removed, cleaning devices that utilize water or steam may be preferred. Caution may be needed when using steam to avoid overheating. Approved cleaning chemicals or combustible (non-flammable) liquids may also be used.

A.8.2.2.2 Where flammable vapors may be present, fans, blowers and eductors are usually air or steam powered. If electrically driven equipment is used it should be inspected and certified safe for use by a qualified person.

A.8.4.6 An example of this is a sweep auger in a grain bin that must be energized to move residual material from the bin. Alternative measures to provide employee protection should be to limit the speed of the auger and provide administrative and engineering controls such as a portable guardrail or kill switch to stop the auger in an emergency.

A.9.2.1 Caution is recommended when relying on natural ventilation as the sole means for implementing ventilation of a confined space. Two primary reasons support a cautious approach when considering use of natural ventilation. First, if the space is constructed with internal structure, that structure or other elements of internal configuration can interfere, impede, or divert the air circulation within the space; and, second, depending on the physical properties of the air contaminants, such as vapor density, the air circulation from natural ventilation might not effectively reach the all points in the space and effective contaminant control would not be accomplished. Incident data illustrate reliance on natural ventilation because it is readily available and requires no additional equipment; however, those data also illustrate that a false sense of security exists because the space has been “ventilated.” As a best practice, the only certain means for
achieving effective ventilation is with mechanical ventilation using well-maintained equipment, approved for the applications, installed according to best practices, and supported by frequent atmospheric monitoring to confirm the conditions.

A.9.2.2.1.4 Ventilation system bonding and grounding is of particular importance when a contaminant is a flammable vapor, gas, solid or a combustible dust. See section 9.4 for additional information on bonding and grounding of ventilation equipment.

A.9.2.2.2.1 Examples of point source contaminants can include, but not be limited to, fumes from welding or other hot work activities; vapors from solvent cleaning or degreasing; or vapors from painting or coating activities.

A.9.2.2.2 Section 9.3 describes the relationship between supply and exhaust for effectively moving air and indicates that the ratio of supplying or blowing air as compared to exhausting or capturing the air is approximately 30 to 1. For local exhaust ventilation to be effective, this performance factor means it is important that the local exhaust ventilation application be located as close to the source as possible – typically within one duct diameter. This might require an assistant within the space to be assigned to move the exhaust air-moving device or its attached flexible ducting as the worker moves (for example, as the welder moves within the space during welding operation the distance from the ventilation device could increase to greater than the capture distance recommended).

A.9.3.1.2 The time required for a single air change can be calculated by knowing the volume of the space and the capacity of the air-moving device, as shown by the equation below:

\[
T = \frac{V}{Q}
\]

where:

\(T\) = time (minutes)

\(V\) = volume (ft\(^3\))

\(Q\) = volumetric flow rate (ft\(^3\)/min)

A.9.3.3.1.3 When selecting and designing ventilation, it is important to recognize that the orientation (supply or exhaust) for the mechanical ventilation makes a difference. The effectiveness of both orientations is limited by the ability of the air-moving device to either push the air into the space or to pull the air from within the space. The ratio for supplying versus exhausting is approximately 30:1. Figure A.9.3.3.1.3 illustrates the impact of such limitations for both supply and exhaust ventilation. Where the air-moving device capacity is inadequate to supply air uniformly throughout the space, a condition known as short-circuiting is likely. Short-circuiting is also possible with exhaust ventilation. See A.9.5 for examples.

***INSERT FIGURE A.9.3.3.1.3 HERE***
A.9.3.3.2 An example of this condition would be for an aboveground petroleum or chemical storage tank previously containing flammable and/or toxic liquids where local environmental regulations control emissions. In this example, exhaust ventilation would be preferred to supply, and the contaminants captured by the exhaust ventilation would need to be controlled during discharge, so that the contaminants were not freely released to the outside air. For the petroleum application, it is common that the discharge would be connected to a thermal oxidizer or similar device to render the flammable vapors non-hazardous.

A.9.3.3.2.1 Axial-flow fan design includes an impeller or propeller that can act as source for ignition if the impeller gets out of alignment and contacts the fan housing. So, it is advisable when ventilating flammable vapors to either use supply ventilation or to not use an axial-flow fan design.

A.9.3.4 As noted in 9.1.3, purging uses air, steam, or an inert gas in the purging process. The most commonly used inert gases are non-flammable gases such as nitrogen, carbon dioxide, or argon.

A.9.3.4.1 For additional guidance on use of inert gases to gas-free spaces previously containing flammable liquids, see NFPA 306, Standard on the Control of Gas Hazards on Vessels, or NFPA 326, Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair.

A.9.3.4.1.3 A minimum oxygen concentration is required due to the operation of the catalytic bead-type sensor which requires oxygen to be at least approximately 16% by volume in air so that the sensor can burn the sample. Low oxygen in the sample, such as would be experienced during inerting, will yield inaccurate results for the flammable vapor concentrations. There are other suitable sensor types that do not require oxygen in the sample when detecting flammable gases or vapors or other methods for detecting flammable vapors.
A.9.4.2.3 Rolled, plastic tubing cannot be properly bonded or grounded due to the non-conductive construction and is considered less safe than typical rigid, flexible ducting if involved in a fire due to the tendency for the plastic tubing style ducting to melt. This material is also not effective when used as ducting for exhaust ventilation as it will collapse on itself due to lack of structural integrity. Because of ease of installation and cost, it is quite common in many applications. It can also be flattened during entry so that the entry path is not completely blocked by the ductwork. In spite of these advantages, the hazard evaluation is important when determining whether the plastic tubing can be used for ductwork.


A.9.4.4 For additional guidance on safe practices to control static electricity generation, accumulation, and discharge refer to NFPA 77, Recommended Practice on Static Electricity, and API 2003, Recommended Practice on Protection Against Ignitions Arising Out of Static, Lightning and Stray Currents.

A.9.5.1.1 Obstruction concerns include, but are not necessarily limited to baffles, piping and equipment, grates and screens, internal configuration (like internal structural members), sumps, sloping or uneven surfaces, and similar space characteristics. Examples of typical space configurations are shown in Figure A.9.5.1.1.

***INSERT FIGURE A.9.5.1.1 HERE***

![Figure A.9.5.1.1 Typical Space Configurations.](image)

A.9.5.1.4 Short circuiting occurs when inadequate “throw” or projection of the supply air occurs, and the supply air is exhausted before it reaches the desired location within the tank to generate the most turbulence...
which promotes the mixing and dilution of the contaminated air. Short circuiting is also possible when using exhaust ventilation. Both conditions are impacted by the limitations illustrated in A.9.3.3.1.3. Examples of this condition are shown in Figure A.9.5.1.4.

***INSERT FIGURE A.9.5.1.4 HERE***

![Diagram of short circuiting](image-url)

**SHORT CIRCUITING - EXHAUST**

**Ducting – Supply**
Ducting - Exhaust

EXHAUST VENTILATION

HEAVIER THAN AIR VAPORS ARE VENTED OUT

TO SAFE LOCATION
Local Exhaust

Figure A 9.5.1.4 [these diagrams are a start; should show supply, exhaust, local exhaust examples; should also show ventilation from top as well as from at grade (side entry) configuration]

A.9.5.3 Add case study (illustrative) example of how stratified atmospheres can impact ventilation effectiveness

A.9.5.8.2 Guidance on when ventilation for thermal protection of workers might be necessary can be obtained from the ACGIH, *Threshold Limit Values for Chemical Substances and Physical Agents*.

A.9.5.9 Purging can be used to displace high concentrations of flammable vapors from a space during the cleaning and gas-freeing stage of the process. The objective is to introduce the inert gas so that it displaces the flammable vapors to approximately the LFL for the material before introducing fresh air into the space to bring the oxygen level up to fresh air levels. Typically, the inert gas is used to displace the flammable vapor concentration to about 1% by volume in air. At this point, when air is introduced to remove the remaining vapor concentration and raise the oxygen concentration level, the flammable vapor and air mixture will not be within the flammable range (it will be at a concentration below the LFL) so there will be no danger of a fire or explosion. Typical inert gases used are carbon dioxide, nitrogen, and argon. Proper application for this process requires knowledge of the space configuration and openings and the gas selection. Carbon dioxide and argon are both heavier-than-air gases, while nitrogen is slightly lighter-than-air. Selection of the inert gas might depend on what openings are used for introducing the inert gas and how the flammable vapors are vented from the space (or captured and treated if environmental requirements prohibit emissions). The source of the inert gas can also impact the implementation of the purging process. As also noted in 9.3.4.3, purging can be used to prepare an area within a confined space (like piping or other hollow structure) or a confined space for hot work where cleaning cannot be effectively accomplished. In this application, the inert gas is used to displace the oxygen concentration to a level below that which will support combustion. It is necessary to reduce the oxygen level to below the limiting oxidant concentration (LOC), which for many petroleum-based materials is approximately 14 – 16 % by volume. NFPA 306, *Standard on the Control of Gas Hazards on Vessels*, or NFPA 326, *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair* establish a factor of safety below the LOC by requiring that the oxygen concentration be below 8% by volume or 50% of the LOC, whichever is least.
A.9.5.10.3 Examples of this condition could be: a decision to conduct entry into an inerted atmosphere: entry into a space during emergency/rescue conditions where ventilation supply air or power source may be compromised and/or unreliable.

A.10.1.2.4(3) This should include fall protection where applicable when operating around unprotected edges such as a portal. It may be very easy for the attendant to fall into a vertically-oriented space while attempting to make contact with an entrant or even more likely in the event of an emergency while trying to affect retrieval efforts. The attendant should take whatever measures necessary to avoid the hazards associated with and/or created by the emergency.

A.10.1.2.4(6) The importance of training attendants to recognize whether or not retrieval should be implemented cannot be overstated. There is a great need to assure attendants understand the implications of retrieval in certain situations. For example, if a significant fall takes place due to a interior collapse of scaffolding not related to the atmospheric hazard and the patient is complaining of numbness of the lower extremities, it may not be prudent to extract this person with the retrieval system as this could create permanent spinal injury and paralysis. The attendant should be taught to assess each emergency quickly to assure the hazards and/or patient condition necessitates rapid removal or not. Some of the considerations may include; but are not limited to; the following parameters:

1. What is the mechanism of injury (atmospheric, mechanical, etc.)?
2. What is the patient’s chief complaint (what is the injury/illness)?
3. What is the patient’s level of consciousness (talking coherently, disoriented or non-responsive)?
4. What are the current hazards (Immediate life-threatening, low-hazard or no hazards related to the emergency)?

Questions such as these can be used to rapidly perform a risk vs. benefit matrix to make the proper decisions on whether or not to retrieve in a confined space emergency where retrieval equipment is an option. If the conditions are immediately life threatening and the only choice is to actuate the retrieval system or the patient is likely to die, the retrieval is the correct response. If the patient’s condition and the hazards are not immediately life threatening, yet the patient’s condition could be worsened by retrieval, then the rescue service should be notified to respond and entry rescue may be the appropriate option.

A.10.1.2.4 (7) Implementing the emergency response system refers to making the appropriate contacts to assure rescue summons as well as those other agencies which may be appropriate. This may be as simple as utilizing an assigned radio to directly notify the rescue service and other appropriate emergency response agencies or as complex as having two attendants so that one can physically leave the scene during an emergency to initiate contact with the appropriate agencies. Regardless of the method, it should be well planned in advance so it can be orchestrated as quickly, safely, and efficiently as possible in the event of an emergency. Simply calling 9-1-1 does not assure an appropriate response to confined space emergencies in a timely manner. The attendant should be ready to summon help in the event of an emergency regardless of whether or not non-entry rescue (retrieval) is appropriate.

A.10.1.3.4.1 Tier 1 responses usually involve those spaces not commonly addressed by Federal standards. While these entries may not require rescue capability of any sort, it is recognized that medical emergencies occurring within these spaces may create a difficult rescue. It is important that organizations recognize this potential through an assessment of each planned work activity to determine the need for a rescue capability. If the need exists, the organization should further assess resources for a qualified rescue capability appropriate to the anticipated emergency. All rescue response should be available and capable of responding in a timely manner. This should be assured prior to making entry into spaces requiring Tier 1 response.

A.10.1.3.4.2 Tier 2 response generally allows a singular Rescue Team to address multiple entries, assuming response times are appropriate to the anticipated emergencies. Pre-incident planning should dictate whether or not a Rescue Team can provide service for multiple spaces. In any case, adequate communications should exist between entry/egress points and the rescue service to assure that an emergency in one space will facilitate immediate suspension of all other entries and exit of all workers from those spaces.
A.10.1.3.4.3 With immediately life-threatening hazards, the goal for patient access should be commensurate with the need for life saving measures associated with cardio-respiratory arrest. It is generally considered that, without intervention, cessation of heart function in normal conditions will yield at least some irreversible brain death within four to six minutes. This is the reasoning behind the recommendations associated with Tier 3 response, especially where non-entry rescue (retrieval) is not possible.

Pre-incident emergency action planning should always serve as the basis for response mode logistics. While Tier 3 response generally suggests a singular dedicated Rescue Team for a singular space, entries may exist that would allow a singular Rescue Team to address multiple entries in the same immediate area. The following criteria should exist before decisions of this type are made:

1. A walking transition time between the most remote two entry/egress points is within one-minute,
2. The team is able to divide its forces so that at least one rescuer is located at each entry/egress point with patent communications to allow immediate notification of other team members in the event of an emergency, or where there are multiple entry sites in close proximity, the rescuer is able to monitor a number of sites.
3. All rescue equipment needed to perform entry rescue is setup within a suitable distance at each entry/egress point or multiple points and every team member possesses the appropriate Personal Protective Equipment to make immediate entry,
4. In the event of an emergency at one entry/egress point, operations at the remaining entry/egress points may be terminated immediately so that the entrants exit the space and the Rescue Team member attending that entry/egress point can respond to the emergency at another point within one minute to begin or assist in rescue operations.

This is not usually possible with multiple simultaneous entries monitored by only one team since Tier 3 entries are associated with immediate life-threatening emergencies that would require extremely rapid intervention.

A.10.1.3.5 Not all contaminants are readily measured on all atmospheric monitor configurations. Gas monitors used for confined space entry typically monitor only two or three toxic gases. If an atmosphere is unknown it should be assumed to be IDLH and appropriate precautions taken prior to entry.

If rescue response is required, rescuers should assume the worst and provide maximum protection for rescuers based on suspected hazards. Appearances may be deceptive. For example; Scale (this may be rust, a hard mineral coating that forms on the inside of boilers, kettles and other containers in which water is heated, or other encapsulating build-up) may entrap residual products that are in a tank. A worker is cleaning the tank interior and, in the process, scrapes a scale bubble containing a contaminant that creates a temporary IDLH environment. The worker is incapacitated as a result. Rescue personnel respond and monitor the space to find the atmosphere clear. The decision is made to enter the space without atmosphere supplying respirators. The first rescue entrant steps on a scale bubble and releases the same contaminant that incapacitated the first victim. This is a mistake that rescuers cannot afford to make. (See Figure A.10.1.3.5.)

***INSERT FIGURE A.10.1.3.5 HERE***
Mitigate Risk/Hazard Prior to Entry

Mitigate Risk/Hazard Prior to Entry

- Atmospheric Monitoring
- Ventilation: dilution/exhaust
- Respiratory Protection

Energy Isolation
Purge/Block/Bleed

- Free Space
- Teather Rescuer
- Coffer Dam/Rescue Tube

Retrieval Systems
Fall Protection
Controlled Descent
Anchor Points

Energy Isolation
Retrieval System
Associated Rescue Tools
or Devices to Free
Rescuer

Energy Isolation
Communication Devices
Lighting, Heat or Cooling
Space

Determine and Select Appropriate PPE

Determine and Select Appropriate Patient Care

Initiate Tactical Worksheet
A.10.1.3.5.1 A disregard for rescuer safety can not only inhibit rescue of the ill or injured persons to which they originally responded, but may place fellow rescuers at risk by compelling them to go after their incapacitated fellow rescuer. Rescuers should observe this cardinal rule: Don’t become a victim!

A.10.2.1 The term Authority Having Jurisdiction, in this case, is meant to apply to whomever may be responsible for the spaces to which the rescue service responds. It generally implies the person, persons, or organization who acquired the rescue service to act as response for the entry or entries taking place. This is independent of where the rescue service is from since there may be many options including in-plant teams, outside municipal response services and privately-owned contracted services.
A.10.2.2 The review team may include the confined space Entry Supervisor.

A.10.2.3.1 The performance evaluations should serve as a basis for determining whether the current training has prepared the rescue service to function at the established level of capability under abnormal weather conditions, extremely hazardous operational conditions, and other difficult situations.

A.10.4.1 It should be recognized that each rescue response should be based on the circumstances surrounding the incident. Standard Operating Procedures should provide a typical approach while allowing latitude for independent judgment. While the incident manager should be held accountable to justify any divergence, this ability to vary allows adjustment to plans to meet changing needs.

A.10.6.5 Analyzing critical areas related to the incident may be the single most important part of any emergency. Emergency response agencies generally refer to this process as “Size-Up”. Having a solid, well thought out action plan can positively aid in determining if an incident can have a pre-forecasted result, minimize harm to life and damages to property, or to expedite the process of rescuing trapped victims. Determining, evaluating and assessing of all of the circumstances helps assure the success of the rescue mission.

Information Acquisition and Management. Analysis of the potential emergency begins with managing information from the facility or space location prior to any incident. The basics of defining what takes place in the confined space is a logical place to begin this analysis.

Record all findings on a pre-plan survey or document that can be made readily available on a moment’s notice. Today’s technological equipment makes information readily available and portable to the incident location. The use of tablets, smart phones and lap top computers aid to facilitate and implement an action plan. Diagrams, plans, blueprints and other means of drawings can be created on paper or computer programs and software may be utilized to aid in managing and inputting ever changing information. Once the information is tabulated, it should be reviewed for accuracy and put on a schedule to be appropriately reviewed so it may be kept current and precise. Technological equipment that is not approved for use in classified areas may present sources of ignition in situations where flammable vapors may be present.

A solid base of written or text type information can be obtained from the facility or owner of the space such as chemical and manufacturing data, Material Safety Data Sheets, the type of processes the space may be used for, dates and times the space may be occupied, size and location of vessels and confined spaces, facility floor plans or site surveys, prior incidents, previous permit entries, and the number of workers in and around the space, or type of work being performed routinely in and around the space.

Hazard and Risk Analysis. Many factors should be taken into consideration when performing an analysis on a confined space. An in depth hazard and risk analysis may include; but not limited to; what type of process takes place in the space and or, what type of work will be done within the space that is not customary to its original process? How does the surrounding environment have an effect on the space and or, are there constant changes in the external environment over periods of time that add layers of complexity that require special attention? What type of work is normally, and potentially performed that may require the entrant/s to evaluate the internal environment of the space on a timed basis including temperature exposure and temperature changes, existing or changing atmospheric conditions, or length of work being performed? Will atmospheric monitoring devices be required or will chemical specific monitoring devices be required? Will the requirement of specialized breathing apparatus be needed to work within the space? Are there biological concerns or radioactive concerns while working inside the space?

Will the work being performed in the space change the internal environment and or will it have an effect on the space’s immediate external surrounding areas or adjacent processes? Are there concerns with equipment, tools, and machines working in the space either repairing or cleaning? Will equipment being used in the space effect the current atmosphere? What type of ventilation is needed to sustain a non-hazardous atmospheric condition? Will the physical dimensions of the space have an effect on the entrants, and will the physical and
mental health condition of the entrant/s pose a potential hazard to work safely inside the space? These and other considerations are covered more thoroughly in chapter six of this guide.

Environmental Considerations. Are low floor level liquids a concern, are there overhead obstructions or utility piping or cables a concern? Will Personal Protective Equipment (PPE) be required to work within the space? Does the space span over many levels or floors? Is there a potential for weather to effect the outcome of an incident within the space? Is uncontrollable ambient noise a factor? Is there a potential for vibrations within and adjacent to the space? Does vehicle traffic or heavy equipment, or other processes effect the space? Does the potential for animal and insect interaction pose a concern to the entrant/s within the space?

Energy Isolation Considerations. Where are the control devices located for power and potential sources of energy for the internal and external areas of the space? How long will it take to verify that these sources can be locked and tagged? Can all sources be mechanically controlled, blocked or blanked or does the space require personnel to be committed to a location to physically control a device?

Will it take a specialty person or special group of individuals or maintenance workers to secure energy sources? How long will it take to assemble a group to secure energy sources within the facility or location of the space? Do these individuals work on premises or off site of the space location? Is there a considerable time factor associated with this specific task of securing energy sources? What is the means of delivering a message that an incident has occurred in a confined space to personnel that will be required to respond?

Communications Considerations. Can entrants, attendants or rescuers communicate effectively throughout the space or is there a need for a more complex system requiring radios or communication systems? Will these communication devices work below grade and span the working length and levels of the space?

Work History and Physical Attributes of the Space. How often has the space been entered into, and is there prior documentation to previous entries? Where are previous entry documents or permit entries located and are they relevant to potential emergencies? Does the configuration, length, or design of the space put limitations on the use of rescue equipment or require specific type of equipment? Does the size, location, or height of the entry point pose challenges for entrants/rescue personnel and rescue type equipment?

Capability of Non-rescuers (Entrants, Attendants, Entry Supervisors). What is the level of training of the individuals working within the space? How often is an emergency plan reviewed and when was the last time a training session was performed? Is there a safety plan in place for the space?

Rescue Capabilities – On-site and Outside Resources. Are there emergency trained professionals on location of the space or is an outside agency or local fire/rescue department tasked as a resource? What is the time frame for a Rescue Team of on-site employees to assemble? What is the time frame for an outside resource to arrive on location of the space? What is the level of training of the outside resource? Is the outside resource trained to the ALS medical level? Where is the closest Medical Facility that can facilitate a patient that has suffered a potential confined space emergency or hazardous materials exposure?

Does the owner of the space have an emergency plan or require notification or contact with specialized agencies such as the FBI, CIA, ATF, Military, local and state police, or local security due to restricted areas, processes or access restrictions?

Does the space require different levels of emergency response depending on the type of process or work being performed in the space? Does the time of day or day of week require different levels of emergency response?

A.10.7.2 Personal Protective Equipment (PPE). As an example, rescuers may choose either Class C Airline respirators (Supplied Air Respirators or SAR) or Self-contain Breathing Apparatus (SCBA) to satisfy the requirements of rescuers to utilize Atmosphere Supplying Respirators for respiratory protection in potentially hazardous atmospheres. However, they should also consider the advantages and disadvantages of each relative to the rescue objective.
In this case, the limited duration of air supply in extended rescue operations requiring spinal immobilization or difficult extraction might preclude the use of SCBA. However, significant entanglement hazards within a space might make the use of SAR impossible. The portal shape and size might be restrictive to the use of SAR so that entry may be made while wearing the apparatus in the manner intended by the manufacturer vs. attempting to remove bulkier SCBA that won’t otherwise fit through the portal and exposing the rescuer to the potential of dropping the apparatus, potential pulling the facepiece off and exposing the rescuer to contaminants.

The most effective means of making these and other decisions is through the use of pre-incident rescue action planning and practice of those plans on representative or actual spaces. Only through careful consideration of the circumstances and testing of the plan may PPE choices made by the Rescue Team be validated.

A.10.9.1 In general confined space Rescue Teams are composed of no less than six members in order to perform all the required functions listed. However, the size and capability of a team required to perform a specific rescue will depend on many factors including; the condition of the patient, the size and shape of the space, size of the access opening and the hazards present. The positions described in (1)-(4) of this paragraph describe the minimum number of exclusive roles that should be filled to perform an entry type rescue. Many rescues will require additional functions such as ventilation, rope rescue support or communication that will require additional trained resources. Pre-incident planning of representative spaces is a key element to determining the size and capabilities of the team. Table A.10.9.1 can be of assistance in understanding the correlation of team size relative to the conditions of the space and anticipated rescue methods;

**Table A.10.9.1 Confined Space Rescue Team Staffing Decision Table**

<table>
<thead>
<tr>
<th>IF</th>
<th>THEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>The permitted confined space has NO obstructions OR entanglement hazards AND the entrant IS properly attached to a retrieval system.</td>
<td>One rescuer is needed to perform a non entry assisted rescue from the outside</td>
</tr>
<tr>
<td>The permitted confined space has obstructions OR entanglement hazards, the entrant IS NOT attached to a retrieval system, NO potential atmospheric hazards exist AND vertical rope rescue IS NOT required.</td>
<td>Three rescuers are needed to perform an emergency entry to perform rescue</td>
</tr>
<tr>
<td></td>
<td>1 edge manager</td>
</tr>
<tr>
<td></td>
<td>2 person entry team</td>
</tr>
<tr>
<td>The permitted confined space has obstructions OR entanglement hazards, the entrant IS NOT attached to a retrieval system, NO potential atmospheric hazards exist AND vertical rope rescue IS required.</td>
<td>Five rescuers are needed to perform an emergency entry to perform rescue</td>
</tr>
<tr>
<td></td>
<td>1 Edge Manager</td>
</tr>
<tr>
<td></td>
<td>2 Rescue System Operators (with assistance from plant personnel)</td>
</tr>
<tr>
<td></td>
<td>2 Person Entry Team</td>
</tr>
<tr>
<td>The permitted confined space has obstructions OR entanglement hazards, the entrant IS NOT attached to a retrieval system, potential atmospheric hazards exist, SAR CANNOT be used (requiring SCBA) AND vertical rope rescue IS NOT required.</td>
<td>Five rescuers are needed to perform an emergency entry to perform rescue</td>
</tr>
<tr>
<td></td>
<td>1 Edge Manager</td>
</tr>
<tr>
<td></td>
<td>2 Person Entry Team</td>
</tr>
<tr>
<td></td>
<td>2 Person Back Up Team</td>
</tr>
<tr>
<td>The permitted confined space has obstructions OR entanglement hazards, the entrant IS NOT attached to a retrieval system, potential atmospheric hazards exist</td>
<td>Six rescuers are needed to perform an emergency entry to perform rescue</td>
</tr>
</tbody>
</table>
The permitted confined space has obstructions OR entanglement hazards, the entrant IS NOT attached to a retrieval system, potential atmospheric hazards exist, SAR CANNOT be used (requiring SCBA) AND vertical rope rescue IS required.

An employee activates a fall protection system and is suspended in a harness requiring rope rescue.

A.10.9.1(1) Entry team size will be driven by the size of the space and degree of difficulty of the rescue operation. While at the operations level the entry team size should be no less than two members, some spaces requiring technician level resources may be only large enough to accommodate a single rescuer. Some incidents may involve large spaces or complex rescue operations that will require several rescuers to enter the space.

A.10.9.1(2) The intent of the backup team is to quickly and effectively remove an incapacitated rescuer who is unable to perform self-rescue. In general this requires no less than two members immediately available to enter the space equipped with the same or greater level of PPE as the entry team. The size and capability of the team should be driven by the specific conditions encountered and the scope of the rescue operation.”

A.11.2.1.2 It should be understood that reaching into a confined space with a monitor probe to measure the atmosphere (or other similar activity such as taking a sample of residue through a small opening) should not be considered as “entry” into the space.

A.11.3.2.7 When the employer's confined space program allows attendant entry for rescue, attendants who have been trained and properly equipped for entry rescue operations may do so, only after being relieved by another qualified attendant. Rescue by the primary attendant should be the last solution, as information they
have will be critically valuable in assisting the designated Rescue Team when assessing what might be the condition in the space that contributed to the emergency.

A.11.3.2.8 Approved assigned duties may include, but are not limited to, checking gas testing instruments to assure they are positioned and working as intended; watching for outside activity that might affect entry operations, assisting in replacing blowers and ductwork for ventilation if moved during entrant entry/exit, monitoring air supply, etc.

Duties that are not allowed include, but are not limited to, any task where direct contact with entrants could be lost, like going to get a tool from truck, performing unauthorized activities, taking a smoking break, etc. as well as any task for which the attendant is not assigned or qualified. Under some circumstances two attendants may be placed outside the space instead of a single attendant to ensure that if there is a need for one attendant to take a break, that there is at least one attendant still dedicated to the space. This would allow some of the above listed duties to be accomplished.

A.11.4.1.2 Confined space related work practices and activities are typically conducted in compliance with legal regulations and/or industry and facility requirements. For example, in the United States, OSHA requires the employer to designate an Entry Supervisor to supervise work that involves entering Permit Required Confined Spaces, including those with inert atmospheres. Industry practices and facility programs are generally consistent with these legal requirements.

A.11.4.2 It is common practice in industry that the Permit Issuer and the Entry Supervisor are often different persons especially when contractors are doing the entry work in a manned facility. In such cases, the Permit Issuer may be a facility employee who initiates the permit according to facility confined space program requirements. Once the permit requirements are met, the issuer and the Entry Supervisor (and tester) then sign off on the permit. The Entry Supervisor controls the entry and operations in accordance with the permit requirements and can cancel the permit if the conditions change so that the permit requirements are no longer met. Where a single entity has total responsibility for the entry and work, the Permit Issuer and Entry Supervisor may be the same person.

A.11.4.2.4 If unacceptable risks develop within or outside the space exceeding those authorized by the permit, the Entry Supervisor should cancel the permit and have entrants vacate the space. The Entry Supervisor should not allow entrants to reenter the space until the hazards are abated and risk is reduced to an acceptable level. Atmospheric testing within the space should be completed before an entry permit may be reissued.

A.11.4.2.11 Before implementing entry or work permits, Entry Supervisors should require that internal combustion and non-approved electrical powered equipment (including, but not limited to, automobiles, trucks, vacuum trucks, forklifts, fans, educators, pumps, welding machines, and compressors) are restricted to designated safe areas (such as outside the tank dike area) away from sources of flammable vapors, by notation on the permits and, if necessary, by posting signs and/or barricading access to the area.

Entry Supervisors should be aware that approved diesel powered internal combustion equipment is preferred to using gasoline or gas powered equipment.

Entry Supervisors should be aware that the use of steam or air operated equipment is preferred to using electric or internal combustion powered equipment.

Entry Supervisors should assure that all electrical equipment and appurtenances have been inspected and approved by a qualified person to determine that they are “explosion proof” or protected so as to not create and/or release sufficient energy to be a source of ignition.

Electrical equipment attached to and around the confined space, should be disconnected and locked or tagged out before issuing an entry permit. Such equipment and appurtenances include, but are not limited to, metering and signaling devices, alarms, sensors, overflow protection systems, cathodic protection systems, and electrical heating coils.
Depending on the potential exposures, Entry Supervisors should assure that all electrically powered cleaning and related equipment, including but not limited to, electrical powered tools, communication devices, lights and motors, used throughout cleaning operations, meets the minimum requirements of NFPA 70 for Class I, Division 1, Group D (or higher) (or Class 1, Zone 0 or Zone 1) locations. The use of any type of non-explosion proof electrical equipment shall be prohibited unless specifically permitted under an authorized job site procedure or by issuance of an entry, hot work or safe (cold) work permit permitting such use.

Entry Supervisors should assure that bonding and grounding cables and clamps are inspected by a qualified person to assure good condition, adequacy and integrity prior to the start of work and periodically, as necessary, during the work.

Entry Supervisors and qualified persons should ensure that equipment capable of creating an ignitable spark upon disconnection is properly bonded and grounded (earthed) before issuing permits (see API 2003, API 2219 and NFPA 77 for additional information).

A.11.4.3.1 NFPA and other training entities offer training to prepare for the American Petroleum Institute Entry Supervisor certification exam. The Marine Chemist program run through NFPA also certifies individuals who are working on marine vessels.

A.11.5.1.1 It is common practice in industry that the Permit Issuer and the Entry Supervisor are usually different persons (especially when contractors are doing the entry work in a location with facility personnel). In such cases, the Permit Issuer may be a facility employee who initiates the permit according to facility confined space program requirements. Once the permit requirements are met, the issuer and the Entry Supervisor (and tester) then sign off on the permit. The Entry Supervisor controls the entry and operations in accordance with the permit requirements and can cancel the permit if the conditions change so that the permit requirements are no longer met. Where a single entity has total responsibility for the entry and work, the Permit Issuer and Entry Supervisor may be the same person.

A.11.5.2.7 Such changes might include the owner/operator’s reclassification of the confined space, other non confined space related activities affecting the confined space operations, emergencies within and outside the space, changes in weather affecting the work, unauthorized persons or equipment entering the work area or confined space, etc.

A.11.82.10 Equipment may include, but is not limited to the following:

1. Testing and monitoring equipment and calibration materials.
2. Ventilating equipment.
3. Communications equipment.
4. Personal protective equipment and respiratory protection.
5. Lighting equipment.
6. Barriers, guards, warning signs and shields.
7. Equipment, such as ladders, needed for ingress and egress.
8. Rescue and emergency equipment needed to comply with the confined space program requirements (except to the extent that the equipment is provided by rescue services).
9. Any other equipment necessary for authorized work in and around the confined space.

A.11.82.13 The owner/operator should develop should retain each cancelled entry permit for at least one year to facilitate the review of the confined space program. Any problems encountered during an entry operation shall be noted on the pertinent permit so that appropriate revisions to the program can be made.

A.11.9.2.6 The contractor should obtain copies of the owner/operators evaluation of the confined space(s) involved including, but not limited to the MSDS’s covering hazardous materials and chemicals in the confined space and in the area of the job, the isolation (Lockout/Tagout) procedures, required and available fire protection equipment, etc.
A.11.9.2.7 The contractor should provide the following documentation to the Owner/operator (and the subcontractor should provide the same to the contractor):

1. General safety policies and procedures
2. Confined Space Entry Program
3. Permit requirements for entry, hot and cold work
4. Qualifications or training certification for all involved personnel.
5. Hot Work and cold work procedures where flammables may be present
6. Past work involving confined spaces
7. PPE and other equipment, materials and chemical to be provided for use on the job
8. Emergency procedures or rescue services to be available
9. A statement indicating that they have never been cited by state or federal safety compliance agencies for any confined space safety infraction. If they have been cited previously, a copy of the citation and a statement from them describing the corrective action they have instituted shall be provided. (Reference 29 CFR 1910.146(C)(9):
10. In addition to complying with the permit space requirements that apply to all employers, each contractor who is retained to perform permit space entry operations should
   a. Obtain any available information regarding permit space hazards and entry operations from the owner/operator;
   b. Inform the owner/operator of the permit space program that the contractor will follow and of any hazards confronted or created in or around the confined space.

A.11.9.2.13 Equipment may include, but is not limited to the following:

1. Testing and monitoring equipment and calibration materials.
2. Ventilating equipment.
3. Communications equipment.
4. Personal protective equipment and respiratory protection.
5. Lighting equipment.
6. Barriers, guards, warning signs and shields.
7. Equipment, such as ladders, needed for ingress and egress.
8. Rescue and emergency equipment needed to comply with the confined space program requirements (except to the extent that the equipment is provided by rescue services).
9. Any other equipment necessary for authorized work in and around the confined space.

A.11.9.2.16 Contractors should retain cancelled entry permits for at least one year to facilitate the review of the confined space program. Any problems encountered during an entry operation should be noted on the pertinent permit so that appropriate revisions to the program can be made.

A.11.9.2.17 When a contractor arranges to have a sub-contractor perform work that involves confined space entry, the contractor should

1. Inform the subcontractor that the workplace contains confined spaces and that entry is allowed only through compliance with an approved confined space program
2. Appraise the subcontractor of the hazards and the owner/operators experience with the space.
3. Apprise the subcontractor of any precautions or procedures that have been implemented for the protection of employees in or near permit spaces where contractor personnel will be working;
4. Coordinate entry operations with the contractor and owner/operator when owner/operator and contractor personnel will be working in or near the confined space.
5. The subcontractor should debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.
A.11.10.1 Ventilation methods may include, but are not limited to, displacement, dilution, flushing, inerting, purging or other appropriate methods of removing or controlling a hazard atmosphere. Note: It is not advisable to use steam to remove a flammable atmosphere due to the potential for a static discharge.

A.11.10.2.3 Permit Issuers should assure that appropriate requirements for safe ventilation operations and personal protective equipment are documented on the entry permit and implemented.

Permit Issuers should ensure that acceptable atmospheric levels are documented before ventilated spaces are entered

Permit Issuers should provide for and Entry Supervisors should assure that continuous forced air ventilation is provided while confined spaces are occupied (even if initial and subsequent atmospheric test results are acceptable) where required by the confined space program.

Entry Supervisors should assure that air quality is monitored as often as feasible, and if necessary use appropriate additional measures to maintain exposures within acceptable levels

A.11.10.2.8 Where required, exhausted atmosphere should be captured, disbursed and treated, as appropriate.

A.11.10.2.12 For example, Gas Tester should take readings away from the incoming air flow and in areas where the sample is representative of the air where personnel are located.

A.11.11.1 Isolation should be achieved by approved methods, including but not limited to, blanking, blinding, double block and bleeding, misaligning or removing sections of lines, pipes, or ducts, lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical, hydraulic, electrical, vapor, gas, engulfment, chemical or steam linkages and connections that could create hazards.

A.11.11.2 Authorized personnel to be notified may include, but are not limited to owner/operators, contractors/subcontractors, Permit Issuers and Entry Supervisors.

A.11.12.1 Worker operations and duties may include, but are not limited to, moving and staging equipment and materials for use within or outside the space; conducting non-entry required hot and/or cold work; assisting Gas Tester, attendants, ventilation and isolation personnel with activities outside of the confined space; manning barriers to prevent unauthorized entry into the surrounding area; acting as a fire watch during hot work operations or when ignition sources are present in the area.

A.12.5 Table A.12.5 is an example of a identification template.

**Table A.12.5 Identification of Confined Spaces at [Facility/Company]**

<table>
<thead>
<tr>
<th>Name and Location</th>
<th>Size/Configuration</th>
<th>Normal Contents or Process</th>
<th>Typical Reasons for entry</th>
<th>Safety Hazards</th>
<th>Health Hazard/Potentially Hazardous Atmosphere</th>
<th>Adjacent Hazards</th>
<th>Notes</th>
</tr>
</thead>
</table>

A.12.7.1 There is no hard and fast rule about what levels should be allowed for entry into confined spaces where toxic contaminants may be present. OSHA Permissible Exposure Limits exist for several hundred air contaminants and these levels must not be exceeded. The National Institute for Occupational Safety and
Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) also have established occupational exposure limits for many contaminants. When working in confined spaces, it is often standard practice to set meter alarm levels at one half or less of the allowable or recommended exposure limits (called the “action level”). Gas meter manufacturers may also recommend alarm limits based on the contaminant properties and based on the accuracy of the measurement.

A.12.14.3 A sample training certification form and alternate tracking are provided in Figure A.12.14.3.

Figure A.12.14.3 Confined Space Entry Training Certification and Alternate Tracking Option

Employee Name

Job Title

Date trained

Trainer Signature

This employee was trained as (entrant, attendant, Entry Supervisor, etc). 

Training source (if outside trainer)*

Date of In-house Training on Policies and Equipment

In-House Trainer Signature

(Recommend attach syllabus or other relevant training materials)

Alternate Option for Tracking Training

<table>
<thead>
<tr>
<th>Employee Name</th>
<th>Training Competency (Entrant/Attendant/Entry Supervisor, Gas Tester etc)</th>
<th>Date Trained and by Whom -Generic or Outside source*</th>
<th>Date Trained on In-House Policy and Equipment</th>
<th>Signature of In-House Trainer</th>
</tr>
</thead>
</table>

Contents of training (attach if possible):

*Note-If an outside training source is used, the training must include the facility’s equipment and policies.

A.12.18 Items to be considered as part of the fitness for duty may include:

(1) Hot and cold temperature changes
(2) Unstable surfaces
(3) Areas which require climbing up or down
(4) Audible alerts and communication
(5) Tight work spaces
(6) Capable of wearing required PPE

A.16.1 The optimal method of preventing occupation illnesses, injuries and fatalities is to “design out” the hazards and risk; thereby, eliminating the need to control them during work operations. This approach involves the design of tools, equipment, systems, work processes and facilities in order to reduce or eliminate, hazards associated with work. (Young-Corbett, 2011)

A.16.5.4 Risk Assessment Process Example (to accompany Chapter 6). Review each identified hazard and determine what the probability of an incident occurring and the severity of the incident if it does occur. The assessment may be qualitative or quantitative (numerical). Explanations of each level of within the probability and severity scales are given in Table A.16.5.4(a), Table A.16.5.4(b), and Table A.16.5.4(c).
### Table A.16.5.4(a) Risk Assessment Matrix

<table>
<thead>
<tr>
<th>Probability</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unlikely</td>
<td>Seldom</td>
<td>Occasional</td>
<td>Likely</td>
<td>Frequent</td>
</tr>
<tr>
<td>1</td>
<td>Negligible</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Minor</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Moderate</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Critical</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>Catastrophic</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

### Table A.16.5.4(b) Severity

<table>
<thead>
<tr>
<th>Severity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible</td>
<td>1 First aid or minor medical treatment</td>
</tr>
<tr>
<td>Minor</td>
<td>2 Minor injury, lost work day</td>
</tr>
<tr>
<td>Moderate</td>
<td>3 Moderate injury resulting in lost work days</td>
</tr>
<tr>
<td>Critical</td>
<td>4 Permanent or partial disability</td>
</tr>
<tr>
<td>Catastrophic</td>
<td>5 Death or permanent total disability</td>
</tr>
</tbody>
</table>

### Table A.16.5.4(c) 1 Probability of Occurrence

<table>
<thead>
<tr>
<th>Probability</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent</td>
<td>5 Expected to occur in most circumstances.</td>
</tr>
<tr>
<td>Likely</td>
<td>4 Will probably occur in most circumstances.</td>
</tr>
<tr>
<td>Occasional</td>
<td>3 Occurs sporadically, not regularly.</td>
</tr>
<tr>
<td>Seldom</td>
<td>2 Unlikely but could occur at some time.</td>
</tr>
<tr>
<td>Unlikely</td>
<td>1 May occur only in exceptional circumstances.</td>
</tr>
</tbody>
</table>

Once the probability and severity are determined, use the matrix to find the level of risk. The above matrix is an example where the different colors indicate the levels of risk. Below is an explanation of each color for this matrix.

Red: Activities in this area are considered unacceptable levels of risk, including catastrophic and critical injuries that are highly likely to occur. Supervisors should consider whether they should eliminate or modify activities that still have this rating after applying all reasonable risk management strategies.

Yellow: Activities in this area are considered critical and may cause severe injury, major property damage, significant, financial loss, and/or result in negative publicity for the organization and/or institution.
Green: Activities in this area are considered minor or negligible hazards that present a minimal threat to the safety, health and well-being of participants. They contain minimal risk and are unlikely to occur. Organizations can proceed with these activities as planned and handle through routine procedures.